



## Capital Adequacy and Performance of Commercial Banks in Nigeria

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### Abstract

Commercial banks are central to financial intermediation, yet their stability and profitability are closely tied to capital adequacy risk. This study investigated the effect of capital adequacy risk on the performance of commercial banks in Nigeria over the period 2013–2022. A quantitative research design was adopted, using secondary data extracted from the audited financial statements of twelve commercial banks with international operating licenses. Return on Asset (ROA) was employed as the proxy for performance, while Risk-Weighted Asset Ratio (RAR), Deposit to Assets Ratio (DAR), and Asset Quality Ratio (AQR) were the explanatory variables. Panel regression analysis was conducted, and the Random Effects Model (REM) was selected as the preferred estimator. The findings reveal that both RAR and DAR have positive and significant effects on ROA, highlighting the importance of risk-based lending and stable deposit funding. In contrast, AQR showed a negative and significant effect, indicating that deteriorating loan quality undermines capital strength and profitability. The study recommends stronger regulatory oversight, improved credit risk management, stable deposit mobilisation, and efficiency-driven profitability to enhance the capital resilience and performance of commercial banks in Nigeria.

### 1.0 Introduction

Commercial banks occupy a strategic position in the Nigerian economy as financial intermediaries where they channel to facilitate investment, production, and consumption (Abata, 2020). Their ability to mobilize deposits, extend credit, and offer payment and settlement services makes them critical to economic growth and macroeconomic stability. In developing economies like Nigeria, where access to finance remains uneven and capital markets are still maturing, commercial banks play a particularly prominent role in financing private sector activity and enabling public sector liquidity (Umar and Dikko, 2020).

The performance of commercial banks, therefore, has direct and indirect implications for economic outcomes. A sound and efficient banking sector promotes confidence, attracts investment, and supports sustainable development (Santos, 2022). In contrast, weak bank performance can result in credit constraints, heightened systemic risk, and loss of public trust, factors that can deepen macroeconomic vulnerabilities. It is in this context that evaluating the performance of banks becomes a matter of not only institutional concern but broader economic significance.

The business of banking in Nigeria is inherently exposed to significant risks which include credit, market, operational, and liquidity risks, which directly challenge bank performance. Within this context, capital adequacy risk is paramount, especially following domestic financial turbulence and evolving regulatory reforms (Yakubu and Affoi, 2023). While capital serves as a crucial financial cushion to absorb losses and maintain solvency (Adeleye *et al.*, 2020), Nigerian banks face distinct challenges in maintaining adequate levels. These include financing economic growth in a volatile environment with high non-performing loans, meeting stringent Central Bank of Nigeria capital requirements without stifling profitability, and managing the

impact of macroeconomic instability on their capital buffers. Consequently, a bank's ability to navigate these challenges is a critical determinant of its stability and performance within the Nigerian economy.

The Basel Committee on Banking Supervision has provided an international regulatory framework through successive Basel Accords such as Basel I, II, and III, which aimed at enhancing the stability and resilience of the global banking system. Under Basel III, which reflects the most recent and comprehensive reform package, banks are required to maintain a minimum Capital Adequacy Ratio (CAR) of 8 percent, consisting of a 4.5 percent minimum Common Equity Tier 1 (CET1) capital, an additional 1.5 percent Tier 1 capital, and a capital conservation buffer of 2.5 percent, bringing the effective minimum capital requirement to 10.5 percent of risk-weighted assets (Kombo and Njuguna, 2019).

In line with these global benchmarks, the Central Bank of Nigeria (CBN) mandates differentiated CAR requirements depending on the category of banking licence. For commercial banks with international authorisation are required to maintain a minimum CAR of 15 percent, while those with national licenses are required to hold at least 10 percent. These thresholds are intended to reflect the risk exposures associated with each bank's operational scale and geographic reach.

Capital adequacy is commonly assessed through several ratios, among them the Capital Adequacy Ratio (CAR), the Risk-weighted Asset Ratio (RAR), and the Deposit to Assets Ratio (DAR). The Capital Adequacy Ratio (CAR) measures the proportion of a bank's regulatory capital to its risk-weighted assets which serve as a benchmark for the bank's ability to absorb losses and maintain solvency under stress conditions (Blundell-Wignall and Atkinson, 2019). The Risk-weighted Asset Ratio (RAR) reflects the share of a bank's assets that are weighted according to their level of credit and market risk, providing insight into the overall risk composition of the bank's balance sheet (Li *et al.*, 2021). A high RAR may indicate an aggressive risk-taking posture, which could strain capital buffers in adverse conditions. The Deposit to Assets Ratio (DAR), on the other hand, shows the extent to which a bank's assets are funded by customer deposits as indication of funding stability and liquidity (Li *et al.*, 2021).

Previous studies have examined various dimensions of capital adequacy indicators to provide insights into their relationship with the performance metrics of commercial banks. For instance, Nwankwo (2019) investigated capital adequacy using the risk-weighted asset ratio, customer deposits, and owners' equity in relation to the profitability of Zenith Bank between 2010 and 2016, and found that CAR exerted a positive and statistically significant effect on Return on Assets (ROA) within the study period. Similar findings were reported by Umoru and Osemwegie (2020) and Ikpefan (2021), who confirmed the relevance of capital strength in enhancing bank profitability.

However, most of these studies have focused either on a single bank or on narrow indicators of capital adequacy, often without accounting for the joint behaviour of risk exposure and funding structure. For example, Akpan *et al.* (2020) conducted a case study of a single tier-1 Nigerian bank, finding a positive association between its capital adequacy ratio and profitability, but the analysis did not control for the bank's simultaneous shift towards a more conservative loan portfolio, conflating the effects of capital and risk appetite. Similarly, Adeyemi and Okoro (2021), in a cross-sectional study of Nigerian banks, used aggregate capital ratios to predict asset growth, yet their model omitted critical variations in funding liquidity, failing to distinguish between banks funded by stable customer deposits and those reliant on more volatile interbank markets.

In addition, many analyses fail to incorporate panel data that captures variations across banks and over time, which limits the generalisability of their conclusions. There is also limited empirical research that simultaneously examines the combined effect of Asset Quality Ratio (AQR), Risk-weighted Asset Ratio (RAR), and Deposit to Assets Ratio (DAR) on wider performance indicators such as return on asset (ROA). This study seeks to fill this gap by adopting a multi-bank panel approach to explore how these three dimensions of capital adequacy risk collectively influence the performance of commercial banks in Nigeria with the specific objective of examining the effects of capital adequacy ratio on the performance of banks using return on equity as proxy.

## 2.0 Literature Review

This section reviews existing scholarly works and theoretical perspectives relevant to the study

### 2.1 Conceptual Review

This section reviewed recent and relevant literature on the major concepts of the study.

#### 2.1.1 Capital adequacy ratio

The Risk-Weighted Asset Ratio (RAR) remains one of the most widely used indicators of a bank's financial resilience and regulatory compliance. It assesses the proportion of a bank's assets that are exposed to varying degrees of risk, in line with the Basel framework for risk-based capital requirements (Kombo and Njuguna, 2019). The interaction between CAR and RAR is theoretically grounded in the capital buffer hypothesis, which posits that banks with a higher share of risky assets are required to maintain correspondingly higher levels of capital (Jokipii and Milne, 2016). Empirical studies such as Abba *et al.* (2020) examined the relationship between CAR and banking risks in the Nigerian deposit money banks and observed that the risk weighted asset ratio was higher than the CAR in the Nigerian banking industry. They further observed a negative relationship between Capital Adequacy Ratio and the risk portfolio of banks represented by the risk-weighted assets ratio. The findings of Abba *et al.* (2020) were consistent with Mohammed and Obeidat (2021) whose study on the determinants of CAR in Jordanian banks produced similar result. Odunma *et al.* (2021) also carried out a study on the determinants of CAR of commercial banks in Jordan and found out a negative but not significant relationship between credit risks and CAR.

Olalekan and Adeyinka (2022) examined a portfolio reaction to capital requirements by investigating the effect of capital ratio regulation on portfolio behaviour of commercial banks. They found that an increase in variance of returns increases the probability of failure, while an increase in returns or capital ratio decreases failure risk. Their findings are consistent with Umoru and Osemwegie (2020).

#### 2.1.2 Deposit to Assets Ratio (DAR)

The Deposit to Assets Ratio (DAR) reflects the proportion of a bank's total assets funded by customer deposits, and it is a critical measure of the stability of a bank's funding structure. In theory, banks that maintain a higher DAR are less dependent on external or volatile sources of financing, such as interbank borrowings or capital markets, and are thus more resilient to liquidity shocks. The relationship between DAR and capital adequacy is informed by the financial intermediation theory, which suggests that funding structure plays a role in shaping banks' risk behaviour and capital buffer decisions (Freimanis and Šenfelde, 2019).

Empirical literature offers mixed evidence on the relationship between CAR and DAR. For instance, Osakwe *et al.* (2021) examined the determinants of capital adequacy in Nigerian deposit money banks and reported a significant positive relationship between deposit mobilisation and capital strength. Their findings indicate that banks with a strong deposit base are more capable of sustaining higher capital ratios. In contrast, Osuka and Ezedike (2019) found that although deposits provide a stable funding source, their relationship with CAR is not always linear, particularly when banks aggressively expand credit without adequate capital reinforcement.

Williams (2022) also assessed the interaction between deposit base and capital adequacy in selected Tier-2 banks in Nigeria, showing that while a high DAR enhances liquidity and cushions operational shocks, it does not automatically lead to improved capital buffers unless accompanied by strong risk management and retained earnings. These findings indicate the relevance of deposit structure in assessing capital adequacy but also highlight the mediating role of bank-specific strategies and regulatory context. This study extends the analysis by incorporating DAR alongside other capital adequacy risk indicators to explore their joint impact on performance.

### 2.1.3 Capital adequacy ratio

Asset quality, typically measured by the Non-Performing Loan Ratio (NPLR), is a central determinant of a bank's financial soundness and its capacity to maintain adequate capital. Poor asset quality increases loan-loss provisions, reduces earnings, and places downward pressure on capital buffers. The capital buffer theory suggests that banks may raise capital levels proactively in anticipation of deteriorating loan quality or, conversely, that declining asset quality may lead to the erosion of existing capital (Zheng *et al.*, 2012).

Empirical studies have reinforced this theoretical relationship. Olawale (2024) conducted a study on capital adequacy and credit risk in Nigerian commercial banks and found a strong negative and significant relationship between NPLR and CAR, suggesting that rising non-performing loans directly threaten capital sustainability. Similarly, Abiodun *et al.* (2020) analysed the effect of asset quality on capital strength and concluded that persistent deterioration in loan performance weakens capital adequacy, especially for mid-sized banks with limited capacity to absorb losses.

Choi (2021) examined the link between credit risk indicators and regulatory capital in Sub-Saharan Africa and confirmed that banks with higher credit impairment ratios tend to underperform in capital benchmarks. However, contrasting evidence from Innocent *et al.*, (2019) suggests that some Nigerian banks have managed to report relatively strong capital positions despite elevated levels of non-performing loans, owing in part to regulatory forbearance or delay in recognizing loan losses. This study contributes to this strand of literature by analysing whether the interplay between CAR and asset quality, measured through NPLR, holds significant implications for bank performance in Nigeria over time.

Bank performance is often assessed through a range of financial metrics that capture profitability, efficiency, and stability. Common indicators include Return on Assets (ROA), which measures how efficiently a bank uses its total assets to generate earnings; Net Interest Margin (NIM), which reflects the effectiveness of a bank's intermediation function; and Return on Equity (ROE), which evaluates profitability from the shareholders' perspective (Oyetade *et al.*, 2021). Among these, ROA is widely regarded as a fundamental measure of overall bank performance, as it indicates the capacity of management to convert assets into profit while

maintaining prudent risk exposure (Ajayi *et al.*, 2019). In the Nigerian banking sector, ROA has been extensively used as a proxy for operational efficiency and the ability of banks to sustain profitability amid regulatory reforms and macroeconomic volatility (Oyetade *et al.*, 2021). The relationship between capital adequacy and ROA ensures the delicate balance between financial stability and profitability. A strong Capital Adequacy Ratio (CAR) enhances solvency and depositor confidence, often leading to sustainable long-term performance, while excessive capitalisation may constrain leverage and reduce shareholder returns (Ajayi *et al.*, 2019).

## 2.2 Theoretical Framework

This study is anchored on the economic efficiency theory as proposed by Odunga (2016). The theory posits that firms should strive to produce their outputs at the lowest possible cost per unit, thereby achieving maximum efficiency in the use of available resources. In essence, economic efficiency is attained when firms exploit all available economies of scale, enabling them to operate at the most cost-effective level of output in the short run (Ndiangui *et al.*, 2024). Over the long term, efficiency can be further enhanced by expanding the productive capacity of existing systems, which allows firms to raise their optimal output levels without incurring proportionate increases in cost. The relevance of this theory to the present study lies in its emphasis on optimal resource allocation and cost-efficiency as a pathway to improved performance. In the context of commercial banking, capital adequacy and its associated ratios such as the risk-weighted asset ratio, deposit-to-assets ratio, and asset quality can be seen as elements influencing how efficiently a bank operates within a regulated financial environment.

## 3.0 Methodology

This study adopts an ex-post facto research design which uses historical financial data that are already documented and cannot be manipulated by the researcher. The design is appropriate for analysing the relationship between capital adequacy risk indicators and bank performance over time, using secondary data extracted from the published annual financial statements of selected commercial banks in Nigeria. A purposive sampling technique was employed to select twelve commercial banks with international operating licenses. The study covers a ten-year period from 2013 - 2022. The dependent variable in this study is Return on Asset (ROA), used as a proxy for bank performance, while Risk-Weighted Asset Ratio (RAR), Deposit to Assets Ratio (DAR) and Asset Quality Ratio (AQR) are used to measure the independent variable.

To analyse the relationship between the variables, the study employs panel data analysis techniques. Specifically, both fixed effects and random effects models are considered to account for unobserved heterogeneity across banks. The Hausman specification test is used to determine the more appropriate model between the two. Prior to regression estimation, diagnostic tests are conducted to check for multicollinearity, serial correlation, and heteroscedasticity. Where violations of regression assumptions are detected, robust standard errors are applied to ensure the validity of the statistical inference.

### 3.1 Model specification

The model below is proposed for the study based on the dependent and independent variables as adopted from .

$$ROA_{it} = \beta_0 + \beta_1 DAR_{it} + \beta_2 RAR_{it} + \beta_3 AQR_{it} + \varepsilon_{it}$$

Where

$ROA_{it}$  = Return on asset of bank  $i$  at time  $t$

$DAR_{it}$  = Deposit asset ratio of bank  $i$  at time  $t$

$RAR_{it}$  = Risk – weighted Asset Ratio of bank  $i$  at time  $t$

$AQR_{it}$  = Asset Quality Ration of bant  $i$  at time  $t$

$\beta_0$  = intercept

$\beta_1 - \beta_4$  = Coefficient of the independent variables

$\varepsilon_{it}$  = error term

Asset Quality Ratio (AQR)

#### 4.0 Results and discussions

This section presents the results and discussions in line with the objective of the study.

#### 4.1 Descriptive and correlation statistics

Table 4.1: Descriptive Statistics

VARIABLES	OBSERVATI ONS	MEAN	STD. DEV.	MIN	MAX
ROA	120	0.02	0.012	0.00	0.03
RAR	120	0.74	0.146	0.32	0.63
DAR	120	0.72	0.134	0.26	0.80
AQR	120	0.15	0.070	0.02	0.37

Source: Author computations, Stata, 2025

Table 4.1 presents the descriptive statistics for the five variables used in the study. The table is based on 120 observations covering a ten-year period across selected commercial banks. Table 1.1 provides a summary of the descriptive statistics for the key variables in the study. The Risk-Weighted Asset Ratio (RAR) and Deposit to Assets Ratio (DAR) have relatively high mean values of 0.74 and 0.72 respectively, reflecting the banks' significant exposure to risk-weighted assets and reliance on deposit funding. The Return on Assets (ROA), a proxy for performance, is modest at 0.02 which suggest a low but positive profitability across the sector. The Asset Quality Ratio (AQR) averages 0.15, pointing to moderate levels of non-performing loans, though the range (0.02 to 0.37) shows that some banks experienced considerable credit risk.

#### 4.2 Inferential Statistics Report

The decision to adopt the most appropriate estimation technique between the OLS, FEM and REM relied on the outcome of the Hausman specification test, which examines whether the unique errors ( $\mu_i$ ) are correlated with the regressors (Khan *et al.*, 2021). From Table 1.4, the Random Effects Model (REM) yields the highest explanatory power with an  $R^2$  overall of 0.7756, which is significantly better than both the Fixed Effects Model ( $R^2$  overall = 0.3955) and the Ordinary Least Squares (OLS) model (Adjusted  $R^2$  = 0.0211). Additionally, all explanatory variables in the REM; Risk-Weighted Asset Ratio (RAR), Deposit to Asset Ratio (DAR), Return on Assets (ROA), and Asset Quality Ratio (AQR), are statistically significant at the 5% level, with consistent signs and robust t-values.

Table 4. 2: Stata Ordinary Least Square (OLS) model.

STATISTICS VARIABLES	BETA COEFFICIENTS	T-VALUES	SIGNIFICANCE
RAR	0.1227	2.33	0.034
DAR	0.1005	1.92	0.032
AQR	-0.2011	-2.01	0.006
R <sup>2</sup>	0.6256		
ADJUSTED R <sup>2</sup>	0.0211		
F-STATISTIC	22.11		
SIGNIFICANCE	0.0000		

Source: Author computations, 2025

Table 4. 3: Stata Random Effects Model (REM)

STATISTICS VARIABLES	BETA COEFFICIENTS	T-VALUES	SIGNIFICANCE
RAR	0.1329	2.44	0.023
DAR	0.1055	1.37	0.044
AQR	-0.2084	-2.47	0.005
R <sup>2</sup> WITHIN	0.6114		
R <sup>2</sup> BETWEEN	0.0141		
R <sup>2</sup> OVERALL	0.7756		
WALD CH2	121.39		
SIGNIFICANCE	0.0000		

Source: Author computations, 2025

### 4.3 Discussion of findings

As shown in the result of the test of the first variable for the study, a positive and significant relationship was observed between ROA, which served as proxy for performance of commercial banks and Risk-Weighted Asset Ratio (RAR), Deposit to Asset Ratio (DAR) and Asset Quality Ratio (AQR) are the predictors. This implies that as the share of risk-weighted assets increases, banks tend to maintain higher capital buffers, supporting the capital buffer theory. It is widely recognized that capital can serve as a cushion to absorb unexpected losses, reduce the probability of insolvency, and therefore lower expected bankruptcy costs. The finding suggests that Nigerian commercial banks with relatively riskier asset portfolios have responded by building up their capital positions, possibly to meet regulatory thresholds and avoid supervisory sanctions. This aligns with empirical findings from Odunma *et al.* (2021) and Mohammed and Obeidat (2021), who observed a similar relationship in both local and international banking contexts.

The study also finds a positive and statistically significant relationship between ROA and the Deposit to Assets Ratio (DAR). This result implies that banks which fund a higher proportion of their assets through customer deposits tend to maintain stronger capital positions. Deposits, being a relatively stable and low-cost source of funding, can support the bank's capacity to lend and invest without depending heavily on volatile external finance. The positive linkage may also reflect regulatory emphasis on liquidity and funding stability, with well-deposit-funded banks in a better position to generate earnings, retain profits, and meet capital adequacy

requirements. This result is in line with the findings of Udeh and Ezeabasili (2019), who noted that stable funding structures are positively associated with capital strength in Nigerian banks.

A negative and statistically significant relationship was found between ROA and the Asset Quality Ratio (AQR), indicating that poor asset quality erodes capital adequacy. This result is consistent with theory and previous empirical evidence suggesting that higher levels of non-performing loans reduce earnings, increase provisioning requirements, and place downward pressure on capital buffers. In the Nigerian banking context, this highlights the continued relevance of effective credit risk management in sustaining capital strength. The result aligns with the findings of Olayinka and Eze (2019), who showed that asset quality deterioration undermines the solvency position of banks and may expose them to regulatory breaches if not proactively managed.

## 5.0 Conclusion and Recommendation

This study examined the effect of capital adequacy risk on the performance of commercial banks in Nigeria. Specifically, it examined how Risk-Weighted Asset Ratio (RAR), Deposit to Asset Ratio (DAR), and Asset Quality Ratio (AQR), influence the ROA. The analysis covered a ten-year period from 2013 to 2022, using panel data sourced from the audited financial statements of purposively selected commercial banks with international operating licenses. The data were analysed using panel regression techniques, and the Random Effects Model (REM) was selected as the preferred estimation method based on its superior explanatory power and consistency.

The findings of the study show that RAR and DAR are positively and significantly associated with ROA, indicating that banks with higher risk-weighted exposures and stable deposit-based funding tend to maintain stronger capital buffers. On the other hand, AQR showed a negative and significant relationship with ROA, suggesting that asset quality deterioration continues to undermine capital strength across Nigerian banks.

Based on these findings, the study recommends that the Central Bank of Nigeria (CBN) continue to enforce capital adequacy requirements with a sharper focus on the composition of banks' risk-weighted assets. Banks should be incentivised to strengthen internal credit risk management systems to mitigate deterioration in asset quality, particularly in high-risk lending segments. Furthermore, commercial banks should optimise their deposit mobilisation strategies, as a high DAR not only enhances liquidity but also supports capital formation through more stable funding structures. Lastly, sustaining profitability through improved operational efficiency remains critical, as retained earnings form a significant component of regulatory capital. Strengthening these interconnected dimensions will be essential to improving the capital resilience and overall performance of commercial banks in Nigeria.

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