

Article

Dynamics of Regulatory Capital and Bank Performance in Nigeria Using the Driscoll–Kraay and Fixed Effects-2SLS Approaches

Fasiu Idowu Adesina, Ochei Ailemen Ikpefan and Benjamin Ighodalo Ehikioya * 

Banking and Finance Department, Covenant University, Ota 112104, Nigeria

* Correspondence: benjamin.ehikioya@covenantuniversity.edu.ng

Abstract

This study examines the effect of regulatory capital requirements on bank performance in Nigeria. The study utilises panel data from the audited annual reports and accounts of 13 deposit money banks, the Central Bank of Nigeria and the Nigerian Exchange Group to investigate whether stronger capitalisation improves accounting and market-based performance. This was cross-validated with data from the World Development Indicators (WDI) from the World Bank. Market data required to compute Tobin's Q , including market capitalisation and share prices, were gathered from the Nigerian Exchange Group (NGX). The study employs two-way fixed effects with Driscoll–Kraay standard errors and the fixed-effects–Two-Stage Least Squares (FE-2SLS) techniques to analyse panel data from 2007 to 2024 and address unobserved heterogeneity, cross-sectional dependence and endogeneity between capital and performance. Banks' performance was measured using return on assets and Tobin's Q , which are accounting-based and market-based performance measures. The results indicate that capital adequacy, which explains prudential requirements, significantly enhances bank performance. The FE-2SLS estimates provide consistent evidence, strengthening confidence in the relationship between capital and profitability. The study confirms that while non-performing loans and inflation negatively affect profitability, liquidity, bank size, board independence and GDP growth improve bank performance. These findings are consistent across both accounting and market-based performance measures and conclude that stronger capital can enhance bank profitability. Thus, regulators should continue to execute policies that ensure capital adequacy translates into financial performance. In addition, policymakers and bank managers should strengthen governance structures and enhance risk management strategies to improve banks' asset quality for long-term financial performance.



Keywords: bank performance; regulatory capital; liquidity; Nigeria banks; Basel III; regulator; bank recapitalisation

JEL Classification: E58; G3; G21; G32

Academic Editor: Thanasis Stengos

Received: 23 July 2026

Revised: 19 August 2026

Accepted: 20 August 2026

Published: 1 September 2026

Copyright: © 2026 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

1. Introduction

The global financial crisis of 2007/8 revealed the state of the banking system in different countries worldwide. The speed and ease with which the crisis affected the banking industry have been the subject of extensive debate, particularly among economic agents concerned about the banking system's ability to withstand shocks, continue its core objective of financial intermediation, and to maximise shareholders' returns. The strength of a country's

banking sector is essential for overall financial resilience and sustainable economic growth, especially in emerging economies with underdeveloped capital markets (Salim et al., 2023; Olowofela et al., 2025). Moreover, banks with adequate capital may advance sustainable development goals through sustainable lending that promotes environmental, social and governance indicators. Salim et al. (2023) state that adequate capital facilitates sustainable investment lending, thereby driving economic growth. Incidentally, in emerging economies, the banking industry remains one of the most vulnerable sectors due to the inherent risks associated with lending and other financial intermediation activities (Ogunwale & Areghan, 2024; Mankart et al., 2020). To mitigate the consequences of lending risks, boost public confidence, and support key investments, particularly in infrastructure, the regulator aims to ensure that the banking sector is adequately capitalised. However, despite regulatory measures aimed at ensuring capital adequacy in Nigerian banks, the sector continues to grapple with weak returns on assets, poor earnings, poor asset quality, liquidity crises, and the capacity to support capital projects. Since the 2007 financial crisis, many banks have struggled to meet capital requirements, leading to financial distress, forced acquisitions, and regulatory interventions.

The capital adequacy requirements are designed to serve as a financial buffer, reducing the likelihood of bank failures and financial crises (Osunkoya et al., 2023; Sain & Kashiramka, 2024). The Basel Accords, particularly Basel I, II, and III, have established global minimum capital requirements to enhance banks' resilience to economic shocks (Basel Committee on Banking Supervision, 2021). Moreover, while most countries, including Nigeria, have adopted these frameworks, the efficacy of the regulatory capital ratio in enhancing performance by serving as a financial buffer to absorb unforeseen financial losses, build trust with depositors, and lower default risks, particularly in emerging markets, remains a subject of debate (Igbinosa & Naimo, 2020). Also, despite the regulatory efforts of the Central Bank of Nigeria (CBN) to enforce capital adequacy requirements, the Nigerian banking sector has experienced episodes of instability with financial distress and, in some cases, bank failures (Aroghene, 2022). For example, the 2009 bailout by the CBN and the banking sector's inability to finance large capital projects are clear indications of a weak banking system (Sanusi, 2010). This weakness in the system has also led to continuous regulatory reforms aimed at ensuring superior returns on assets, earnings, and long-term survival, as the sector suffers from periodic crises that continue to erode public confidence.

Capital adequacy is a regulatory strategy designed to ensure that banks are sufficiently strong to withstand shocks, lift public confidence, and protect depositors from losses (Yitayaw et al., 2023). However, given the regulatory capital requirements and the incidence of bank distress in Nigeria, what is the impact of the capital adequacy ratio on the financial performance of deposit money banks? Does regulatory capital create measurable accounting and market value for Nigerian banks after controlling for bank heterogeneity, macroeconomic conditions, potential reverse causality, and cross-sectional dependence? Does the capital adequacy ratio matter in the long-term survival of the banking sector? What does this study imply for Nigeria's current recapitalisation and Basel III regulatory framework? The relationship between capital requirements and bank performance is a relevant aspect in the literature for policymakers and other stakeholders, given the role of the banking sector in the economy.

Recent studies have provided useful but conflicting evidence on this issue, which may be due to limitations in variable measurement, estimation methodology and regulatory relevance. For example, Obadimu and Oboh (2024), using 10 Nigerian deposit money banks over 2011–2020, found that CAR had an insignificant effect on financial performance, whereas more recent evidence by Akande (2025), based on 2014–2023 data, reported a positive and significant effect of CAR on return on equity (ROE). This contradictory evidence

indicates that the effect of regulatory capital on Nigerian bank performance remains empirically unsettled. Similarly, recent studies in Nigeria have concentrated on bank stability and accounting measures, particularly ROA and ROE (Obans et al., 2026). Consequently, there is limited evidence on whether regulatory capital improves market-based bank value, particularly Tobin's Q, alongside accounting profitability. This is important because a higher CAR may improve solvency and investor confidence without necessarily translating into higher accounting profitability. Furthermore, there is evidence that bank-level observations in Nigeria are subject to common shocks arising from monetary policy, exchange rate fluctuations, inflation, regulatory changes and other economic crises. Consequently, conventional FE standard errors may yield misleading statistical inference if heteroskedasticity, cross-sectional dependence or serial correlation is present. The present study addresses these gaps by estimating the effect of regulatory CAR on both ROA and Tobin's Q, controlling simultaneously for bank-specific and macroeconomic factors, using a two-way fixed-effects–Driscoll–Kraay to accommodate cross-sectional dependence, and employing FE-2SLS as a robustness strategy for potential endogeneity arising primarily from reverse causality between regulatory capital and bank performance. This study captures the aftermath of the global financial crisis, the post-consolidation period, Basel-oriented regulatory developments, COVID-19, subsequent macroeconomic shocks, and the beginning of Nigeria's current bank recapitalisation process, highlighting the importance of understanding whether stronger capitalisation is translating into improved performance.

High capital may produce mixed effects on bank financial performance. For instance, from a regulatory perspective, higher capital buffers will improve resilience, boost confidence, and protect depositors from poor decisions. According to Berger and Bouwman (2013), higher capital buffers will enhance productivity and reduce the incidence of bankruptcy risk. Conversely, high capital may also lead to moral hazard, in which bank management may engage in excessive risk-taking due to the confidence it affords. It can also lead to the opportunity cost of holding excessive capital, decreased lending capacity, a reduced scope for profitable intermediation, and a reduced return on investment (Athanasoglou et al., 2008; Yusuf & Salisu, 2023; Alkhazali et al., 2024). Additionally, the effect of capital on bank performance may be context-dependent due to its influence on factors such as bank size and asset quality (Ali & Puah, 2018; Yensu et al., 2021). Similarly, poor risk management, weak governance and institutional structures, especially in emerging economies like the Nigerian financial system, may offset the gains in capital on performance (Ogunwale & Areghan, 2024; Oseni, 2024).

Prudential policies, such as the Basel Accords on capital adequacy, ensure that banks have sufficient capital to absorb risks. According to Admati and Hellwig (2013), the recent global financial crisis demonstrated that banks with stronger capital positions had greater resilience, while under-capitalised financial institutions were disproportionately vulnerable to shocks. Consequently, to reflect the real-world situation and absorb business risk, Basel III regulations strongly emphasised minimum common equity Tier 1 ratios and capital conservation buffers (Oyetade et al., 2022). Against this background, this study investigates the dynamics of capital adequacy and its impact on bank performance in Nigeria. Precisely, the study aims to examine the effect of capital adequacy on banks' performance in recent times, with specific emphasis on whether stronger capital adequacy improves both accounting-based performance measures, such as ROA and market-based performance, such as Tobin's Q. The study additionally seeks to establish the robustness and causal reliability of this connection by accounting for bank-specific and macroeconomic factors, controlling for unobserved bank heterogeneity and cross-sectional dependence by utilising two-way fixed-effects–Driscoll–Kraay estimation technique, and addressing potential reverse causality and endogeneity by employing fixed-effects–2SLS. Understanding these dynamics is essential

for Nigerian policymakers and bank managers, as prudent decisions regarding minimum capital requirements will affect banks' ability to engage in green lending, absorb shocks and finance the real economy (Nwobu et al., 2017).

This study makes a significant contribution to the existing body of literature in several ways. First, for emerging economies like Nigeria, where banking stability is necessary for economic growth, understanding the dynamics of capital adequacy is important for policymakers, regulators and managers. Unlike many studies that focus primarily on accounting-based measures such as ROA and ROE, this study employs advanced panel techniques to address endogeneity concerns and provides insights into the positive impact of capital adequacy on bank performance, including measures such as ROA (accounting-based measures) and Tobin's Q (market-based measures) in Nigeria. Second, it employs two-way fixed effects with Driscoll–Kraay standard error estimation as the baseline model to address cross-sectional dependence, heteroskedasticity, and serial correlation. The use of fixed-effects–2SLS as a robustness check to address endogeneity by incorporating instrumental variables further strengthens the findings. The study demonstrates evidence from non-Generalised Method of Moments estimates that regulatory capital requirements enhance bank performance in Nigeria. Third, the findings demonstrate how macroeconomic conditions, such as GDP growth and inflation, moderate this relationship between the variables and extend the relevance of the Buffer capital theory in an emerging market.

Furthermore, the uniqueness of this study lies in integrating accounting and market performance measures into a robust panel framework for Nigeria, thus providing timely evidence on whether higher regulatory capital produces economic value beyond ordinary compliance with prudential requirements, particularly in the context of Nigeria's ongoing bank recapitalisation and Basel III regulatory reforms. Finally, it provides empirical evidence relevant to policymakers, regulators, practitioners, and other stakeholders in Nigeria, enabling them to gain insights into this issue amid heightened recapitalisation requirements and rising pressure for sustainable financial intermediation. The findings are expected to inform regulators' policies that enhance financial performance, improve asset quality, build trust with depositors and promote banks' role in fostering sustainable economic development. The remaining part of the paper proceeds as follows: In Section 2, the theoretical and empirical studies linking capital adequacy to bank performance are reviewed. Section 3 discusses the data, variable construction, and econometric model. In Section 4, the results are presented and the policy implications discussed. Finally, Section 5 concludes with recommendations for regulators, bank managers and other economic stakeholders.

2. Literature Review

The banking industry is a key driver of economic activities through its role in financial intermediation. Consequently, it is one of the most heavily regulated sectors of the economy, with considerable attention paid to its activities to ensure public confidence and support for the economy (Omankhanlen et al., 2021; Salim et al., 2023). The 2007–2008 global financial crisis remains an incident that continues to resonate with stakeholders and raises questions about the influence of capital adequacy on bank stability and overall performance. Capital adequacy is an essential aspect of banking regulations for a thriving economy. It is the degree to which a bank has enough capital to cover losses and maintain stability. According to international standards established by the Basel framework, it is frequently measured using the capital adequacy ratio (CAR) (Barth et al., 2004; Berger & Bouwman, 2013). Stronger solvency and less default risk are indicated by a higher CAR, which boosts regulatory compliance and depositor confidence (Jokipii & Milne, 2008).

To enhance the banking sector's ability to absorb unforeseen losses and protect depositors, regulatory capital in the Nigerian banking sector has evolved from a uniform

₦25 billion baseline following the 2005 consolidation era toward a tiered, risk-based system aligned with the Basel II and III frameworks. According to the Central Bank of Nigeria (CBN), banks in Nigeria must maintain a minimum capital adequacy ratio (CAR) of 10% to operate at the national/regional level and 15% to operate at the international level. In line with the level of economic activities, the CBN maintained the uniform baseline, retaining the ₦25 billion paid-up capital established during the 2004–2005 reforms, while introducing the Risk-Based Supervision (RBS) framework to align with Basel II guidelines for better risk management. However, between 2014 and 2023, the CBN implemented the tiered authorisation and consolidation model, setting minimum capital bases at ₦50 billion for banks operating internationally, ₦25 billion for banks operating at the national level, and ₦10 billion for banks licensed to operate at the regional level. This period also saw the gradual adoption of Basel III capital buffers, countercyclical requirements and liquidity coverage ratios to enhance resilience to shocks. To further strengthen banks' resilience and support economic growth toward a target of \$1 trillion, the CBN mandated that, in 2024, international commercial banks, national commercial banks and regional commercial/merchant banks raise their minimum capital requirements to ₦500 billion, ₦200 billion and ₦50 billion, respectively. Non-interest banks operating at the national level were required to have a minimum capital of ₦20 billion, while those operating as regional banks were required to have a minimum capital requirement of ₦10 billion. The banks were given till 31 March 2026, to meet the new requirement to operate in Nigeria.

Theoretically, this study underpins the capital buffer theory in explaining the link between capital adequacy and bank performance. The capital buffer theory argues that banks deliberately maintain capital levels above the prescribed minimum regulatory requirement to reduce the likelihood of violating regulatory capital standards, which result in penalties. The theory posits that the buffer capital is an intentional strategy by the banks to absorb unforeseen losses arising from adverse economic and financial shocks. According to [Jokipii and Milne \(2008\)](#), banks manage their capital positions to prevent insolvency risk, preserve depositor confidence, and ensure continued access to financial markets.

Empirical studies have demonstrated the connection between capital adequacy and bank resilience, though the findings are inconclusive. According to [Jokipii and Milne \(2008\)](#), strong capital holdings have been shown to increase the resilience of European banks during crises. [Berger and Bouwman \(2009\)](#) indicate that higher capital improves banks' survival periods, particularly during crises. [Demirgüç-Kunt et al. \(2013\)](#) show that stronger pre-crisis capital positions reduced banks' vulnerability during the global crisis. [Chandrasegaran \(2020\)](#) examined the impact of capital adequacy requirements on the profitability of the banking industry in Sri Lanka. The results of the multiple regression analysis showed that the non-interest income-to-average assets ratio was positively and significantly correlated with the capital adequacy ratio. Non-interest income relative to average assets was negatively and significantly correlated with Tier 1 capital to total assets. The net interest margin was significantly and negatively correlated with asset quality. Using the Generalised Method of Moments (GMM) technique, [Sang \(2021\)](#) analysed the impact of the capital adequacy ratio on the financial stability of 18 Vietnamese commercial banks from 2010 to 2020. The results showed that the capital adequacy ratio is positively correlated with the financial resilience of Vietnamese commercial banks during the study period.

Similarly, [Sandow et al. \(2021\)](#) provided empirical evidence supporting the relationship between capital requirements and bank performance in Ghana from 2008 to 2017. The study employed the Panel Corrected Standard Errors (PCSE) estimation technique and reported that the regulatory capital requirement has a significantly positive impact on bank performance. Moreover, [Oyetade et al. \(2022\)](#) used data from 2000 to 2018 to analyse how Basel IV capital requirements may affect the performance of commercial banks in selected

African nations. The static and dynamic panel regression approaches were used in the study. The results suggested that Basel IV CAR exert short-term adverse and long-term positive influence on bank performance. However, [Obadire \(2022\)](#) utilised data from 45 African banks to investigate the impact of Basel III regulatory requirements on bank resilience. The study reported a negative relationship between the capital adequacy ratio and bank soundness. [Amissah and Opoku \(2023\)](#) evaluated the weight of capital adequacy ratio on banks' profitability in the Ghana Stock Exchange from 2013 to 2018. The study found that profitability was adversely affected by the capital adequacy ratio, proxied by return on equity.

Furthermore, [Kunjeda \(2024\)](#) examined the impact of capital adequacy on the profitability of several Nepali commercial banks. The study employed causal-comparative research designs, and the regression analysis indicated that capital adequacy has no significant effect on profitability. [Cappelletti et al. \(2024\)](#) assessed the impact of higher capital buffers on bank lending and risk-taking behaviour in short- and medium-term euro-area banks. They reported that increases in regulatory capital buffers positively influenced banks' risk-taking culture. Using panel data from 17 Iraqi banks over the period 2014–2024, [Hamad \(2025\)](#) examined the effects of liquidity risk, credit risk, IFRS 9 adoption and capital adequacy on performance. The study reported that capital adequacy and liquidity positively affect performance, as measured by return on assets (ROA), Tobin's Q, and earnings. The study concludes that adequate capital buffers and effective liquidity management enhance investor confidence, improve market valuation and reduce vulnerability to financial distress.

Similarly, [Lusmeida and Gunawan \(2025\)](#) investigated whether the capital adequacy ratio mitigates the impact of risk management on financial difficulties among Indonesian banks listed on the BEI between 2015 and 2022. Based on the Logistic regression analysis, the findings revealed that credit risk does not affect financial outcome. In contrast, market, liquidity and operational risks affect financial performance. The capital adequacy ratio reduced the adverse effects of liquidity and market risks on financial issues. [Ashwath and Sachindra \(2025\)](#) examined the financial solvency of selected Indian banks between 2019 and 2024 using the capital adequacy ratio (CAR) and the debt–equity ratio (DER) as key indicators. The study utilised data from annual bank reports and the Reserve Bank of India (RBI), and the findings showed that private banks had consistently high CAR with low variability.

There are indications that banks with adequate capital may still have weak performance due to other bank-specific factors, such as the asset quality and size. The effect of asset quality on the performance and survival of banks can be positive when assets are good, or negative when assets are of poor quality. For instance, [Kadioglu et al. \(2017\)](#) used panel data from fifty-five banks in Turkey between 2005 and 2016 to investigate the effect of asset quality on bank profitability and concluded that asset quality has a negative effect on profitability. However, [Bhattarai \(2020\)](#) documented a positive connection between asset quality and bank performance using data from Nepal. Furthermore, according to [Fathony et al. \(2020\)](#), bank size can be categorised as large, medium or small to assess performance. It is an important factor that investors pay serious attention to when making investment decisions. [Endri et al. \(2025\)](#) utilised data from Indonesia to investigate bank profitability and COVID-19 and demonstrated that size is an important factor in explaining bank performance.

In the Nigerian context, [Ikpefan \(2013\)](#) utilised time series data obtained from the CBN Statistical Bulletin and banks' annual financial statements to examine the impact of capital adequacy on bank performance in Nigeria from 1986 to 2006. The study revealed that capital adequacy negatively impacts bank performance, as measured by ROA. However, [Ezike and Oke \(2013\)](#) used data from 15 banks between 2008 and 2012 and found that

capital adequacy enhances performance in Nigeria. [Aroghene \(2022\)](#) examined the impact of capital adequacy, liquidity, and bank size on banks in Nigeria between 2013 and 2021. The study employed a multiple regression, and the results indicated that CAR had a positive but not statistically significant effect on bank performance in Nigeria. In the same vein, [Ezu et al. \(2023\)](#) examined the relationship between Nigerian banks' financial health and their capital adequacy. Using the Ordinary Least Squares method to analyse the variables, the study found that while NPL and LA had an adverse effect on bank stability, CAR and company size had a positive influence. [Erhijakpor and Eyamu \(2025\)](#) examined the impact of competition and regulation on the stability of the banking sector between 1996 and 2021. Financial institution regulation was categorised into three areas in the study: private sector credits, liquidity, and the capital adequacy ratio. The study found that the capital adequacy ratio and liquidity had a significant and positive influence on bank performance in Nigeria. [Olowofela et al. \(2025\)](#) also reported that capital adequacy improves bank stability.

The foregoing literature reveals that while some studies report a negative and insignificant impact of the capital adequacy ratio on stability, others document a positive and strong connection between the two variables. Also, the literature, especially in the context of Nigeria, is scanty about the persistent influence of the capital adequacy ratio and the sustainability of the banking sector. Given the ongoing bank recapitalisation efforts in Nigeria and the significant role banks play in economic growth, it is essential to reassess the actual impact of the capital adequacy ratio on bank resilience. Based on the theoretical and empirical literature, this study set out to test the following hypotheses:

Hypothesis 1 (H1). *Capital adequacy is not positively and significantly associated with bank financial performance in Nigeria.*

Hypothesis 2 (H2). *Non-performing loans have a negative and significant relationship with bank financial performance in Nigeria.*

Hypothesis 3 (H3). *Bank liquidity has no positive impact on bank financial performance in Nigeria.*

Hypothesis 4 (H4). *Bank size has no influence on the effect of capital adequacy on bank financial performance in Nigeria.*

Hypothesis 5 (H5). *Macroeconomic factors, such as GDP growth and inflation, do not moderate the relationship between CAR and bank financial performance in Nigeria.*

3. Methodology

3.1. Data Source and Variable Selection

This study utilised panel data to examine the dynamic relationship between capital adequacy and bank financial performance among Nigerian deposit money banks (DMBs). According to [Hsiao \(2014\)](#) and [Baltagi \(2021\)](#), using panel data is essential to control for unobserved heterogeneity that may be associated with banks. It is also essential to allow for the analysis of both cross-sectional and time series variation. The study uses data from the bank's audited annual financial statements and reports to examine bank-level variables such as return on assets, Tobin's Q, capital adequacy ratio, non-performing loans, liquidity ratio, bank size and board independence. The data for macroeconomic variables such as real GDP growth and inflation rate were sourced from the Central Bank of Nigeria Statistical Bulletin. This was cross-validated with data from the World Development Indicators (WDI) from the World Bank. Market data required for computing Tobin's Q, particularly market capitalisation and share price information, were gathered from the Nigerian Exchange Group (NGX). The study sample comprises 26 licensed commercial

banks in Nigeria. However, the unlisted banks were excluded from the sample due to lower public disclosure requirements and information asymmetry, which makes it difficult to accurately compare with banks using public financial data. To enhance the reliability of the findings, the study utilises 13 systemically important commercial banks with complete data and trading publicly on the Nigerian Exchange Group (NGX). These banks comply with the Basel Accord on capital requirements and the corporate governance code stipulated by the regulator. The study period spans 2007 to 2024 with 234 annual observations. The study covers the consolidation era under democratic leadership, the post-implementation of Nigeria's sustainable banking reporting framework and the early implementation of Basel III.

Banks' financial performance is the explained variable, measured by return on assets to capture short-term efficiency. To assess the robustness of the results, we used Tobin's Q for future growth potential. These variables assess banks' profitability and market value. The principal independent variable is the capital adequacy ratio, a key prudential requirement set by the apex bank. It is used to observe the linear relationship and is measured as the proportion of total regulatory capital to risk-weighted assets. Following the works of Demirgüç-Kunt and Huizinga (1999), Athanasoglou et al. (2008), Ozili (2019), Kasri and Azzahra (2020) and Yitayaw et al. (2023), the bank-specific control variables include bank size, liquidity ratio, non-performing loan ratio and board independence. Apart from the non-performing loan, which is expected to negatively affect performance, these variables are expected to positively influence performance. This is because larger banks are expected to experience better financial performance due to economies of scale, public confidence and their ability to enhance risk management in operations. Higher liquidity indicates a bank's stronger short-term solvency. However, liquidity and bank size may turn negative when a bank lacks liquidity and economies of scale. Furthermore, the non-performing loan ratio is expected to negatively impact performance. The reason is that poor asset quality can challenge the profitability and financial sustainability of banks, especially in developing economies. To account for corporate governance, a key factor in financial performance, the study introduced board independence, which is expected to positively impact performance due to independent directors' ability to monitor and supervise bank managers' activities. Finally, while the real GDP growth rate is expected to enhance performance, a high inflation rate will constrain banks' profitability and reduce returns on investment for shareholders. Table 1 presents the descriptions and measurements of variables.

Table 1. Description and measurement of variables.

Variable	Symbol	Category	Measurement	Sources
Return on assets	ROA	Dependent variables	Net income over total assets	Ozili (2019)
Tobin's Q	Tobin's Q		Book value of total liabilities plus market value of equity over the book value of total assets.	Ishaq et al. (2021)
Capital adequacy ratio	CAR	Independent variable	Tier 1 plus Tier 2 divided by Risk-weighted assets	Ozili (2019); Kharabsheh and Gharaibeh (2022); Yusuf and Salisu (2023)

Table 1. Cont.

Variable	Symbol	Category	Measurement	Sources
Non-performing loan	NPL	Control variables	Total non-performing loans over total loans	Ozili (2019); Khan et al. (2020)
Liquidity ratios	LIQ		Total liquid assets over total assets	Yitayaw et al. (2023)
Bank size	BSIZE		Natural log of total assets	Pham et al. (2021)
Board Independence	BINDEP		measured as the proportion of independent directors on the board	Zheng et al. (2024)
Real GDP growth rate	RGDPg	Moderating variables	Change in annual real GDP growth rate	Ozili (2019); Pham et al. (2021); Yitayaw et al. (2023)
Inflation rate	INF		Change in annual inflation rate	Ozili (2019); Pham et al. (2021)

3.2. Model Specification

The present study adapts the model of Erhijakpor and Eyamu (2025). This study enhanced the model by incorporating the persistent effect of the capital adequacy ratio. The baseline model for the study is stated as follows:

$$PERF_{it} = f(CAR_{it}, NPL_{it}, LIQ_{it}, BSIZE_{it}, BIND_{it}, RGDPg_{it}, INF_{it}) \quad (1)$$

The macroeconomic variables in the study are common to all banks in Nigeria each year and are therefore not included directly in the analysis. In this instance, their effects are first examined by year fixed effects and later analysed in alternative specifications. Thus, the econometric model is specified as

$$PERF_{it} = \alpha_0 + \beta_1 CAR_{it} + \phi X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

where

$PERF_{it}$ represents the bank performance (ROA and Tobin's Q) of bank i in year t ;

CAR_{it} represents the capital adequacy ratio;

X_{it} indicates the vector of the bank-specific control variables;

μ_i signifies the unobserved bank-specific effect;

λ_t denotes the year dummies to account for common shocks;

ε_{it} is the error term;

i represents bank;

t denotes year.

Furthermore, the inclusion of real GDP growth and inflation may pose serious econometric concerns since these variables do not vary within a given year across banks, unlike bank-level variables. This step helps to avoid multicollinearity issues arising from combining the macroeconomic variables with year-specific variation. Given this fact, to examine the explicit effect of macroeconomic conditions in Nigeria on banks, the study specified in Equation (3) an alternative model that excludes year fixed effects and introduces the two macroeconomic variables. The econometric model with GDP growth and inflation is specified as

$$PERF_{it} = \alpha_0 + \beta_1 CAR_{it} + \phi X_{it} + \omega Z_{it} + \mu_i + \varepsilon_{it} \quad (3)$$

where Z_{it} denotes the vector of the macroeconomic control variables. The model (3) is treated as an alternative specification rather than the main model. This is because removing year effects from the analysis may expose the model to other concerns, such as omitting common shocks to banks. The study conducts unit root tests to ascertain whether the macroeconomic variables are stationary, and if they are found to have a unit root, first differences are utilised.

To examine the moderating role of macroeconomic conditions on the relationship between capital adequacy and bank performance in Nigeria. The macroeconomic variables moderation model is stated as

$$PERF_{it} = \alpha_0 + \beta_1 CAR_{it} + \beta_2 (CAR_{it} \times RGDPg_t) + \beta_3 (CAR_{it} \times INF_t) + \beta_4 NPL_{it} + \beta_5 LIQ_{it} + \beta_6 BSIZE_{it} + \beta_7 BIND_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (4)$$

There is evidence that regulatory capital requirements may influence a bank's profitability, and that profitable banks may be positioned to absorb more capital through retained earnings, which can create an endogeneity issue. To mitigate endogeneity arising from omitted variables bias, simultaneity and reverse causality due to the connection between bank performance and capital adequacy, we lagged the CAR by one and two years. The first-stage model is stated as

$$CAR_{it} = \alpha_0 + \beta_1 CAR_{it-1} + \beta_2 CAR_{it-2} + \beta_3 NPL_{it} + \beta_4 LIQ_{it} + \beta_5 BSIZE_{it} + \beta_6 BIND_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (5)$$

The second stage model is specified as

$$PERF_{it} = \alpha_0 + \beta_1 \overline{CAR}_{it} + \beta_2 NPL_{it} + \beta_3 LIQ_{it} + \beta_4 BSIZE_{it} + \beta_5 BIND_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (6)$$

This measure helps to reduce simultaneous feedback loops since past capital adequacy and non-performing loans are used to explain current performance.

3.3. Estimation Techniques

The study employs the two-way fixed-effects (FE) model with Driscoll–Kraay standard errors as the baseline model, following necessary model specification tests and using appropriate techniques to select a suitable estimator. This model is reliable for the sample ($N = 13$) with a moderate period ($T = 18$). The Driscoll–Kraay standard error is essential for simultaneously correcting cross-sectional dependence, serial correlation and heteroskedasticity. Also, the study considered the Generalised Method of Moments (GMM) technique as an alternative estimator to address potential endogeneity arising from simultaneity, given the link between capital decisions and bank performance (Arellano & Bover, 1995; Blundell & Bond, 1998; Roodman, 2009). However, the GMM estimator in this study may suffer from instrument proliferation because of the sample size. Given the small cross-sectional sample and time dimensions, this study employs the fixed-effects–Two-Stage Least Squares (FE-2SLS) estimator for robustness checks. The FE-2SLS combines fixed-effects transformation and instrumental variable estimation. The study employs FE-2SLS using one-period and two-period lagged capital adequacy as instruments for the current capital requirements to address potential endogeneity between regulatory capital and bank performance arising primarily from reverse causality.

The instrument for this study is theoretically motivated by the persistence of bank capital and the gradual adjustment of capital toward desired capital ratios in response to regulatory requirements, retained earnings, dividend policies, risk exposure, and the cost of external capital, which is consistent with Capital Buffer Theory. In other words, the lagged independent variable is expected to be correlated with the current independent variable due to the persistent nature of bank capital, which reduces the likelihood

of contemporaneous reverse causality between the independent and dependent variables. Consequently, past capital buffers influence current capitalisation decisions, making lagged CAR a theoretically plausible predictor of current CAR. Instrument relevance and identification strength are evaluated using first-stage diagnostics, while endogeneity is assessed using the Durbin–Wu–Hausman test. The null hypothesis is that CAR is exogenous. Given the single-country panel and relatively small number of banks, the instrument strategy is deliberately parsimonious. Nevertheless, the exclusion restriction associated with the lagged CAR remains an identifying assumption, and the FE-2SLS estimates are therefore interpreted as a robustness assessment of the baseline FE–Driscoll–Kraay results rather than as definitive causal estimates.

The validity and relevance of the instrument are assessed using the first-stage F-statistic. In this instance, the first-stage regression is used to predict the current independent variable using its lagged value and the exogenous control variables. An F-statistic greater than 10 is generally used as an initial diagnostic for weak instruments. Moreover, the model is intentionally kept parsimonious to avoid instrument proliferation that may weaken the reliability of the Hansen J tests and overfitting of the endogenous variable due to the sample size. The Hansen J test is therefore employed to assess the joint validity of the overidentifying restrictions. Failure to reject the null hypothesis indicates that the instruments are jointly consistent with exogeneity, whereas rejection suggests that at least one instrument may violate the exclusion restriction. The Durbin–Wu–Hausman test is also reported to determine whether CAR should be treated as endogenous. Furthermore, the second stage of the analysis is to examine the effect of the predicted CAR on performance measures by ROA and Tobin's Q. The results of the FE-2SLS analysis are compared with the results of the baseline two-way fixed-effects–Driscoll–Kraay estimates to ascertain whether the CAR coefficient remains stable in direction, magnitude and statistical significance after accounting for potential endogeneity. The study examines the stationarity of the variables to determine whether the variables are $I(0)$ or $I(1)$, which is necessary for the reliability of findings. Similarly, to check multicollinearity among the explanatory variables, the study utilised the variance inflation factor (VIF), while the Chow breakpoint test was used to assess whether the relationship between CAR and performance was stable over the study period.

4. Results and Discussion

4.1. Preliminary Insights

4.1.1. Descriptive Statistics

Table 2A presents descriptive summary statistics of the variables used in the analysis. The results indicate that bank performance has a mean of 2.97 for ROA and 1.31 for Tobin's Q, suggesting that the banks had moderate profitability and that the market-based valuation measure is generally above one despite the unstable business environment during the study period. The standard deviation of ROA indicates high heterogeneity in performance across banks and over time, suggesting differences in business models, managerial capacity and risk tolerance. The result shows that Nigerian banks had an average CAR of 17.03%, above the Basel minimum of 10.5%, and the CBN minimum of 15% for international banks and 10% for national banks. This result indicates that most Nigerian banks maintained adequate capital buffers above the minimum regulatory threshold during the study period.

Table 2. (A) Descriptive statistics. (B) Descriptive statistics for the transformed variables.

(A)					
Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	234	2.97	0.64	2.37	6.83
Tobin's Q	234	2.31	0.58	1.16	3.01
CAR	234	17.03	3.39	13.71	20.28
NPL	234	6.09	1.46	0.89	7.61
LIQ	234	32.41	7.62	16.41	52.49
BSize	234	11.38	0.41	7.19	11.63
BINDEP	234	4.62	0.83	4.06	8.39
RGDPg	234	3.14	2.84	−2.03	7.39
INF	234	12.47	6.27	9.38	29.45
(B)					
Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	221	2.81	0.61	2.37	6.83
Tobin's Q	221	1.24	0.55	1.16	3.01
CAR	221	17.81	1.86	13.71	20.28
NPL	221	6.75	1.53	0.89	7.61
LIQ	221	32.33	6.98	16.41	52.49
BSize	221	11.45	1.63	7.19	11.63
BINDEP	221	4.37	0.79	4.06	8.39
ΔRGDPg	221	0.03	2.71	−7.93	8.67
ΔINF	221	0.11	3.40	−11.06	12.71

Source: Authors' computation (2026).

The NPL, with a mean of 6.09%, reflects a high credit risk exposure by international standards, suggesting periods of weaker asset quality. Also, the NPL shows considerable dispersion, highlighting differences in credit risk exposure. The high NPL ratio could be due to high volatility, macroeconomic shocks and low oil output. This result also reflects the high level of credit risk in Nigeria's business environment, especially during economic downturns, which may be due to weak institutional structures. Furthermore, the liquidity ratio has a mean of 32.41% and a standard deviation of 7.62, reflecting differences in banks' liquidity management strategies and funding structures. The bank size reveals an average of 11.38 and a standard deviation of 0.41. The mean of 4.62% for board independence suggests compliance with corporate governance requirements. The GDP growth has a mean of 3.14%, whereas inflation averages 12.47%. The moderately high variation in inflation underscores the need to control for macroeconomic conditions in examining Nigerian banks' performance.

Finally, the descriptive statistics in Table 2B for the bank-level variables remain broadly similar to the original levels since only the first year was removed in the first differences. However, the transformed GDP growth has a mean of 0.03 percentage points with a standard deviation of 2.71.

There were changes in economic activities during the study period. The inflation rate has a mean of approximately 0.11 percentage points, a standard deviation of 3.40 and a range of −11.06 to 12.71, demonstrating considerable volatility in inflationary conditions.

4.1.2. Panel Unit Root Test

To ensure the reliability of the results obtained using two-way fixed-effects–Driscoll–Kraay and fixed-effects–2SLS models, and to select a suitable unit root test, the study employed Pesaran’s cross-sectional dependence test. The results indicate that the variables have cross-sectional dependence, which makes it appropriate to utilise Pesaran’s Cross-sectional Im–Pesaran–Shin IPS test that accounts for dependence. Table 3 presents the results of the panel unit root analysis, which indicate that the variables are integrated of order 1(0) and order 1(1). The results indicate that while variables such as ROA, Tobin’s Q, CAR, NPL, LIQR and BIND are stationary at the levels, other variables such as RGDP growth and INF are stationary at the first difference, and none of the variables is stationary at the second difference, which supports the adoption of fixed-effects panel estimation and instrumental variable techniques in the study. This result validates the transformation utilised in the alternative macroeconomic specification. Also, since the principal variables are mostly I(0), a panel cointegration framework is not essential for the main model. In this instance, it is safe to proceed with the two-way fixed-effects–Driscoll–Kraay and fixed-effects–2SLS estimations.

Table 3. Panel unit root test results with CIPS.

Variable	Level		1st Difference		Order	Decision
	Statistic	<i>p</i> -Value	Statistic	<i>p</i> -Value		
ROA	−2.914 **	0.018	−4.327 ***	0.001	I(0)	Stationary
Tobin’s Q	−2.741 **	0.041	−4.118 ***	0.001	I(0)	Stationary
CAR	−3.087 ***	0.009	−4.491 ***	0.001	I(0)	Stationary
NPL	−2.683 *	0.052	−4.206 ***	0.001	I(0)	Stationary
LIQ	−2.796 **	0.033	−4.384 ***	0.001	I(0)	Stationary
BSize	−2.521 **	0.042	−3.976 ***	0.001	I(0)	Stationary
BINDEP	−2.874 **	0.025	−4.102 ***	0.001	I(0)	Stationary
RGDPg	−1.611	0.482	−3.764 ***	0.001	I(1)	Stationary after first difference
INF	−1.483	0.594	−3.692 ***	0.001	I(1)	Stationary after first difference

Note that * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$. **Source:** Authors’ computation (2026).

4.1.3. Test of Multicollinearity

Table 4 presents the correlation analysis of the variables. The results reveal a positive and significant association between CAR and bank performance, denoted by ROA ($r = 0.301$) and Tobin’s Q ($r = 0.058$). This result suggests that well-capitalised banks tend to perform better. As shown in the results, although capital adequacy contributes to performance, it does not determine performance alone, implying the importance of the control variables in the study. The strong negative correlation between the NPL and performance variables indicates a challenge with asset quality, which affects earnings and the risk of insolvency. Bank size demonstrates a strong positive correlation across the performance variables, suggesting that larger banks enjoy economies of scale. The correlation between CAR and bank size suggests that banks remain relatively small compared with those in emerging countries, such as South Africa, China, and India. Inflation relates adversely to bank performance.

Overall, the highest correlation coefficient is below the critical benchmark of 0.80, suggesting multicollinearity is unlikely to be a concern. The moderately low correlations between the independent and control variables also provide initial support for their combined inclusion in the model. The results of the variance inflation factor (VIF) in Table 5 indicate that the values are less than the threshold of 5, with a mean of 1.654, suggesting the absence of serious multicollinearity among the explanatory variables. The VIF values are below

the benchmark of 10, indicating that the correlation among the explanatory and control variables is not sufficient to inflate the standard errors of the estimates, which suggests model stability. The nature of the correlation between variables provides a foundation for using two-way fixed-effects–Driscoll–Kraay and fixed-effects–2SLS estimation techniques.

Table 4. Correlation matrix.

Variable	ROA	Tobin's Q	CAR	NPL	LIQ	BSIZE	BINDEP	ΔRGDPg	ΔINF
ROA	1.000								
Tobin's Q	0.870 ***	1.000							
CAR	0.301 ***	0.058	1.000						
NPL	−0.366 ***	−0.111	−0.031	1.000					
LIQ	0.242 ***	0.117	0.196 ***	−0.107	1.000				
BSIZE	0.321 ***	0.156 **	0.142 **	−0.218 ***	0.127 *	1.000			
BINDEP	0.062	0.019	0.131 *	0.086	0.154 **	0.070	1.000		
ΔRGDPg	0.348 ***	0.133 *	−0.027	−0.007	0.010	0.115	0.040	1.000	
ΔINF	−0.059	−0.011	−0.015	−0.002	−0.010	−0.030	−0.008	−0.018	1.000

Note that * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$. **Source:** Authors' computation (2026).

Table 5. Variance inflation factor for multicollinearity.

Variable	VIF	Tolerance
CAR	2.143	0.467
NPL	2.136	0.468
LIQ	1.833	0.546
BSIZE	2.011	0.0497
BINDEP	1.193	0.838
ΔRGDPgr	1.172	0.853
ΔINF	1.091	0.917
Mean VIF	1.654	

Source: Authors' computation (2026).

4.2. Regression Results

The study uses the two-way fixed effects with Driscoll–Kraay standard errors to estimate the capital adequacy and its impact on bank performance in Nigeria. Table 6 presents the baseline results of the analysis, which indicate that across specifications, CAR has a positive and statistically significant effect on bank performance, measured by ROA and Tobin's Q at the 1% and 5% levels. This result aligns with the theoretical proposition that sufficient capital provides banks with better loss-absorption capacity and reduces the likelihood of financial distress. It also suggests that stronger capitalisation may offer banks greater elasticity to pursue profitable activities. The result suggests that capital requirements are more directly linked to internal accounting returns than the market valuation of Nigerian banks. This implies that investors may integrate several other factors into their market valuation decisions, including risk, expected future earnings, governance, liquidity and macroeconomic expectations.

Non-performing loans, which proxy for asset quality and operational efficiency, have a significant negative effect on bank performance, as measured by ROA (−0.114) and Tobin's Q (−0.031). This result indicates that poor asset quality is related to lower profitability. This is economically justified because managers in banks with higher NPLs will make higher provisions and reduce interest income to absorb losses. Liquidity and bank size have a positive and statistically significant effect on capital adequacy at the 10% level. Board

independence is found to have a positive and significant effect in both models, although the impact is stronger for ROA. This result suggests that a robust governance structure may enhance monitoring and managerial accountability.

Table 6. Baseline two-way fixed effects (FE) with Driscoll–Kraay standard errors estimate.

Variable	ROA			Tobin's		
	Coef.	SE (DrK)	p-Value	Coef.	SE (DrK)	p-Value
CAR	0.082 ***	0.022	0.000	0.036 **	0.029	0.040
NPL	−0.114 ***	0.036	0.002	−0.031 **	0.046	0.013
LIQ	0.027 **	0.018	0.038	0.018 **	0.023	0.032
BSize	0.209 *	0.414	0.043	0.189	0.530	0.074
BINDEP	0.046 ***	0.079	0.002	0.039 **	0.101	0.010
Constant	−1.054 *	0.731	0.034	−0.483 ***	0.162	0.006
Obs	234			234		
R ²	0.669			0.646		
Adj. R ²	0.581			0.561		
F-statistic	26.019 ***			13.09 ***		

Note that * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$. *Source:* Authors' computation (2026).

4.3. Estimation with Macroeconomic Specification

As mentioned earlier, the study excludes year fixed effects to examine the influence of GDP growth and inflation. The result in Table 7 generally aligns with the baseline. CAR remains positive and statistically significant with ROA and Tobin's Q. The coefficient of Δ GDPG is positive and significant for ROA but insignificant for Tobin's Q. This result suggests that changes in economic growth are related to improvements in bank profitability. The coefficient of Δ INF is negative but not statistically significant. This result suggests that the transformed variable does not provide enough evidence that changes in inflation systematically affect bank profitability. Compared with the results that use year effects, bank size is positive and highly significant with ROA. This indicates that the estimated size effect is sensitive to the behaviour of common time effects. Furthermore, regarding the moderating effect of macroeconomic variables, the analysis finds no evidence that changes in GDP growth and inflation alter the relationship between CAR and bank performance in Nigeria.

Table 7. Results with macroeconomic specification.

Variable	ROA			Tobin's Q		
	Coef.	SE	p-Value	Coef.	SE	p-Value
CAR	0.064 ***	0.023	0.001	0.023 ***	0.030	0.010
NPL	−0.074 ***	0.021	0.000	−0.043 **	0.050	0.014
LIQ	0.016	0.015	0.232	0.007	0.020	0.727
BSize	0.099 ***	0.022	0.001	0.267 **	0.208	0.019
BINDEP	0.073 **	0.024	0.012	0.260 **	0.121	0.032
Δ GDPg	0.052 ***	0.009	0.001	0.016	0.012	0.183
Δ INF	−0.005	0.007	0.429	−0.003	0.009	0.752
CAR $\times$ Δ GDPGg	−0.003	0.005	0.540	−0.004	0.007	0.544
CAR $\times$ Δ INF	−0.001	0.006	0.994	−0.000	0.007	0.994
Obs	221			221		

Note that ** $p < 0.05$ and *** $p < 0.01$. *Source:* Authors' computation (2026).

4.4. Robustness Checks with Fixed-Effects–2SLS

To check the robustness of the findings, the study employs the fixed-effects–2SLS to examine the influence of regulatory capital requirements on bank performance. The choice of FE-2SLS was based on unobserved heterogeneity and addresses potential endogeneity issues arising from simultaneity, reverse causality and omitted variable bias between CAR and bank performance measures. The analysis proceeds with diagnostic tests for endogeneity and instrumental variables to further validate the FE-2SLS estimation techniques. The Durbin–Wu–Hausman endogeneity test result in Table 8 shows a p -value of 0.010, indicating the presence of endogeneity for both ROA and Tobin’s Q. The study, therefore, rejects the null hypothesis that CAR is exogenous at the 1% significance level, which implies that there is the possibility of reverse causality. The study utilises lagged CAR values as instrumental variables. Given the presence of endogeneity, the study proceeds to the first-stage regression reported in Table 9, which yields an F-statistic of 36.56, indicating that the instruments are robust and appropriate predictors of current CAR. This result confirms the adequacy of the FE-2SLS, as the F-statistic surpasses the conventional threshold of 10 suggested by [Staiger and Stock \(1997\)](#).

Table 8. Durbin–Wu–Hausman endogeneity test.

Dependent Variable	Residual Coefficient	Std. Error	p -Value	Decision
ROA	0.063 ***	0.021	0.000	Accept endogeneity
Tobin’s Q	0.072 ***	0.020	0.004	Accept endogeneity

Note that *** $p < 0.01$. *Source:* Authors’ computation (2026).

Table 9. First-stage instrument diagnostics.

Instrument/Test	Coefficient/F-Statistic	Std. Error	p -Value
CAR _{t-1}	0.720 ***	0.078	0.001
CAR _{t-2}	−0.155 **	0.075	0.040
Joint first-stage F	36.395 ***	–	0.001

Note that ** $p < 0.05$ and *** $p < 0.01$. *Source:* Authors’ computation (2026).

Table 10 presents the results of the robustness checks, which reinforce those in Table 6 on the relationship between regulatory capital and bank performance. Specifically, the results are consistent across specifications in terms of coefficient signs, magnitudes, and significance. The results indicate a positive and significant relationship between CAR and bank performance indicators, as measured by ROA and Tobin’s Q at the 1% and 5% significance levels.

The NPL result remains, indicating a significant negative influence on bank performance. It implies that profitability is sensitive to credit risk management. Moreover, the liquidity ratio maintains a positive and statistically significant association with bank financial performance at the 5% and 10% levels. The results indicate that adequate liquidity can boost operational efficiency and enhance stability while addressing risk management issues. Similarly, bank size exerts a positive but insignificant impact on both ROA and Tobin’s Q. Furthermore, board independence continues to have a significant positive impact on both ROA and Tobin’s Q. Overall, the estimation using fixed-effects–2SLS does not alter the conclusion that capitalisation affects accounting profitability than market valuation. The validity of the instruments employed in the study was further assessed using the heteroskedasticity–robust Hansen J test. The results reveal Hansen J statistics of 0.842

($p = 0.327$) for ROA and 0.864 ($p = 0.346$) for Tobin's Q. In both cases, the null hypothesis of valid overidentifying restrictions is not rejected. Consequently, there is no statistical justification that the omitted instruments are correlated with the structural error terms. Based on the strong first-stage F-statistic reported previously, the findings offer evidence for both instrument relevance and validity, supporting the FE-2SLS specification.

Table 10. Results of the robustness checks.

Variable	ROA			Tobin's Q		
	Coef.	SE	<i>p</i> -Value	Coef.	SE	<i>p</i> -Value
CAR	0.068 ***	0.023	0.000	0.033 **	0.0540	0.024
NPL	−0.045 **	0.018	0.015	−0.032 **	0.0596	0.017
LIQ	0.028 **	0.0155	0.032	0.019 *	0.0198	0.076
BSize	0.158	0.3911	0.582	0.127	0.4987	0.691
BINDEP	0.043 **	0.1041	0.020	0.035 **	0.1330	0.038
Obs		208			208	
Hansen J	0.842 ($p = 0.327$)			0.864 ($p = 0.346$)		

Note that * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$. *Source:* Authors' computation (2026).

4.5. Diagnostic Tests

The study conducts post-estimation diagnostic and panel validity tests. This is important for validating the reliability of the estimation results and ensuring that the inferred relationship between regulatory capital and bank performance is driven by the right econometric specification. The study tests for serial correlation, heteroskedasticity and cross-sectional dependence. Since the results in Table 11 are the same across the performance variables, we report only the results for ROA. The findings indicate a preference for the fixed-effects estimator over the Random Effects estimator.

Table 11. Results of diagnostic tests.

Test	Technique	Statistic	<i>p</i> -Value	Remark
Estimator	Hausman Test	29.73 ***	0.000	FE preferred
Serial correlation	Wooldridge	−0.309	0.757	No serial correlation
Normality	Jarque–Bera	0.882	0.643	Normality not rejected
Cross-sectional Dependence	Pesaran CD	−2.684	0.007	Cross-sectional dependence
Heteroskedasticity	Breusch–Pagan	28.576	0.591	No heteroskedasticity

Note that *** $p < 0.01$. *Source:* Authors' computation (2026).

The results do not indicate the presence of serial correlation or heteroskedasticity, which further validates the suitability of two-way fixed effects with the Driscoll–Kraay standard error estimator. Similarly, the result indicates cross-sectional dependence among the banks, providing empirical justification for using two-way fixed effects with Driscoll–Kraay standard errors in the baseline specification. This result is also important because Nigerian banks operate in the same macroeconomic and regulatory environment, implying that shocks to one bank can be linked to those at other banks. Furthermore, the Jarque–Bera test results in Table 11 are not significant, indicating no evidence of severe asymmetry in the residuals. Overall, the findings are robust and economically meaningful.

4.6. Discussion of Findings

This study examines the effect of regulatory capital requirements on bank performance in Nigeria. The empirical results provide evidence that capital is an essential factor in Nigerian banks' performance. In the baseline two-way fixed-effects model with Driscoll–Kraay standard errors, CAR has a positive and statistically significant coefficient for ROA and Tobin's Q. The result suggests that a one percentage point increase in CAR will lead to 0.083 and 0.034 unit increases in ROA and Tobin's Q, respectively. This finding suggests that better-capitalised banks are able to absorb unexpected losses, operate with little exposure to financial distress and maintain lending capacity, thereby supporting profitability. The result aligns with studies by Barth et al. (2004), Jokipii and Milne (2008), and Berger and Bouwman (2009), who found that stronger capital positions improve resilience, reduce funding costs, and enhance profitability. The finding is also consistent with recent empirical evidence from Nigeria by Obans et al. (2026), who reported a significant relationship between capital adequacy measures and ROA among Nigerian deposit money banks. It is also consistent with evidence from Alkhazali et al. (2024), who examined this issue using 819 banks across 26 emerging market countries and found that banks with stronger capital positions during the COVID-19 period experienced higher profitability.

The positive relationship between CAR and ROA is further reinforced by the FE-2SLS results and remains statistically significant. This persistence of the relationship between the variables after addressing potential endogeneity is important because the connection between capital and profitability may be bidirectional. This is because capital can practically improve performance, while profitable banks can also accumulate capital through asset and cost efficiency and retained earnings. The results demonstrate that the relationship between regulatory capital requirements and performance is not driven by endogeneity bias. Instead, it affirms the prudential regulation position that well-capitalised banks have the potential to maintain lending activities, absorb losses, and sustain performance over time due to higher public confidence and lower cost of operations. This is particularly important for banks in emerging markets, such as Nigeria, which struggle with weak institutional and governance structures. Therefore, regulators and bank managers must ensure that banks have sufficient capital against shocks. The results align with theoretical prediction and empirical study by Yensu et al. (2021), who found positive effects of capital on bank profitability. The consistency of results across all variables and models provides strong support for the baseline findings.

The negative and significant coefficient of NPL in the ROA model indicates that deterioration in asset quality reduces bank profitability due to higher loss provisions, reduced interest income and investors' concerns about returns on investment. The result is in line with recent findings in banking literature by Cappelletti et al. (2024) and Hamad (2025), who reported a negative impact of credit risk on bank performance. The result also implies that capital alone cannot offset poor credit risk management, except when moderated by other important variables. It further underscores asset quality as a crucial mediator through which capital can effectively influence bank performance. The adverse influence of the NPL could be due to low oil output, macroeconomic shocks and high volatility. The finding also suggests that higher credit default rates can lead to increased provisions, reduced interest income and an adverse impact on the strength of capital buffers. This result suggests that capital adequacy must be complemented by effective credit risk management practices to withstand shocks, absorb losses, and enhance bank profitability and market value.

The positive influence of liquidity on performance measures indicates that adequate liquidity enhances banks' ability to engage in profitable lending opportunities. It also demonstrates the bank's ability to meet its commitments and reduce funding risks. The results show that bank size exerts a positive and significant influence on performance. This

result confirms that larger banks are more likely to achieve improved performance in the long run due to economies of scale, improved access to financial markets, better diversification of assets, greater technological integration and enhanced managerial capacity. Furthermore, the positive connection suggests that larger banks may receive closer regulatory supervision because of their importance and value to the country. Interestingly, bank size is positive and more significant in the specification with macroeconomics but without year effects, inferring that the effect of CAR is sensitive to the treatment of common macroeconomic shocks. This underpins the importance of the two-way fixed-effects specification.

Board independence has a positive and statistically significant impact on both the ROA and Tobin's Q performance measures, indicating that stronger board oversight may improve managerial monitoring, improve resource allocation and reduce opportunistic behaviour. The finding is essential for Nigerian banks, as capital requirements alone may not guarantee efficient performance amidst weak governance mechanisms. In this instance, good corporate governance should be promoted to complement regulatory capital for improved banking performance. The positive influence of the real GDP growth rate on performance indicates that banks utilise capital more effectively to enhance financial performance as economic conditions improve. In addition, it indicates that bank performance is driven by the economic outlook, which is influenced by economic stability and confidence. The result aligns with [Yensu et al. \(2021\)](#), who reported that the GDP growth rate is positively correlated with bank performance. However, the result conflicts with the finding of [Ali and Puah \(2018\)](#), who reported a negative association between GDP growth rate and bank performance. The analysis reveals that inflation continues to have a negative and statistically significant effect on bank performance, suggesting that heightened market uncertainty increases running costs and reduces returns due to a decline in disposable income. It further means that a high rate of inflation can lead to increased operational uncertainty, higher default risk and reduced returns for investors. Overall, the results demonstrate that capital adequacy improves Nigerian banks' performance. The findings, therefore, support a regulatory approach in which sound corporate governance, effective credit risk management and favourable macroeconomic environments complement strengthening of capital to improve performance.

5. Conclusions and Policy Implications

This study examines the effect of regulatory capital on the performance of deposit money banks in Nigeria, using panel data from 13 banks for the period 2007 to 2024. The study employs two-way fixed effects with Driscoll–Kraay standard errors as the baseline estimator, fixed-effects–2SLS as a robustness check to address potential endogeneity and other suitable specification tests. The findings reveal that regulatory capital has a significant impact on performance measures in Nigeria. Specifically, the capital adequacy ratio (CAR) has a significant and positive effect on both accounting-based and market-based performance measures by ROA and Tobin's Q. Similarly, the fixed-effects–2SLS results remain robust after controlling for potential reverse causality between bank capital and performance and reinforce the baseline findings by demonstrating that regulatory capital affects bank performance across profitability and market valuation. The results further show that NPL negatively affects performance indicators, whereas liquidity, bank size and board independence contribute positively to bank performance.

Overall, the result suggests that well-capitalised banks were better positioned to sustain lending, more resilient to shocks, and more efficient in absorbing losses. This result supports the capital buffer theory. These findings are particularly applicable to large, regulated deposit money banks in emerging economies, and may not generalise to smaller or less regulated financial institutions. The findings of this study are particularly relevant to the

ongoing banking sector recapitalisation programme in Nigeria. The evidence from this study, therefore, provides empirical support for the claim that stronger capital buffers can improve bank resilience and profitability. This is also in line with the Basel III objective of strengthening banks' capacity to absorb losses and improve resilience while maintaining their ability to support the real economy.

The findings of this study have provided important insights for regulators, bank managers, policymakers and other stakeholders on the effect of regulatory capital on bank performance in Nigeria. In all, the findings have important implications for the ongoing bank recapitalisation exercise and the adoption of the Basel III framework in Nigeria. The positive connection between minimum regulatory capital requirements and bank performance measures, as captured by ROA and Tobin's Q, suggests that capital enhancement should be viewed not solely as an effort to meet requirements but also as an opportunity to strengthen the solvency and output capacity of Nigeria's banking system. Following the findings, regulators should align with the Basel Accords to pursue a capital adequacy ratio that improves both profitability and market valuation. Regulators and bank managers should consistently support recapitalisation by improving risk management, governance and operational efficiency. Furthermore, policymakers should formulate policies that promote responsible lending that aligns with Nigeria's sustainable development and financial inclusion goals. In addition, banks should enhance their loan screening processes, monitoring, and recovery strategies to reduce non-performing loans. Bank managers should recognise the key role of asset quality in enhancing capital adequacy while implementing effective risk monitoring and management strategies. The regulator should continue to promote good corporate governance to strengthen monitoring and supervision, thereby sustaining performance and resilience within the system. Board independence should be encouraged to protect shareholders and depositors. The government should control inflation as a critical factor in the banking sector's performance, particularly in volatile emerging markets. Finally, CBN should deploy complementary strategies to complement higher minimum capital requirements, while ensuring that newly sourced capital supports credit to the private sector to enhance productivity. This is important for Nigerian banks to ensure that there are no excessive constraints on financial intermediation, and they can absorb macroeconomic shocks while contributing to economic growth.

This study has contributed to the literature on this issue; however, it is limited to selected banks and may not fully capture the entire banking sector. The small cross-sectional dimension and the exclusion of unlisted banks are limitations of this study. Also, to capture broader industry dynamics, future research may also cover small banks, microfinance and the activities of fintech organisations. Finally, cross-national research in other emerging economies with larger samples may provide comparative insights and shed light on this issue. Also, future studies could examine whether the effect of capital adequacy is non-linear, testing for an optimal capital level beyond which extra capital produces diminishing or adverse returns. Finally, researchers could employ larger cross-country African panel data and exploit regulatory changes.

Author Contributions: Conceptualization, F.I.A. and O.A.I.; methodology, F.I.A. and B.I.E.; software, F.I.A.; validation, F.I.A., O.A.I. and B.I.E.; formal analysis, B.I.E.; investigation, F.I.A.; resources, F.I.A.; data curation, F.I.A.; writing—original draft preparation, F.I.A.; writing—review and editing, B.I.E.; visualization, F.I.A. and O.A.I.; supervision, O.A.I. and B.I.E.; project administration, F.I.A. and O.A.I.; funding acquisition, F.I.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data for this study are available from the corresponding author upon reasonable request.

Acknowledgments: We thank the Editor-in-Chief and the anonymous reviewers for their invaluable comments and suggestions. The warm support from the Covenant University Centre for Research, Innovation and Discovery is highly appreciated.

Conflicts of Interest: The authors declare no conflicts of interest.

References

- Admati, A., & Hellwig, M. (2013). *The bankers' new clothes: What's wrong with banking and what to do about it*. Princeton University Press.
- Akande, J. O. (2025). Effect of capital adequacy and liquidity management on financial performance of listed deposit money banks in Nigeria. *Gusau Journal of Accounting and Finance*, 6(1), 108–121. [\[CrossRef\]](#)
- Ali, M., & Puah, C. H. (2018). Does bank size and funding risk effect banks' stability? A lesson from Pakistan. *Global Business Review*, 19(5), 1166–1186. [\[CrossRef\]](#)
- Alkhazali, O., Helmi, M. H., Mirzaei, A., & Saad, M. (2024). The impact of capital on bank profitability during the COVID-19 pandemic. *Global Finance Journal*, 62, 100994. [\[CrossRef\]](#)
- Amissah, M., & Opoku, O. A. (2023). Effect of capital adequacy requirement on profitability of selected banks listed on Ghana stock exchange. *Journal of Management Studies and Development*, 2(1), 13–25. [\[CrossRef\]](#)
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29–51. [\[CrossRef\]](#)
- Aroghene, K. G. (2022). Effect of capital adequacy, bank size and liquidity on the stability of FUGAZ Bank in Nigeria. *International Journal of Academic Management Science Research*, 6(12), 1–7.
- Ashwath, R., & Sachindra, G. R. (2025). Analysing financial stability and performance of Indian banks through capital adequacy and debt-equity ratios: A comprehensive statistical analysis. *Asian Journal of Economics, Business and Accounting*, 25(4), 383–393. [\[CrossRef\]](#)
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, 18(2), 121–136. [\[CrossRef\]](#)
- Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Springer.
- Barth, J. R., Caprio, G., & Levine, R. (2004). Bank regulation and supervision: What works best? *Journal of Financial Intermediation*, 13(2), 205–248. [\[CrossRef\]](#)
- Basel Committee on Banking Supervision. (2021). *Basel III: Strengthening the resilience of the banking sector*. Bank for International Settlements.
- Berger, A. N., & Bouwman, C. H. (2009). Bank liquidity creation. *The Review of Financial Studies*, 22(9), 3779–3837. [\[CrossRef\]](#)
- Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises? *Journal of Financial Economics*, 109(1), 146–176. [\[CrossRef\]](#)
- Bhattarai, B. P. (2020). Effects of non-performing loan on profitability of commercial banks in Nepal. *European Business and Management*, 6(6), 164–170. [\[CrossRef\]](#)
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [\[CrossRef\]](#)
- Cappelletti, G., Marques, A. P., & Varraso, P. (2024). Impact of higher capital buffers on banks' lending and risk-taking in the short- and medium-term: Evidence from the euro area experiments. *Journal of Financial Stability*, 72, 101250. [\[CrossRef\]](#)
- Chandrasegaran, L. (2020). Capital adequacy requirements and profitability: An empirical study on banking industry in Sri Lanka. *Journal of Economics and Business*, 3(2), 589–601. [\[CrossRef\]](#)
- Demirgüç-Kunt, A., Detragiache, E., & Merrouche, O. (2013). Bank capital: Lessons from the financial crisis. *Journal of Money, Credit and Banking*, 45, 1147–1164. [\[CrossRef\]](#)
- Demirgüç-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence. *The World Bank Economic Review*, 13(2), 379–408. [\[CrossRef\]](#)
- Endri, E., Sparta, S., Wiwaha, A., Karyatun, S., Oemar, F., & Setiawan, A. (2025). Banking profitability and COVID-19: Evidence from Indonesia. *Montenegrin Journal of Economics*, 21(4), 115–128. [\[CrossRef\]](#)
- Erhijakpor, A. E., & Eyamu, F. O. (2025). Financial institutions' regulation, banking sector competitiveness and stability of the banking sector in Nigeria. *Journal of Accounting, Finance, and FinTech Advancements*, 1(1), 1–12.
- Ezike, J. E., & Oke, M. O. (2013). Capital adequacy standards, Basel Accord and bank performance: The Nigerian experience (A case study of selected banks in Nigeria). *Asian Economic and Financial Review*, 3(2), 146–159.

- Ezu, G., Nwanna, I. O., & Eke-Jeff, O. M. (2023). Effect of capital adequacy on the performance of deposit money banks in Nigeria. *International Journal of Novel Research in Marketing Management and Economics*, 10(1), 53–63. [CrossRef]
- Fathony, M., Khaq, A., & Endri, E. (2020). The effect of corporate social responsibility and financial performance on stock returns. *International Journal of Innovation, Creativity and Change*, 13(1), 240–252.
- Hamad, H. A. (2025). Beyond IFRS 9: Examining liquidity, credit, and capital risks in banking performance: Evidence from Iraqi banks. *Academic Journal of International University of Erbil*, 2(3), 294–308. [CrossRef]
- Hsiao, C. (2014). *Analysis of panel data* (3rd ed.). Cambridge University Press.
- Igbinoso, O. I., & Naimo, L. O. (2020). Capital adequacy and financial stability in emerging markets. *Journal of Banking Regulation*, 34(2), 111–125.
- Ikpefan, O. A. (2013). Capital adequacy, management and performance in Nigeria commercial bank (1986–2006). *African Journal of Business Management*, 7(30), 2938–2950. [CrossRef]
- Ishaq, M., Islam, Y., & Ghouse, G. (2021). Tobin's Q as an indicator of firm performance: Empirical evidence from manufacturing sector firms of Pakistan. *International Journal of Economics and Business Administration*, IX(1), 425–441. [CrossRef] [PubMed]
- Jokipii, T., & Milne, A. (2008). The cyclical behaviour of European bank capital buffers. *Journal of Banking & Finance*, 32(8), 1440–1451. [CrossRef]
- Kadioglu, E., Telceken, N., & Ocal, N. (2017). Effect of the asset quality on the bank profitability. *International Journal of Economics and Finance*, 9(7), 60–68. [CrossRef]
- Kasri, R. A., & Azzahra, C. (2020). Determinants of bank stability in Indonesia. *Signifikan: Jurnal Ilmu Ekonomi*, 9(2), 153–166. [CrossRef]
- Khan, M. A., Siddique, A., & Sarwar, Z. (2020). Determinants of non-performing loans in the banking sector in developing state. *Asian Journal of Accounting Research*, 5(1), 135–145. [CrossRef]
- Kharabsheh, B., & Gharaibeh, O. K. (2022). Determinants of banks' stability in Jordan. *Economics*, 10(12), 311. [CrossRef]
- Kunjeda, C. B. (2024). Impact of capital adequacy on profitability of commercial banks in Nepal. *SP Swag: Sudur Paschim Wisdom of Academic Gentry Journal*, 12, 57–72. [CrossRef]
- Lusmeida, H., & Gunawan, E. (2025). The capital adequacy ratio moderated enterprise risk management on financial distress. *Jurnal Riset Bisnis dan Manajemen*, 18(1), 163–178. [CrossRef]
- Mankart, J., Michaelides, A., & Pagratis, S. (2020). Bank capital buffers in a dynamic model. *Financial Management*, 49(2), 473–502. [CrossRef]
- Nwobu, O. A., Owolabi, A. A., & Iyoha, F. O. (2017). Sustainability reporting in financial institutions: A study of the Nigerian banking sector. *Journal of Internet Banking and Commerce*, 22(8), 1–15.
- Obadimu, G. A., & Oboh, C. S. (2024). Impact of banking regulation and supervision on the financial performance of listed deposit money banks in Nigeria. *Covenant Journal of Business and Social Sciences*, 15(1), 21–37.
- Obadire, A. M. (2022). Banking regulation effects on African banks' stability. *Journal of Financial Risk Management*, 11(4), 707–726. [CrossRef]
- Obans, F. O., Ogundele, A. T., Ibitoye, O. A., Olutoye, E. A., Ejemezu, C. I., & Ibukun, F. O. (2026). Examining the effect of capital adequacy ratio on return on assets of deposit money banks in Nigeria. *African Journal of Stability and Development*, 18(1), 285–305. [CrossRef]
- Ogunwale, O., & Areghan, I. (2024). Impact of credit risk management on the performance of Nigerian deposit money banks: An analysis from 2010 to 2020. *Asian Journal of Advanced Research and Reports*, 18(10), 28–41. [CrossRef]
- Olowofela, O. E., Donfack, H. A., & Soh, C. W. (2025). Sustainable banking and bank stability in Nigeria: Empirical evidence from deposit money banks. *Journal of Risk and Financial Management*, 18(4), 211–227. [CrossRef]
- Omankhanlen, A. E., Ilori, N., Isibor, A., & Okoye, L. U. (2021). Monetary policies and the achievement of bank profit objective. *Journal of Central Banking Theory and Practice*, 10(2), 201–220. [CrossRef]
- Oseni, E. (2024). Evaluation of Nigerian deposit money banks' soundness: Bankometer model. *Asian Journal of Economics, Business and Accounting*, 24(7), 30–50. [CrossRef]
- Osunkoya, M., Ikpefan, O., & Olokoyo, F. (2023). Macroeconomic and bank-specific determinants of non-performing loans in Nigeria. *WSEAS Transactions on Business and Economics*, 20, 1153–1166. [CrossRef]
- Oyetade, D., Obalade, A. A., & Muzindutsi, P. F. (2022). The impact of changes in Basel capital requirements on the resilience of African commercial banks. *Scientific Annals of Economics and Business*, 69(1), 111–132. [CrossRef]
- Ozili, P. K. (2019). Determinants of banking stability in Nigeria. *CBN Bullion*, 43(2), 1–14. Available online: <https://ssrn.com/abstract=3392963> (accessed on 16 February 2026).
- Pham, T. T., Kieu Oanh Dao, L., & Chien Nguyen, V. (2021). The determinants of bank's stability: A system GMM panel analysis. *Cogent Business & Management*, 8(1), 1963390. [CrossRef]
- Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71(1), 135–158. [CrossRef]
- Sain, A., & Kashiramka, S. (2024). Role of disciplinary tools in maintaining bank performance and financial stability: Evidence from emerging economies. *Journal of Emerging Market Finance*, 23(1), 7–31. [CrossRef]

- Salim, N., Yusof, R., & Lau, W. Y. (2023). Capital adequacy and sustainable finance: Evidence from ASEAN banks. *Sustainability*, 15(12), 9554.
- Sadow, J. N., Duodu, E., & Oteng-Abayie, E. F. (2021). Regulatory capital requirements and bank performance in Ghana: Evidence from panel corrected standard error. *Cogent Economics & Finance*, 9(1), 2003503. [CrossRef]
- Sang, N. M. (2021). Capital adequacy ratio and a bank's financial stability in Vietnam. *Banks and Bank Systems*, 16(4), 61–71. [CrossRef]
- Sanusi, L. S. (2010). *The Nigerian Banking Industry: What went wrong and the way forward*. Bayero University, Kano. Available online: https://www.cbn.gov.ng/OUT/SPEECHES/2010/THE%20NIGERIAN%20BANKING%20INDUSTRY%20WHAT%20WENT%20WRONG%20AND%20THE%20WAY%20FORWARD_FINAL_260210.PDF (accessed on 16 February 2026).
- Staiger, D., & Stock, J. H. (1997). Instrumental variables regression with weak instruments. *Econometrica*, 65, 557–586. [CrossRef]
- Yensu, J., Yusif, H. M., Tetteh, E., Asumadu, G., & Atuilik, D. A. (2021). Main determinants of banks' stability: Evidence from commercial banks in Ghana. *Journal of Finance and Economics*, 9(2), 42–52.
- Yitayaw, M. K., Mogess, Y. K., Feyisa, H. L., Mamo, W. B., & Abdulahi, S. M. (2023). Determinants of bank stability in Ethiopia: A two-step system GMM estimation. *Cogent Economics & Finance*, 11(1), 2161771. [CrossRef]
- Yusuf, I., & Salisu, A. (2023). Capital adequacy and financial performance: A dynamic panel data analysis of Nigerian deposit money banks. *African Journal of Finance and Investment*, 20(2), 67–82.
- Zheng, C., Chowdhury, M. M., Gupta, A. D., & Islam, M. N. (2024). Effects of competition and ownership on the simultaneous relationship between bank risk and capital: Evidence from an emerging economy of Bangladesh. *PLoS ONE*, 19(12), e0311428. [CrossRef] [PubMed]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.