



Impact of Capital Adequacy Ratio on Return on Equity

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DOI: 10.5281/zenodo.23269112

ARTICLE INFO

Article history:

Received : 10-09-2026

Accepted : 25-09-2026

Available online : 09-10-2026

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Citation: Akintayo, O. O. A. (2025). Impact of Capital Adequacy Ratio on Return on Equity. *IKR Journal of Economics, Business and Management (IKRJEBM)*, 1(2), 27-37



ABSTRACT

Original Research Article

This study investigated the effect of the Capital Adequacy Ratio (CAR) on the Return on Equity (ROE) of quoted deposit money banks in Nigeria, while controlling for firm size and leverage. A quantitative research design was employed using secondary panel data obtained from the audited financial statements and annual reports of 10 quoted Nigerian deposit money banks covering the period from 2014 to 2024. The study applied panel regression analysis using the Random Effects model, with the Hausman test employed to guide the choice between fixed-effects and random-effects estimators. Descriptive statistics, correlation analysis, and diagnostic tests were also conducted to assess the reliability and robustness of the estimated models. The findings indicate that CAR has a positive but statistically insignificant effect on ROE ($\beta = 0.0283$, $p = 0.853 > 0.05$). Accordingly, the null hypothesis that CAR has no significant effect on the ROE of quoted deposit money banks in Nigeria was not rejected, suggesting that although adequate capital strengthens regulatory compliance and financial stability, it does not necessarily translate directly into improved profitability. Firm size, however, exerted a positive and statistically significant effect on ROE ($\beta = 6.6821$, $p = 0.000 < 0.05$), indicating that larger banks may achieve superior financial performance through economies of scale and greater operational efficiency. Leverage had a negative but statistically insignificant effect on ROE ($\beta = -5.9450$, $p = 0.642 > 0.05$), implying that variations in debt levels did not significantly affect profitability within the sampled banks. The overall model explained approximately 42% of the variation in ROE, demonstrating the combined explanatory contribution of the variables. The study concludes that while CAR is important for maintaining regulatory stability and financial soundness, bank profitability is more strongly associated with institutional size and operational capacity. It therefore recommends that quoted deposit money banks prioritise efficient capital utilisation, sustainable expansion, and improved operational efficiency as strategies for enhancing profitability.

Keywords: Capital Adequacy Ratio, Financial Performance, Deposit Money Banks, Return on Assets, Return on Equity.

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Introduction

Banking sectors are very crucial to any country economic growth globally since it mobilises savings, allocates credit, enables investments and promotes financial intermediation that supports country economic activity. Deposit money banks are the life-wire of the financial system in Nigeria and every other country by providing credit to people, corporate organisations and government entities. Therefore, the stability

and performance of these institutions is very important for the national economic progress. Obadimu and country 25) pointed out the important role of banks in the financial intermediation process as they serve as a conduit between surplus and deficit units in the economy growth of a country. Given the systemic importance of banking system, regulators across the world have put considerable emphasis on the maintenance of bank soundness and stability. Capital sufficiency has emerged as a major tool of prudential control.

CAR or Capital Adequacy Ratio is a regulatory term that signifies the ratio of the core capital of a bank to its risk weighted assets. It is generally considered as an important indication to judge a bank's ability to absorb losses and to withstand financial shocks. The CAR requirement was formalised under the Basel regulations (Basel I, II and III) to improve banks' risk absorption capacity and foster financial stability (Patel & Kanchan, 2024).

The empirical relationship between capital adequacy and bank performance remains an important subject of academic and regulatory interest. Theoretically, a strong capital base enhances a bank's risk-absorbing capacity which leads to greater financial stability and reduced probability of insolvency. From the perspective of buffer theory, capital serves as a cushion against unexpected losses, enabling banks to survive negative economic tremors and sustain operations (Obadimu & Oboh, 2025). Furthermore, regulatory theory emphasizes that capital adequacy standards help enforce market discipline and reduce excessive risk-taking by ensuring that banks hold sufficient equity relative to risky assets. However, the trade-off theory suggests that while adequate capital improves safety, excessively high capital may reduce returns on equity due to higher funding costs and reduced leverage.

Empirically, several recent research had highlighted the significance of CAR in affecting financial performance in emerging nations including Nigeria. For instance, Festus et al. (2025) in their study found that capital adequacy had a positive and statistically significant effect on Return on Equity (ROE) of listed Deposit Money Banks across selected Sub-Saharan African countries including Nigeria, thus reinforcing the significance of upholding strong capital buffers for profitability. Likewise, Ibrahim & Aris (2025) established the positive and significant effect of Capital Adequacy Ratio on Return on Assets (ROA) of listed banks in Nigeria showing that adequately capitalised banks tend to perform better in terms of asset utilisation and profitability. In line with these findings, a study on capital adequacy and financial performance found that CAR is key to the resilience and profitability of Nigerian banks, particularly when bank-specific characteristics and market conditions are controlled for (Festus et al., 2025). Recent empirical evidence highlights the dual role of capital sufficiency in enhancing the stability of banks and also in the support of improving their financial performance.

In view of these views and empirical evidence, the influence of capital adequacy on the financial performance of quoted deposit money banks in Nigeria is an important field of investigation.

Hence, the study seeks to analyse the effect of capital adequacy ratio on the return on equity of Deposit Money Banks in Nigeria. Therefore, to conduct the study efficiently, the study is divided into five parts namely introduction,

literature review, methodology, empirical results and conclusions and recommendations.

Literature Review

This section focuses on the review of literature for the study, conceptual, theoretical and empirical review of literature.

Conceptual Review

Capital Adequacy Ratio is a foundational regulatory metric in banking that measures the amount of capital a financial institution holds relative to the risks inherent in its asset portfolio, and it remains central to discussions on financial stability, risk management, and performance outcomes in contemporary banking literature. CAR reflects a bank's cushion against potential losses, ensuring that it can absorb unexpected shocks without jeopardizing depositor funds or systemic stability.

In simplest mathematical or calculating form, CAR is defined as the ratio of a bank's regulatory capital typically comprising Tier 1 and Tier 2 components to its risk-weighted assets (RWA), thereby adjusting capital requirements according to the relative riskiness of different types of assets (Isitoah & Onuorah, 2025).

CAR is expressed as:

$$\text{CAR} = (\text{Tier 1 Capital} + \text{Tier 2 Capital}) \div \text{Risk-Weighted Assets} \times 100$$

Tier 1 capital generally represents a bank's core shareholder equity and retained earnings that can readily absorb losses, while Tier 2 capital includes supplementary reserves and hybrid instruments that provide additional loss-absorbing capacity but with lower liquidity. Academic scholars consistently frames CAR as a vital indicator of banking health and resilience. Scholars highlight that a robust capital adequacy position reduces vulnerability to credit, market, and operational risks, enabling banks to manage losses without interrupting operations (Isitoah & Onuorah, 2025).

In Nigeria, for example, recent data reported by financial authorities indicate that banking system capital adequacy improved substantially in 2024, reaching a level well above minimum regulatory thresholds, which underscores the practical importance regulators place on this metric for safeguarding the sector against economic headwinds (All-Africa, 2025). This regulatory emphasis is consistent with the Basel III framework an international standard adopted by many countries, including Nigeria which explicitly sets minimum capital requirements and additional buffers to mitigate systemic risk. Under Basel III, CAR includes not only the basic capital ratio but also conservation and countercyclical buffers designed to build resilience during economic expansions and absorb losses during downturns.

In academic literature, multiple scholars have offered definitions and theoretical perspectives on CAR that highlight both its regulatory and strategic roles. According to Isitoah &

Onuorah (2025), CAR is described as “the ratio of a bank’s capital to its risk-weighted assets that reflects the ability to absorb risk and potential losses,” emphasizing its function as both a buffer and a performance determinant. Another scholarly interpretation situates CAR within broader risk management frameworks, asserting that “capital adequacy is essential for assessing the safety and soundness of banks, protecting depositors, and promoting systemic stability” (Okwudili et al., 2025). These definitions illustrate that CAR goes beyond a mechanical regulatory requirement to encapsulate a bank’s strategic capacity to manage contemporary financial risks.

Therefore, for this study capital adequacy follows the definition given by Isitoah and Onuorah (2025) that defined CAR as the ratio of a bank’s capital to its risk-weighted assets that reflects the ability to absorb risk and potential losses.

Bank Financial Performance

Bank financial performance is a multifaceted concept that reflects the effectiveness with which banks utilize their resources to generate returns, sustain operations, and meet stakeholder expectations in a competitive and risk intensive environment. In banking, performance is typically evaluated through both profitability and efficiency measures that capture how well a bank deploys its assets, equity, and capital to achieve desired financial outcomes. The importance of assessing bank performance stems from its implications for financial stability, shareholder value, credit supply, and the broader economy, particularly in evolving markets where banking sector resilience act as a strategic role in country’s economic development (Akande, 2025). Financial performance in banking is commonly measured using key indicators such as Return on Assets (ROA) and Return on Equity (ROE). In contrast, ROE measures the return generated on shareholders’ equity, reflecting the bank’s capacity to reward investors for their capital commitments. ROE is particularly relevant from an investor’s perspective, as it assesses profitability relative to the capital invested by shareholders, capturing the interplay between capital structure, risk management, and earnings generation (Raheem & Bamidele, 2023).

Scholars have offered varying but complementary definitions of bank financial performance that help frame its measurement in empirical research. According to Omankhanlen et al. (2022), bank financial performance represents “the ability of financial institutions to utilize their resources efficiently to generate sustainable profits, maintain capital adequacy, and achieve growth while controlling risk exposures. Alhaji and Bala (2023) define bank performance as “the outcome of a bank’s financial activities measured through profitability ratios, efficiency ratios, and growth indicators that collectively reflect operational success and stakeholder value creation.” These definitions emphasize that financial performance is not a unidimensional measure but encompasses a range of indicators that together signal how

well a bank performs relative to its objectives and market conditions.

This research paper follows the definition of Alhaji and Bala (2023) that defined bank financial performance as the outcome of a bank’s financial activities measured through profitability ratios, efficiency ratios, and growth indicators that collectively reflect operational success and stakeholder value creation.

Return on Equity

The other important profitability ratio is the Return on Equity (ROE) which measures profitability in relation to shareholders’ equity and shows the bank’s ability to generate returns for its investors. ROE is computed by dividing the net profit after tax by the shareholders’ equity (Akande, 2025). ROE is important for the decision-making of investors as it indicates the effectiveness of equity capital in generating earnings and it is sensitive to leverage, dividend policies and capital adequacy levels. Studies on the Nigerian banking industry have indicated that CAR has favourable effects on ROE, but high leverage might reduce returns due to the higher financial risk (Adeola & Afolabi, 2023). So, ROE gives you an idea of not just profitability, but also capital efficiency and financial risk management.

Firm Size

Firm Size (FSIZE) is a control variable representing the scale of a bank’s operations, typically measured by the natural logarithm of total assets. Firm size influences performance through economies of scale, operational diversification, and market power. Larger banks may enjoy advantages such as lower average costs, better risk management systems, and wider customer reach, which can enhance profitability. However, while some studies suggest a positive relationship between firm size and profitability, others find that larger banks may face bureaucratic inefficiencies that offset scale advantages (Ogbonna & Appah, 2022). Including FSIZE as a control variable in this researcher isolate the effect of capital adequacy on profitability while accounting for structural differences among banks.

Other Profitability Measures and Control variables in the Study

Firm Size

Firm Size (FSIZE) is a control variable that reflects the size of bank operations and is usually measured as the natural logarithm of total assets. The effect of firm size on performance is due to economies of scale, diversification of operations and market strength. Larger banks may benefit from lower average expenses; improved risk management systems and a greater client reach which can help profitability. However, other research has reported a favourable association between business size and profitability, while some studies have argued that larger banks suffer from bureaucratic inefficiencies that negate scale

benefits (Ogbonna & Appah, 2022). These researchers control for the effects of FSIZE in an effort to isolate the influence of capital sufficiency on profitability while controlling for structural differences among banks.

Leverage

Leverage (LEV) is the ratio of the bank's financing of assets with debt relative to equity, defined as total liabilities divided by total assets. High leverage can improve profits if returns on assets are greater than the cost of debt but also raises financial risk because you must pay obligations regardless of profitability. In Nigeria, it has been observed that debt levels above sustainable norms have a negative impact on profitability, stressing the necessity of balancing capital and debt financing (Okoye & Ezeani, 2025). These studies include leverage as a control variable to test if capital sufficiency plays a role in performance independent of the bank debt structure.

Return on Assets

Return on Assets (ROA) is defined as the ratio of net profit after tax to total assets, and it captures how efficiently banks use their asset base to generate earnings (Adewuyi & Azeez, 2023). ROA is particularly informative in banking because it abstracts from the influence of capital structure, meaning it measures profitability purely in relation to the total productive resources controlled by the bank. High ROA values indicate that management effectively deploys assets to maximize returns, while low ROA values can signal inefficiencies in asset utilization or elevated operating costs. Empirical evidence by Adewuyi and Azeez (2023) supports the importance of ROA by found that Nigerian banks with efficient asset management strategies tend to sustain stronger profitability, even when facing regulatory changes in capital and liquidity guidelines

Conceptual Framework

The conceptual framework of this study shows the theoretical and logical relationship between Capital Adequacy Ratio (CAR) and Bank Financial Performance, along with key control variables that can influence this relationship. It gives a systematic description of the effect of the independent variable on the dependent variable in the financial sectors.

The main independent variable in the study is the Capital Adequacy Ratio (CAR). It expresses the regulatory capital of a bank as a percentage of its risk-weighted assets. It represents the bank's capacity to absorb unexpected losses and withstand financial shocks. The framework assumes that an increase in CAR improves the stability, risk management capabilities and depositor confidence of a bank which in turn has a favourable impact on the profitability and overall financial performance.

The dependent variable is Bank Financial Performance assessed by Return on Assets (ROA) and Return on Equity (ROE). ROA is a measure of how well management is able to

use total assets to generate profits. ROE is a measure of the returns made for shareholders. Both these indicators are well acknowledged in banking and financial literature as valid markers of success.

The conceptual linkage between CAR and financial performance is grounded in Regulatory Theory, Buffer Theory, and Trade-Off Theory. Regulatory and Buffer theories suggest that adequate capital strengthens resilience and promotes sustainable profitability. However, Trade-Off Theory acknowledges that excessively high capital levels may reduce leverage benefits and lower return on equity. Therefore, the relationship may be positive but subject to optimal levels.

To strengthen the model and reduce omitted variable bias, the framework incorporates control variables, including:

- Firm Size: Larger banks may benefit from economies of scale and diversification advantages.
- Leverage: Higher leverage increases financial risk and may influence profitability.

Below is the diagrammatic representation of the conceptual framework:

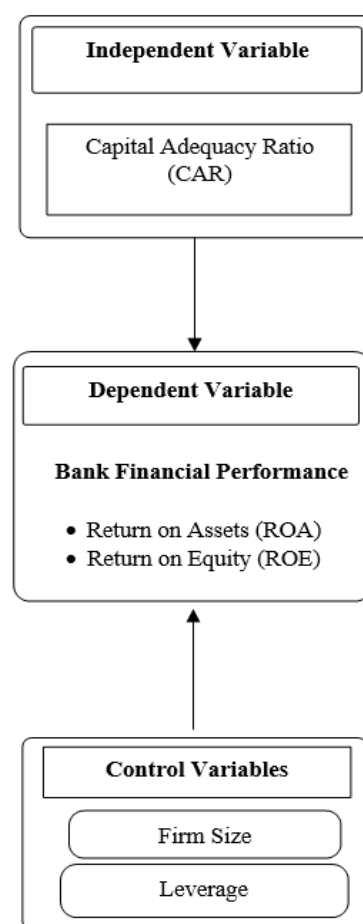


Figure 1: Conceptual Framework illustrating the relationship between Capital Adequacy Ratio (CAR) and Bank Financial Performance

Source: Researcher's Computation, 2026

Theoretical Review

This study is hinged on the Trade-off Theory: The Trade-Off Theory of Capital Structure was originated by Kraus and Litzenberger in 1973, emphasizes that firms balance the benefits and costs of debt financing to determine an optimal capital structure. The theory posits that debt financing provides a tax shield advantage because interest payments are tax-deductible, which can enhance firm value and profitability. However, debt also increases financial risk and the potential for bankruptcy costs. Consequently, banks and other firms are theorized to maintain a balance between the benefits of leverage such as tax savings and the costs of financial distress, with this trade-off guiding their capital and performance decisions.

In banking sector, the Trade-Off Theory is particularly relevant because banks operate under regulatory capital requirements while seeking to maximize returns on equity. High leverage can magnify returns, improving metrics such as Return on Equity (ROE), but it simultaneously elevates the risk of insolvency, non-performing loans, and regulatory breaches. Recent studies in emerging economies, including Nigeria, highlight that deposit money banks must navigate this trade-off carefully: maintaining sufficient equity and capital buffers to meet Capital Adequacy Ratio (CAR) standards while leveraging debt to fund operations and enhance profitability (Ibrahim & Oladipo, 2024). Empirical evidence by Adewuyi and Azeez, (2023) reveals that banks with moderate leverage ratios aligned with regulatory benchmarks tend to achieve better financial performance, as excessive debt increases default risk and reduces stability.

Empirical Review

Khairi et al (2024) studied the influence of Return on Equity (ROE), Capital Adequacy Ratio (CAR), and Financing to Deposit Ratio (FDR) on Return on Assets (ROA) of PT Bank Muamalat Tbk with quarterly secondary data from 2014 to 2023. Multiple linear regression analysis was performed using SPSS version 29. The F-test at 0.05 level of significance indicated that ROE, CAR and FDR together have substantial effect on ROA. However, the t-test showed that the individual effect of ROE on ROA was statistically significant, while the individual influence of CAR and FDR was statistically negligible. The model gave a R value of 0.993 and an R² value of 0.986 which means 98.6% of the variation in ROA was explained by the explanatory variables. The authors concluded that CAR is important to the total financial success, whereas the effect in isolation may depend on complimentary factors of profitability.

Wanjiru et al (2024) also explored the effect of capital sufficiency on the financial performance of 39 commercial banks in Kenya using explanatory research design and unbalanced panel regression analysis. The results of their study state that capital sufficiency has a positive and significant effect on financial performance with a regression

coefficient value of $\beta = 0.0333113$ and $p = 0.027$ which is less than the significance level of 0.05. The study also revealed that over 67 percent of the selected banks met the needed regulatory cash ratio, but 33 percent still faced liquidity issues. The authors concluded that proper capital buffers improve bank profitability and stability.

In Nigeria, Abonyi and Ogbada (2025) analysed panel data of listed deposit money banks from 2014 to 2023 using the use of a fixed effects model. Their results showed that CAR had a strong, positive and statistically significant effect on Return on Assets (ROA), but Tier 1 leverage ratio and equity to assets ratio were not statistically significant. The study indicated that capital adequacy remained a key driver of profitability and resilience in Nigerian banks, particularly in times of macroeconomic instability.

Similarly, Ihejirika et al. (2024) studied the impact of capital adequacy on the shareholders' returns of Nigerian deposit money banks using the NDIC data from 2004 to 2022. The study used ARDL modelling and Granger causality approaches. The findings show that total qualifying capital, adjusted shareholders' fund and capital to risk-weighted asset ratio has positive substantial effects on Return on Equity (ROE). The authors concluded that capital sufficiency is a major determinant of shareholders' wealth and enhances investors' confidence in the Nigerian banking sector.

Ahmed and Haruna (2023) also studied 14 listed Nigerian deposit money banks from 2014 to 2023 using panel regression methodology. Their study reveals CAR had favourable and significant effect on Return on Assets (ROA) at 5% significance level. However, the foreign exchange risk and operational risk were positive but not statistically significant. The research found that high capital positions boost profitability but need to be backed by efficient risk management mechanisms.

However, there are still considerable gaps, especially on quoted deposit money banks in Nigeria, as the empirical research on capital adequacy ratio and bank financial performance continue to grow. Although the majority of the recent research produced valuable information on the relationship between regulatory capital and profitability, nevertheless, the variations in findings and limitations imply the need for further investigation.

A notable lacuna in the research is the discrepancy of empirical evidence on the direction and intensity of the association between CAR and financial performance. Ahmed and Haruna (2023) showed that CAR has positive and statistically significant effects on Return on Assets (ROA) of Nigerian listed banks. This implies that higher capital buffers boost profitability and resilience. Likewise, Wanjiru et al (2024) observed that capital sufficiency had a positive and substantial link with financial performance of Kenyan commercial banks. They concluded that adequate capital enhances stability and returns. The study by Khairi et al

(2024) however found that CAR together with other variables had a combined effect on ROA but was statistically insignificant, suggesting that capital adequacy may not be a sole driver of profitability in all banking situations. The mixed results of these studies demonstrate that there is no consensus in the literature and suggest that the effect of CAR may vary based on country-specific regulatory regimes, bank structure, and macroeconomic circumstances. Therefore, there is still the need for more concentrated empirical investigations inside the listed banking sector in Nigeria to resolve these contradictions.

Another critical gap relates to the sample composition of previous studies. Many recent empirical works examine commercial banks generally without distinguishing between quoted and non-quoted deposit money banks. For example, Ihejirika et al. (2024) and Samir (2023) examined banking sectors in Nigeria and Nepal respectively but did not specifically isolate quoted banks. Quoted deposit money banks operate under stricter corporate governance standards, enhanced disclosure requirements, and stronger market discipline due to their listing status. These structural differences may influence how capital adequacy affects their performance. However, limited empirical evidence specifically addresses quoted Nigerian banks as a distinct category, create a gap that this study intends to fill.

Methodology

The study utilised a quantitative research methodology, namely a descriptive-causal research approach to evaluate the effect of Capital Adequacy Ratio (CAR) on the financial performance of listed Deposit Money Banks (DMBs) in Nigeria. Descriptive research is suited to provide a full description of the present state of variables and causal research is good for evaluating the link and the influence of independent variables on dependent variables across time (Sekaran & Bougie, 2022). For the period the study on banks listed on the Nigerian Exchange Group (NGX) used secondary panel data to verify data reliability and consistency. The design enables for the detection of trends, connections and patterns in CAR, firm size, leverage and financial performance indicators like ROA and ROE. The descriptive approach was chosen because it allows for robust statistical analysis through the use of panel regression techniques that take into account cross-sectional (across banks) and longitudinal (over time) variation. The population of the study is all quoted deposit money banks in Nigeria. a deposit money bank means a banking institution licensed by the Central Bank of Nigeria to accept deposits, provide loans and offer other banking services. Only banks traded on the stock exchange are included, since their financial statements are public, audited and reported in a consistent manner, which makes them reliable for statistical research. As at 2025, the Nigerian Exchange Group has thirteen (13) deposit money banks listed. The sample is composed of large commercial

banks with broad financial activities and enough observations across many periods to enable panel analysis.

The study employs purposive sampling, a non-probability sampling technique where the researcher selects subjects based on data availability and relevance to the research objectives (Etikan et al., 2021). Purposive sampling ensures that only banks with consistent reporting and complete data are included, thereby enhancing the quality of statistical inference.

Based on this, banks were selected based on the following criteria:

1. They must be listed on the NGX throughout the study period (2014–2024).
2. They must have complete audited financial statements for the entire period.
3. They must consistently disclose components necessary for computing CAR, ROA, ROE, and control variables.

Ten (10) deposit money banks were sampled based on these characteristics. The secondary data used in this study was sourced from the audited financial statement and annual report of the sampled deposit money banks downloaded from the Nigerian Stock Exchange website. Secondary data was picked due to the reliability, availability and standardisation of data and the ability to compare data across banks and between years.

This study examines the impact of Capital Adequacy Ratio on the financial performance of quoted deposit money banks in Nigeria. The variables used in the study consist of dependent, independent, and control variables. Their measurements are defined as follows:

Dependent Variables: The financial performance is determined by the profitability indicators: Return on Assets (ROA) and Return on Equity (ROE). Return on Assets (ROA): Net profit after tax divided by total assets. It measures how efficiently a bank uses its entire assets to earn income. The Return on Equity (ROE) is calculated as the net profit after tax divided by the shareholders' equity. It displays the return on shareholders' invested cash and assesses overall profitability from the owners' standpoint.

Independent Variable: The main explanatory variable is Capital Adequacy Ratio (CAR). CAR is defined as the ratio of total regulatory capital to risk-weighted assets. It shows how strong the bank's capital is and how well it can handle possible losses and still stay financially stable. The higher the CAR, the stronger the capital basis relative to the risk exposure.

Control Variables: Two control variables are used to eliminate omitted variable bias. Firm Size (FSIZE) is the natural logarithm of total assets. Log transformation reduces the discrepancies in scale and normalises the distribution of

the data. The leverage ratio (LEV) is equal to total debt divided by total assets. It indicates the ratio of assets financed through debt and the level of financial risk to which the bank is exposed.

These measurements are consistent with prior empirical studies and ensure that the variables are operationalized in a manner suitable for panel regression analysis.

The above information is stated in table 1 below:

Table 1: Measurement of Variables

Variable	Formula	Measurement	Sources	Prior Expectation
Return on Assets (ROA)	Net Profit ÷ Total Assets	Dependent variable representing profitability measured as profit after tax divided by total assets at year end	Annual Reports (2014–2024) / Company Websites	Positive
Return on Equity (ROE)	Net Profit ÷ Shareholders' Equity	Dependent variable representing shareholders' return measured as profit after tax divided by total equity	Annual Reports (2014–2024) / Company Websites	Positive
Capital Adequacy Ratio (CAR)	Total Regulatory Capital ÷ Risk-Weighted Assets	Independent variable measuring the bank's capital strength and ability to absorb losses	Annual Reports (2014–2024) / Central Bank Publications	Positive
Firm Size (FSIZE)	ln (Total Assets)	Control variable measured as the natural logarithm of total assets to capture bank size	Annual Reports (2014–2024) / Company Websites	Positive
Leverage (LEV)	Total Debt ÷ Total Assets	Control variable measuring the proportion of assets financed by debt, indicating financial risk	Annual Reports (2014–2024) / Company Websites	Negative

Model Specification

$$ROE_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 FSIZE + \beta_3 LEV_{it} + \mu_i + \varepsilon_{it}$$

Where:

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

ROE_{it} = Return on Equity of bank i at time t

CAR_{it} = Capital Adequacy Ratio of bank i at time t

$FSIZE_{it}$ = Firm Size of bank i at time t

LEV_{it} = Leverage of bank i at time t

β_0 = Intercept

$\beta_1 - \beta_3$ = Coefficients of explanatory variables

μ_i = Unobserved bank-specific effect

ε_{it} = Stochastic error term

The models allow for the assessment of both between-bank and within-bank effects, controlling for unobserved heterogeneity

Estimation Techniques

To ensure the reliability and validity of the empirical findings, the study applied panel data regression techniques and associated diagnostic tests. The estimate approaches used were Pooled Ordinary Least Squares (Pooled OLS), Fixed Effects (FE) and Random Effects (RE) models. The decision between these models was based on the Hausman specification test, which tests for correlation between the bank-specific unobserved effects and the explanatory variables. The Pooled OLS model ignores individual variation across banks and gives us with baseline estimates, but it can provide skewed findings if there are unobserved effects.

Results and Discussion

Variable Description and Correlation Analysis

Table 2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
CAR (Capital Adequacy Ratio %)	101	13.30	5.45	6.88	36.14
ROA (Return on Assets %)	101	1.72	1.17	0.40	6.87
ROE (Return on Equity %)	101	15.43	7.82	2.11	38.30
FSIZE (Firm Size)	101	15.19	0.84	13.71	17.54
LEV (Leverage)	101	0.89	0.038	0.73	0.94
Bank (Deposit Money Bank)	101	5.62	2.86	1	10
Year (2014-2024)	101	6.13	3.21	1	11

Source: Researcher's Computation, (2026)

The descriptive data presented in table 1 provide an idea about the financial features of the sampled deposit money banks for the period 2014 to 2024. The average Capital Adequacy Ratio (CAR) is 13.30% with a standard deviation of 5.45 suggesting substantial range in the regulatory capital levels of banks, with the lowest figure being 6.88% and the highest being 36.14%. The average Return on Assets (ROA) was 1.72% with a standard deviation of 1.17%, indicating that profitability relative to total assets is generally low, but varies somewhat across banks and years. The Return on

Equity (ROE) has an average of 15.43% and a standard deviation of 7.82%, which means that there is a considerable variation of the shareholders' return among the banks, with the minimum of 2.11% and the maximum of 38.30%. The average firm size (FSIZE) is 15.19 implying moderately large banks, while leverage (LEV) is consistently high (mean = 0.89) indicating that banks rely heavily on debt funding. The bank max of 10 and year of 11 means that the data is for ten banks across 11 years, but it is also ensured that there is appropriate temporal and cross-sectional representation.

Table 3. ROE as Dependent variable

MODEL (ROE)		
Test / Statistic	Model 1	Decision
Wooldridge Test (Autocorrelation)	$F(1,9) = 1.309, p = 0.2821$	Fail to reject null; no first-order autocorrelation
Modified Wald Test (Groupwise Heteroskedasticity)	$\chi^2(10) = 4550.52, p = 0.0000$	Reject null; heteroskedasticity present
Hausman Test (Fixed vs Random Effects)	$\chi^2(3) = 1.86, p = 0.6025$	Fail to reject null; Random Effects preferred
Breusch-Pagan LM Test (Random Effects vs Pooled OLS)	$\text{chibar}^2(01) = 103.03, p = 0.0000$	Reject null; Random Effects model appropriate
Pesaran's Test (Cross-sectional Dependence)	$5.377, p = 0.0000$	Reject null; cross-sectional dependence present

Source: *Researcher's Computation, (2026)*

Similarly, for Model 2, which examines ROE as the dependent variable, the Wooldridge test ($F(1,9) = 1.309, p = 0.2821$) shows no autocorrelation, while the Modified Wald test ($\chi^2(10) = 4550.52, p = 0.0000$) again confirms heteroskedasticity. The Hausman test ($\chi^2(3) = 1.86, p = 0.6025$) favors Random Effects over Fixed Effects, and the Breusch-Pagan LM test ($\text{chibar}^2(01) = 103.03, p = 0.0000$) indicates that bank-specific effects are significant, justifying the use of Random Effects instead of pooled OLS. Pesaran's test ($5.377, p = 0.0000$) shows cross-sectional dependence

among banks, suggesting that external sector-wide factors may simultaneously affect bank performance.

So, for the two models (i.e ROA and ROE), the diagnostic tests across both models confirm that Random Effects panel regression with robust standard errors is the most appropriate estimation technique so as to account for heteroskedasticity and cross-sectional dependence, while ensuring the reliability of the

H₀₂: Capital Adequacy Ratio has no significant effect on Return on Equity of quoted Deposit Money Banks in Nigeria.

Table 4: Random Effects Regression of Return on Equity on Capital Adequacy with Clustered Robust Standard Errors

Table 1: Random Effects Regression of Return on Equity on Capital Adequacy with Clustered Robust Standard Errors						
R-sq:				Numbers of Obs		101
Within	0.5000				Number of groups	10
Between	0.3593				Obs per group:	
Overall	0.4155				Min	8
					Avg	10.1
					Max	11
					Wald chi2(4)	46.46
					Prob> chi2	0.0000
(Std. Err. adjusted for 10 clusters in Bank)						
ROE	Coefficient	Robust Std. Error	Std.	z-value	p-value	95% Confidence Interval
CAR	0.0283	0.1524		0.19	0.853	[-0.2705, 0.3271]
FSIZE	6.6821	1.0034		6.66	0.000	[4.7154, 8.6488]
LEV	-5.9450	12.7797		-0.47	0.642	[-30.9927, 19.1027]
_cons	-81.2318	16.1153		-5.04	0.000	[-112.8171, -49.6464]
sigma_u	4.7239					
sigma_e	4.2374					
Rho	0.5541 (fraction of variance due to u_i)					

Source: *Researcher's Computation, (2026)*

The model analysis in table 4 exhibits a within R-squared of 0.5000, indicating that 50% of the variation in ROE within banks over time is explained by CAR, FSIZE, and LEV. The between R-squared of 0.3593 suggests that 35.9% of the variation in ROE across banks is accounted for by the model, while the overall R-squared of 0.4155 indicates that approximately 41.6% of the total variation in ROE across both time and banks is explained by the explanatory variables. The Wald chi-square statistic of 46.46 with a probability value of 0.0000 confirms that the model is statistically significant, demonstrating that the combined effect of CAR, FSIZE, and LEV on ROE is meaningful.

Individually, CAR has a positive coefficient of 0.0283, suggesting that a 1 unit increase in CAR is associated with a 0.0283 increase in ROE, holding other variables constant. However, this effect is not statistically significant ($p = 0.853$), and the 95% confidence interval $[-0.2705, 0.3271]$ includes zero, indicating that changes in capital adequacy do not significantly influence shareholder returns among the sampled banks. Firm Size (FSIZE), on the other hand, demonstrates a strong positive and statistically significant relationship with ROE (coefficient = 6.6821, $p = 0.000$), implying that larger banks are more effective in generating returns for equity holders, likely due to better resource utilization, operational efficiency, and diversification advantages. Leverage (LEV) has a negative coefficient of -5.9450 but is not statistically significant ($p = 0.642$), indicating that higher debt levels do not have a meaningful effect on ROE within this sample, although the negative sign suggests a potential inverse relationship between financial risk and shareholder profitability.

The Rho value of 0.5541 shows that approximately 55.4% of the total variance in ROE is due to differences between banks, while 44.6% is due to within-bank variation over time.

That 55% of total variance is due to differences between banks. Overall, the results fail to reject H_{02} , confirming that CAR does not significantly influence ROE.

Thus, the results analysis also retained the null hypothesis (H_{02}) that Capital Adequacy Ratio has no significant effect on ROE of quoted deposit money banks in Nigeria, suggesting that while adequate capital supports regulatory compliance, it does not directly translate into higher shareholder returns.

Conclusion

Based on the findings of this study, it can be concluded that the Capital Adequacy Ratio of quoted deposit money banks in Nigeria does not have a significant effect on their financial profitability, whether measured by Return on Assets or Return on Equity. The results consistently show that, while Capital Adequacy Ratio is positively related to profitability, the relationship is statistically insignificant, confirming that regulatory capital alone is not a direct driver of bank performance. Conversely, firm size emerges as a significant

determinant of ROE, indicating that larger banks benefit from economies of scale, diversified operations, and more efficient management of assets and equity. Leverage was negatively related to profitability but did not exhibit statistical significance. On the whole, the study brings to light that for Nigerian deposit money banks operational efficiency and strategic growth matter more for profitability than capital adequacy.

Recommendations

Based on the findings and conclusion of the study, the following recommendations were brought up;

1. Deposit Money Banks should not only maintain adequate capital levels for regulatory compliance but also ensure that capital is efficiently deployed into productive, income-generating assets to enhance profitability.
2. Banks should pursue sustainable growth strategies such as branch expansion, digital banking development, and service diversification, as firm size was found to significantly improve financial performance.
3. Management should focus on cost control, risk management, and innovation to maximize returns on assets and equity, since profitability appears more influenced by operational strength than by capital levels alone.
4. Although leverage was not significant, but banks should avoid excessive borrowing and maintain balanced capital structures to minimize financial risk and ensure long-term stability.

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