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Capital Adequacy and Profitability of Manufacturing Firms Listed in Nigeria

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Abstract: Manufacturing firms in Nigeria continue to face fluctuating profitability levels despite efforts aimed at improving capital adequacy and operational efficiency. This situation raises concerns regarding the extent to which capital structure and financial management variables influence firm performance. The main objective of this study was to examine the effect of capital adequacy indicators on the profitability of listed manufacturing firms in Nigeria. The study adopted a panel research design using secondary data sourced from the annual reports of selected firms. The findings revealed that EQA had a positive significant effect on profitability with a coefficient of 0.2034 and a probability value of 0.0041, suggesting that stronger equity positions enhance financial performance. CIR also exhibited a positive significant influence on profitability, with a coefficient of 1.6317 and a probability value of 0.0308, indicating that efficient cost management contributes to improved returns. Conversely, CAR (–0.2645; p = 0.3684) and DER (–0.0358; p = 0.2720) showed negative but statistically insignificant effects on profitability, implying that leverage and capital adequacy alone do not meaningfully drive firm performance. It is recommended that firms optimize their capital structures by improving equity positions, adopting cost-effective operational strategies, and reducing reliance on debt financing to boost profitability.

Keywords: Capital adequacy, Cost efficiency, Equity-to-asset ratio, Manufacturing Firms, Profitability.

INTRODUCTION

Profitability remains a key determinant of business sustainability and economic progress across nations. In the manufacturing sector, it serves as a measure of operational efficiency and long-term viability, reflecting how effectively firms utilize resources to generate income and sustain growth. Globally, profitability is assessed using indicators such as Return on Assets (ROA), Return on Equity (ROE), Return on Investment (ROI), and Operating Profit Margin (OPM), each offering unique insights into financial performance and management efficiency. ROA gauges how effectively a company uses its assets to generate profit, while ROE measures returns to shareholders, and ROI evaluates financial gains relative to investment costs. OPM, on the other hand, assesses operational efficiency by determining how much of total revenue is converted into profit (Gichuhi, 2021). These profitability metrics collectively highlight how manufacturing firms optimize capital utilization, ensure stakeholder satisfaction, and contribute to overall economic development through employment creation and industrial output.

Capital adequacy, on the other hand, denotes the sufficiency of a firm's capital base to sustain operations and absorb financial shocks. It is a crucial determinant of a firm's resilience, profitability, and capacity to meet both internal and external financial obligations (Lekaaso et al., 2020). Adequate capitalization enhances investor confidence, ensures liquidity, and provides a buffer against unforeseen losses, thus preserving corporate solvency (Melani et al., 2019). Firms that effectively manage their capital often reinvest profits to build stronger financial foundations and sustain growth (Carvallo & Kasman, 2005). The adequacy of capital, therefore, forms a strategic pillar for organizational survival, particularly in volatile business environments. As global economic conditions become increasingly unpredictable, effective financial management and adequate capitalization have become central to sustaining competitiveness and ensuring long-term profitability among manufacturing firms.

The concept of capital adequacy extends beyond financial institutions to non-financial sectors, including manufacturing firms, where it can be measured using proxies such as Capital Adequacy Ratio (CAR), Equity to Asset Ratio (EAR), Debt-to-Equity Ratio (DER), and Cost-to-Income Ratio (CIR) (Udom & Eze, 2018; Duho, 2023). These indicators help assess a firm's capacity to finance operations and withstand financial risk. CAR reflects a firm's capital strength relative to risk-weighted assets (Antwi, 2019), while EAR measures the proportion of assets financed through equity rather than debt (Kong et al., 2023). DER captures the degree of financial leverage and risk exposure (Grozdić et al., 2020), and CIR evaluates operational efficiency by comparing costs to income (Hess & Francis, 2004). Empirical studies such as AlZoubi (2021) and Ogunode et al. (2022) emphasize that inadequate capital and high CIR negatively affect profitability, whereas balanced capital structures enhance financial performance. Consequently, capital adequacy provides an essential framework for firms to evaluate financial health, mitigate risk, and ensure stability in competitive manufacturing environments. In Nigeria, the manufacturing sector remains a cornerstone of industrialization and economic diversification, yet its profitability is persistently constrained by structural and financial challenges.

Despite its potential to drive GDP growth, employment, and export diversification, the sector's contribution to national output remains below expectations due to inadequate capital, rising production costs, and limited access to credit (Aroghene & Onuorah, 2024). Erratic power supply, high-interest rates, inflationary pressures, and dependence on imported machinery further strain profitability and operational efficiency (Ihemeje et al., 2020). As capital adequacy plays a critical role in determining firms' ability to withstand these macroeconomic and operational shocks, understanding its relationship with profitability becomes imperative.

Therefore, this study investigates the relationship between capital adequacy and profitability of listed manufacturing firms in Nigeria, focusing on how measures such as CAR, EAR, DER, and CIR influence profitability indicators like ROA, ROE, ROI, and OPM, with implications for financial resilience and industrial competitiveness. The remainder of the paper is organized as follows: Section two presents a review of relevant literature, sections three and four detail the methodology and empirical results, respectively, and the final section offers the study's conclusions along with policy recommendations.

LITERATURE REVIEW

Conceptual Review

Profitability

Profitability has been conceptualized by various scholars as a core indicator of a firm's financial health and operational performance. It reflects the ability of a business to generate earnings relative to its costs and resources over time, serving as a key measure of efficiency and sustainability (Mohammad et al., 2022). Several internal and external determinants influence profitability. Internally, effective working capital management, through prudent control of inventory, receivables, and payables, plays a significant role in enhancing profitability (Sulaiman et al., 2019). Externally, a firm's capital structure, defined by the mix of debt and equity financing, has considerable implications for profit generation. While moderate debt can enhance profitability through leverage and tax benefits, excessive debt increases financial risk, potentially reducing net returns (Olorunfemi et al., 2017). In contemporary business environments, the concept of profitability has evolved beyond short-term financial gains to include long-term sustainability and social responsibility. Companies are increasingly recognizing that sustainable profitability depends on responsible corporate practices that foster environmental stewardship, ethical operations, and community engagement (Fernandez & González, 2020). Empirical evidence suggests that firms integrating corporate social responsibility (CSR) into their operations experience improved financial performance due to enhanced stakeholder trust, brand loyalty, and operational efficiency (Smith et al., 2022). Consequently, profitability is now viewed as a multidimensional construct that encapsulates financial, social, and environmental dimensions, aligning firm success with sustainable development objectives.

Capital Adequacy

Capital adequacy has been defined by various scholars as a key determinant of a firm's financial soundness and stability. Bawua (2020) describes capital adequacy as the ability of firms to maintain a strong capital base that can cushion against financial shocks and sustain long-term solvency. This concept is particularly vital in both manufacturing and financial sectors, where firms are exposed to market volatility, credit risk, and operational disruptions. The characteristics of capital adequacy are closely linked to the firm's ability to manage risk and maintain operational efficiency. It is commonly evaluated through financial ratios that act as benchmarks for measuring a company's strength and solvency. One of the most widely recognized indicators is the Capital Adequacy Ratio (CAR), which assesses the proportion of a firm's capital relative to its risk-weighted assets. A higher CAR signifies a stronger capital position and greater capacity to absorb losses (Smith et al., 2020).

Although originally developed for the banking sector, CAR has become a relevant measure across other industries, including manufacturing, where financial stability is equally essential. Regulators and investors often use CAR to assess a firm's financial robustness, as it provides insight into the company's ability to continue operations under uncertain economic circumstances.

Theoretical Review: Trade-off Theory

The study was theoretically hinged on the trade-off theory. The theory stipulates that value maximizing managers will always seek to maintain capital levels (Adequacy) that optimize resources while minimizing associated costs of obtaining the capital, (Serrasqueiro & Caetano, 2015). These associated costs are usually a delicate balancing act between costs savings from the deployment of debt capital on the one hand and the costs of possible insolvency on the other. The optimum level is reached when the tax savings from interest payments on debts more than compensate for the costs of debts. This is because most firms would usually be partly financed by debt and partly by equity. Securing the right balance between the two main capital components in appropriate levels and value is therefore the major thrust of the theory. Moreover, to examine the effect of capital adequacy on profitability, this study adapted the Work of Ogunode et al. (2022) on capital adequacy and corporate performance of non-financial firms in Nigeria.

Empirical Review

Nguyen et al. (2020) conducted an empirical investigation to determine how capital adequacy and related indicators influence the performance of Deposit Money Banks (DMBs) in Vietnam. The analysis covered the period between 2013 and 2018 and purposively involved 31 commercial banks. Capital adequacy was captured using financial leverage and minimum capital adequacy ratio, while corporate performance was assessed using return on average total assets (ROTA), return on equity (ROE), and net interest margin (NIM). Panel data gathered for the study were analyzed with multiple regression models, and the outcomes revealed that capital adequacy positively contributes to the performance of banks. Although this result is consistent with the findings of Abebe (2022), it contrasts with the work of Dao and Nguyen (2020), who reported a negative linkage between capital adequacy and profitability using different analytical approaches. The study recommended improving managerial efficiency and adopting systematic measures to raise equity capital as strategies for enhancing the financial performance of firms.

In another study, Wassie (2021) explored how maintaining optimal capital levels affects the performance of export-oriented firms in Ethiopia. The research relied primarily on a descriptive design and involved 164 firms that were selected through stratified sampling. Multiple regression was applied in analyzing the collected data. The findings showed a significant positive association between capital adequacy and corporate performance, which aligns with earlier reports by Enitan (2019) and Aboussof and Belkaid (2021), who similarly concluded that working capital measures improve firm performance. However, the study also revealed that the inventory conversion period—a component reflecting operating capital adequacy had a negative impact on firm performance. Based on these insights, the author recommended that firms adopt more conservative working capital policies to sustain adequate capital levels required for improved performance.

Similarly, Hassan et al. (2021) evaluated the influence of capital adequacy on the performance of firms within Nigeria's agricultural sector. Correlation and regression analyses were conducted on data obtained from four listed agricultural firms, with further post-estimation diagnostics used to validate the regression models. The results indicated that liquidity structure, serving as a proxy for capital adequacy, had a significant positive

effect on firm performance measured by ROA. However, when firm size was introduced into the model, its effect on ROA became insignificant. The authors concluded that firms should implement deliberate strategies that encourage consistent capital accumulation and asset acquisition over time to enhance long-term performance.

Ogunode et al., (2022) assessed the effect of capital adequacy on the corporate performance of quoted non-financial firms operating in Nigeria. Several studies on the influence of capital adequacy on corporate performance have been conducted without specific focus on non-financial entities despite their growing contribution to the country's gross domestic product (GDP). The study utilized the ex-post facto research design using secondary data obtained for the period 2011–2020. A sample of thirty-eight (38) out of sixty-three (63) listed non-financial firms were purposively selected while data obtained were analyzed using multivariate regression. The study found that while capital adequacy ratio, equity capital/total assets ratio and cost income ratio negatively affected corporate performance, debt equity ratio and firm size positively influenced corporate performance of quoted non-financial firms operating in Nigeria. It therefore concluded that firm size and profitable use of debt capital in the capital mix of non-financial firms are key factors that can positively drive their corporate performance.

Despite the growing body of literature on capital adequacy and its relationship with financial performance, significant gaps remain. Many studies are limited to specific regions, industries, or short-term effects, which hinder a broader understanding of how CAR influences ROI in diverse settings. The lack of long-term perspectives and the narrow focus on specific factors like sustainability reporting or governance mechanisms further complicates the ability to generalize findings. Therefore, a comprehensive examination of the impact of CAR on ROI is essential to fill these gaps, particularly in the context of global financial systems and varying economic conditions. Understanding how capital adequacy affects ROI, not only in terms of financial stability but also in supporting sustainable growth, innovation, and long-term profitability, will provide crucial insights for both financial institutions and policymakers. Further research could help establish clearer guidelines on optimal capital requirements, enhancing financial resilience while promoting sustainable business practices across various sectors.

METHODOLOGY

This study adopted the ex-post facto research design within a panel data framework. The panel data design, which combines both time series and cross-sectional observations, provided a robust dataset capable of addressing the research questions and testing the formulated hypotheses. This design was essential for understanding both the temporal and firm-specific dynamics influencing capital adequacy and profitability in the Nigerian manufacturing sector.

The use of secondary data was deemed suitable and comprehensive because all variables under investigation were well-documented and quantifiable across the study period. Hence, the ex-post facto approach was adopted because the data required for the analysis were already available from secondary sources and were utilized without any form of manipulation. This design allowed for the assessment of the relationship between capital adequacy indicators and profitability measures among listed manufacturing firms in Nigeria.

The population of this study comprised all the sixty-three (63) listed manufacturing firms in Nigeria as of 31st December 2023. From this population, a purposive sampling technique was employed to select twelve (12) firms whose financial statements were consistently available for the study period. The selected firms include Cadbury Nigeria PLC, Flour Mills Nigeria PLC, Guinness Nigeria PLC, International Breweries PLC, NASCON Allied Industries PLC, Nestle Nigeria PLC, Nigerian Breweries PLC, Nigerian Enamelware PLC, Northern Nigeria Flour Mills PLC, PZ Cussons Nigeria PLC, Unilever Nigeria PLC, and Vitafoam Nigeria PLC. The study covered a fourteen-year period spanning from 2014 to 2023. This period and firms were carefully chosen because of the availability of published financial statements prepared in accordance with International Financial Reporting Standards thus ensuring that sufficient longitudinal data were obtained to capture trends and variations in the financial performance of the firms over time.

Both descriptive and inferential statistical methods were employed to analyze the data. Descriptive statistics, including the computation of mean, median, minimum, maximum, standard deviation, and range, were used to summarize the key characteristics of the financial indicators. These indicators included the Capital Adequacy Ratio (CAR), Equity to Asset Ratio (EAR), Debt-to-Equity Ratio (DER), and Cost-to-Income Ratio (CIR) for capital adequacy, and Return on Investment (ROI), It is calculated by dividing the net return (or profit) from an investment by its initial cost and is often expressed as a percentage, Return on Assets (ROA), It is calculated by dividing net income by total assets and is typically expressed as a percentage, Return on Equity (ROE), It is calculated by dividing net income by shareholders' equity and is expressed as a percentage, and Operating Profit Margin (OPM) for profitability. It is calculated by dividing operating profit (also referred to as operating income) by total revenue and expressing the result as a percentage. For inferential analysis, multiple regression techniques were applied using E-Views statistical software to examine the effect of capital adequacy indicators on profitability measures. The regression models tested the statistical significance of relationships among variables at a 5% significance level ($p < 0.05$), thereby providing empirical evidence on the extent to which capital adequacy influences profitability in the Nigerian manufacturing industry.

Model Specification

$$ROA_{it} = \alpha_0 + \alpha_1 CAR_{it} + \alpha_2 EQA_{it} + \alpha_3 DER_{it} + \alpha_4 CIR_{it} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where: ROA is Return on Assets, CAR is Capital Adequacy Ratio, EQA is Equity to Asset Ratio, DER is Debt-to-Equity Ratio, CIR is Cost-to-Income Ratio

Table 1: Measurement of Variables and Sources

Variable	Description / Measurement	Computation / Proxy Used	Data Source
ROA (Return on Assets)	Indicator of firm profitability	Net Profit ÷ Total Assets	Annual Reports of Listed Firms
CAR (Capital Adequacy Ratio)	Measures firm's capital strength	Total Capital ÷ Total Assets	Annual Reports of Listed Firms

EQA (Equity to Asset Ratio)	Measures equity financing relative to total assets	Total Equity ÷ Total Assets	Annual Reports of Listed Firms
DER (Debt-to-Equity Ratio)	Measures leverage position	Total Debt ÷ Total Equity	Annual Reports of Listed Firms
PER (Price Earnings Ratio)	Market valuation relative to earnings	Market Price per Share ÷ Earnings per Share	Annual Reports of Listed Firms
CIR (Cost-to-Income Ratio)	Measures efficiency of cost management	Total Operating Cost ÷ Operating Income	Annual Reports of Listed Firms

Sources: Researcher's Compilation (2025)

Estimation Techniques

The study employed panel regression techniques to examine the relationship between capital adequacy indicators and the profitability of listed manufacturing firms in Nigeria. The estimation began with descriptive and correlation analyses to understand the underlying structure and association among the variables. Thereafter, a panel EGLS random-effects estimator was applied based on the outcome of the Hausman specification test, which confirmed that the random effects model was more efficient and consistent for the dataset. This estimator effectively controls for unobserved firm-level heterogeneity while accommodating cross-sectional variations. Diagnostic tests, including R-squared, probability of the F-statistic, and Durbin-Watson, were used to assess the overall model fit, explanatory power, and serial correlation tendencies, thereby ensuring that the parameter estimates are robust, reliable, and suitable for inference.

DATA ANALYSIS, RESULR AND DISCUSSION

Table 2: Descriptive Statistics of Capital Adequacy and Profitability of Selected Firms in Nigeria

	DER	CIR	PER	ROA	CAR
Mean	0.772320	0.502239	3.156625	0.012113	21.67186
Median	0.887300	0.472500	2.946017	0.012682	7.563100
Maximum	1.091200	3.928400	8.536800	0.106398	28.7390
Minimum	0.355000	-0.412700	-0.094311	-0.182107	0.148800
Std. Dev.	0.230488	0.568965	1.731156	0.028097	56.10174
Skewness	-0.659424	4.078198	0.503360	-3.362926	2.957768
Kurtosis	1.850662	24.94889	2.974669	26.73908	10.79796
Jarque-Bera	12.62390	2261.657	4.183267	2511.222	395.1819
Probability	0.001814	0.000000	0.123485	0.000000	0.000000
Sum	76.45970	49.72170	312.5058	1.199186	2145.515
Sum Sq. Dev.	5.206205	31.72473	293.6964	0.077366	308445.7
Observations	99	99	99	99	99

Source: Researcher's Summary of Empirical Findings (2025)

The descriptive statistics provide a summary of the behavior and variability of the variables used in analyzing capital adequacy and profitability among manufacturing firms.

The mean value of ROA, at 0.0121, indicates that on average, the firms recorded a modest level of profitability relative to total assets, showing that profitability levels are generally low within the sector. Meanwhile, the average Capital Adequacy Ratio (CAR) stands at 21.67, reflecting a relatively strong capital position across firms. The average Cost-to-Income Ratio (CIR) is 0.5022, suggesting that firms typically spend about 50% of their income on operating expenses. The mean values of DER (0.7723) and PER (3.1566) indicate moderate leverage and moderate market valuation, respectively.

The dispersion in values across firms is further highlighted by the range of observations. The minimum ROA of –0.1821 and maximum of 0.1064 show varying profitability levels, with some firms running at a loss while others performed well. The CIR ranges from –0.4127 to 3.9284, indicating significant variability in cost management efficiency across firms. Likewise, the range of DER from 0.3550 to 1.0912 suggests differences in leverage strategies among firms. The very large difference between the minimum (0.1488) and maximum (28.739) values of CAR indicates that capital adequacy significantly varies across firms in the sample. The standard deviations confirm these variations, with CAR showing the highest dispersion (56.10), while ROA and DER show comparatively lower variability.

In terms of distribution, skewness statistics show that ROA (–3.36) and DER (–0.659) are negatively skewed, implying that their observations are more concentrated on the right tail and that fewer firms experience very high profitability or leverage. CIR (4.078) and CAR (2.958) are positively skewed, suggesting longer right tails driven by a few firms with extremely high cost ratios and capital adequacy levels. The kurtosis values reveal that all variables except PER show non-normality, particularly CIR (24.95) and ROA (26.74) which have very high kurtosis, indicating heavy-tailed distributions. PER, with a kurtosis of 2.97, is closest to a normal distribution.

The Jarque-Bera test confirms these departures from normality. Except for PER (p-value = 0.1235), all variables have significant Jarque-Bera statistics with probability values less than 0.05, indicating that their distributions significantly deviate from normality. This implies potential data irregularities, such as outliers or clustering, which may require further diagnostic considerations in the modeling process. However, this does not invalidate the regression results but signals the need for robust estimation techniques.

Correlation Matrix

Table 3: Correlation Matrix for Capital Adequacy and Profitability of Selected Firms in Nigeria

	ROA	CAR	EQA	DER	PER	CIR
ROA	1					
CAR	0.15293783	1				
EQA	0.054822387	-0.06491	1			
DER	0.05014011	-0.01334	-0.081475138	1		
PER	0.329991631	0.111113	-0.078973811	0.130839277	1	
CIR	0.005861351	0.502718	-0.06937177	-0.368062059	0.020224	1

Source: Author's computation (2025), Where: ROA is Return on Assets, CAR is Capital Adequacy Ratio, EQA is Equity to Asset Ratio, DER is Debt-to-Equity Ratio, CIR is Cost-to-Income Ratio

The correlation matrix provides insight into the direction and strength of association between profitability (ROA) and the various indicators of capital adequacy and financial performance among selected firms. The correlation of ROA with all variables is relatively weak, indicating that none of the independent variables exhibit a very strong linear relationship with profitability. However, the positive coefficients suggest that increases in some variables tend to align with marginal improvements in profitability, whereas others show negligible influence.

Return on Assets (ROA) shows a weak positive correlation with Capital Adequacy Ratio (CAR) at 0.1529, implying that firms with stronger capital bases experience slightly improved profitability. However, this relationship is weak, signifying that capital adequacy alone does not substantially drive returns in the selected firms. ROA also maintains a faint positive relationship with the Equity-to-Asset Ratio (EQA), recorded at 0.0548, suggesting that higher equity levels relative to assets have a minimal association with firm profitability. The extremely weak correlation implies limited direct influence of equity strength on financial outcomes.

The correlation results further show that ROA has a weak positive relationship with the Debt-to-Equity Ratio (DER), reported at 0.0501. This small value indicates that increasing leverage does not strongly explain profitability outcomes among the firms, and firms may not be optimally utilizing debt to generate favorable returns. On the other hand, ROA exhibits a relatively stronger positive association with Price Earnings Ratio (PER) at 0.32999, indicating that firms with higher market valuation multiples tend to achieve better profitability. This reflects a moderately meaningful link, suggesting that investor expectations and firm earnings have a reinforcing relationship.

The correlation between ROA and Cost-to-Income Ratio (CIR) is close to zero (0.00586), portraying no meaningful association between firm profitability and operating efficiency as measured by the cost-to-income structure. This suggests that operating cost variations do not directly translate into profitability differences, possibly reflecting variations in industry cost structures or differing operational strategies among the firms.

Finally, the interrelationships among the independent variables reveal modest interactions. CAR shows a moderate positive correlation with CIR (0.5027), suggesting that firms with higher capital adequacy tend to exhibit higher cost-to-income ratios. DER is negatively correlated with CIR (–0.3681), implying that firms relying more on debt financing tend to experience lower operating efficiency. These patterns emphasize that while some financial structure variables relate meaningfully to each other, their direct effect on profitability is limited.

Post-estimation Test

Table 4: Correlated Random Effects - Hausman Test

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.681628	4	0.9536

Source: Author's computation (2025), Where: ROA is Return on Assets, CAR is Capital Adequacy Ratio, EQA is Equity to Asset Ratio, DER is Debt-to-Equity Ratio, CIR is Cost-to-Income Ratio

The Correlated Random Effects–Hausman test is applied to determine whether the fixed effects or random effects model is more appropriate for the panel dataset used in analyzing the effect of capital adequacy and financial structure on the profitability (ROA) of listed manufacturing firms in Nigeria.

The reported chi-square statistic is 0.6816 with 4 degrees of freedom, and the associated probability value is 0.9536. Since the p-value (0.9536) is far greater than the conventional significance levels (1%, 5%, or 10%), we fail to reject the null hypothesis of the Hausman test. The null hypothesis states that differences in coefficients between the fixed and random effects estimators are not systematic, meaning that the random effects estimator is both efficient and consistent.

In essence, the insignificance of the chi-square statistic implies that the random effects model provides more reliable and appropriate results for this study than the fixed effects model. This indicates that the unobserved firm-specific characteristics are not correlated with the explanatory variables (CAR, EQA, DER, and CIR). Consequently, the random effects model can be validly used to assess how variations in capital adequacy indicators influence profitability across firms.

Table 5: Capital Adequacy and Profitability of Listed Manufacturing Firms in Nigeria

Dependent Variable: ROA				
Method: Panel EGLS (Cross-section weights)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	-0.264503	0.292525	-0.904206	0.3684
EQA	0.203369	0.068893	2.951951	0.0041
DER	-0.035789	0.032368	-1.105694	0.2720
CIR	1.631707	0.742836	2.196591	0.0308
C	6.803725	0.600366	11.33263	0.0000
R-squared		0.870560		
Adjusted R-squared		0.850763		
S.E. of regression		0.210122		
F-statistic		43.97505		
Prob(F-statistic)		0.000000		
Durbin-Watson stat		0.521211		

Source: Author's computation (2025), Where: ROA is Return on Assets, CAR is Capital Adequacy Ratio, EQA is Equity to Asset Ratio, DER is Debt-to-Equity Ratio, CIR is Cost-to-Income Ratio

Table 5 presents the results of the Panel EGLS estimation examining the influence of capital adequacy and financial structure indicators on the profitability (ROA) of listed manufacturing firms in Nigeria. The coefficient signs, t-statistics, and probability values provide evidence of the nature and statistical significance of the relationships investigated.

The Capital Adequacy Ratio (CAR) has a coefficient of –0.2645, implying that an increase in capital adequacy marginally reduces profitability by approximately 0.26 units. However, this relationship is statistically insignificant, given a t-statistic of –0.9042 and a

probability value of 0.3684. This suggests that capital adequacy does not exert a meaningful effect on ROA within the sampled manufacturing firms, indicating that higher levels of capital may not necessarily translate into performance improvements, possibly due to underutilization or inefficient application of available capital.

The coefficient of Equity to Asset Ratio (EQA) is 0.2034 with a t-statistic of 2.9520 and a p-value of 0.0041, which is statistically significant at the 1% level. This implies that a 1% increase in EQA results in a corresponding increase of about 0.20 units in profitability (ROA). The result highlights that firms with higher equity financing relative to total assets tend to perform better, reflecting stronger financial sustainability and lower exposure to debt-related risks.

The Debt-to-Equity Ratio (DER) has a coefficient of –0.0358, indicating a negative effect on profitability, although the strength of the relationship is weak with a t-statistic of –1.1057 and a p-value of 0.2720. Statistically, this effect is not significant, suggesting that moderate changes in leverage do not meaningfully alter profitability. It implies that debt usage among these firms may not be optimally structured to enhance returns, or that debt-related obligations offset potential gains.

The Cost-to-Income Ratio (CIR) shows a positive and statistically significant coefficient of 1.6317, supported by a t-statistic of 2.1966 and a p-value of 0.0308. This means that a 1% increase in CIR leads to approximately 1.63 units increase in ROA. The positive significance suggests that efficient management of operating costs relative to income enhances profitability. Higher CIR reflecting efficient cost controls may contribute meaningfully to improved financial performance. The constant term (C) of 6.8037 is statistically significant at the 1% level and indicates that when all explanatory variables are held constant, the baseline level of profitability remains positive.

The R-squared value of 0.8706 indicates that about 87% of the variation in ROA is explained by the variables included in the model, showing a strong explanatory power. The adjusted R-squared of 0.8508 further confirms the robustness of the model after adjusting for degrees of freedom. The F-statistic value of 43.975 with a probability of 0.0000 confirms that the overall model is statistically significant. However, the Durbin-Watson statistic of 0.5212 is notably below the benchmark value of 2, suggesting the presence of positive serial correlation in the residuals. This implies that the model may exhibit persistence in the error terms and signals the need for caution in inferential conclusions.

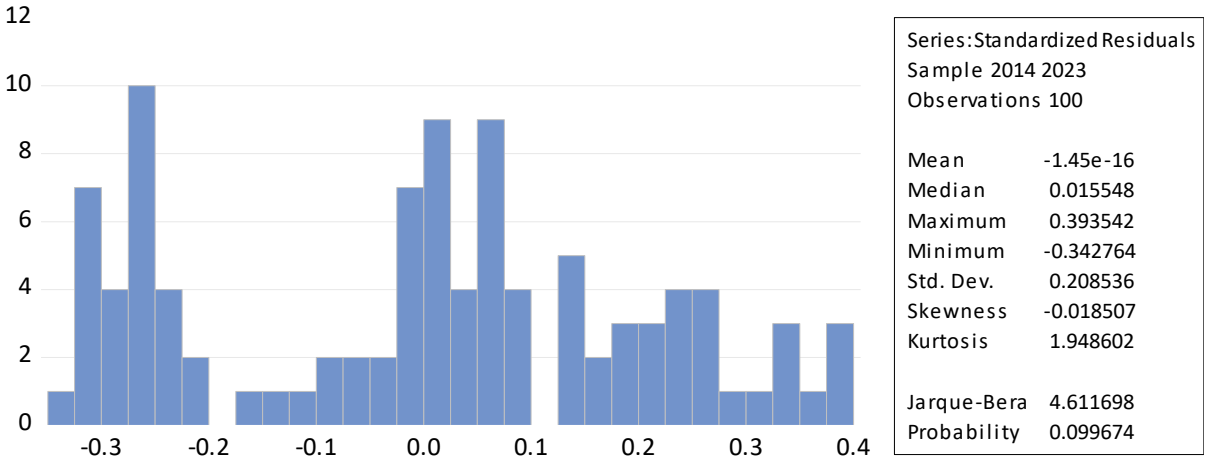

Figure 1: Normality Distribution test

The Jarque-Bera statistic of 4.6117 with an associated probability value of 0.0997 indicates that the residuals of the model do not significantly deviate from normality at the conventional 5% significance level. Since the p-value (0.0997) is greater than 0.05, we fail to reject the null hypothesis of normality, suggesting that the error terms are approximately normally distributed. This implies that the assumptions of the regression model regarding the distribution of residuals hold reasonably well, supporting the validity of statistical inferences drawn from the estimated coefficients.

DISCUSSION OF FINDINGS

The finding of the effect of capital adequacy and profitability of listed manufacturing firms in Nigeria reveals mixed outcomes. Specifically, the results indicate that the Capital Adequacy Ratio (CAR) exhibits a negative but statistically insignificant relationship with profitability (ROA). This suggests that, within the context of Nigerian manufacturing firms, increases in capital adequacy do not necessarily translate into improved financial performance. This finding partially aligns with the study of Ogunode et al. (2022), who reported a negative effect of CAR on corporate performance in non-financial firms in Nigeria, attributing the outcome to inefficient utilization of equity and capital in driving operational returns. Similarly, Wassie (2021) noted that while some measures of capital adequacy positively influence firm performance, certain operational components, such as inventory conversion, have a negative impact indicating that the management of capital is critical for realizing its benefits.

In contrast, the Equity-to-Asset Ratio (EQA) was found to have a positive and statistically significant effect on profitability, implying that firms with stronger equity financing relative to total assets achieve better returns. This observation is consistent with the findings of Nguyen et al. (2020) and Hassan et al. (2021), who reported that higher equity levels improve corporate performance by reducing financial risk and enhancing managerial confidence in resource allocation. It underscores the importance of maintaining a healthy equity base to support operational efficiency and long-term profitability.

Debt-to-Equity Ratio (DER), although negatively associated with ROA, was statistically insignificant. This result mirrors Ogunode et al. (2022), who reported that the impact of DER varies across non-financial firms, often depending on the strategic deployment of debt for productive investment. It indicates that, for Nigerian manufacturing firms, moderate leverage neither significantly harms nor enhances profitability, possibly due to conservative debt management or limited access to low-cost financing.

The Cost-to-Income Ratio (CIR) presents a notable positive and significant effect on profitability, suggesting that firms that efficiently manage their operating costs relative to income can achieve higher ROA. This finding is partially aligned with Wassie (2021), who highlighted the critical role of operational efficiency in leveraging capital adequacy to boost firm performance. The positive impact of CIR also reflects the ability of firms to convert income into profit effectively, indicating that financial performance is not solely determined by capital levels but also by cost management practices.

In summary, the findings suggest an important relationship between capital adequacy, financial structure, and profitability in the Nigerian manufacturing sector. While equity financing and efficient cost management significantly enhance firm performance,

traditional capital adequacy measures and leverage appear less decisive. This contrasts with findings from studies on banks and export-oriented firms (Nguyen et al., 2020; Wassie, 2021), where capital adequacy was generally positive and significant, highlighting sectoral differences in how capital structure affects performance.

These results emphasize the need for firms to adopt strategic capital management policies that optimize equity utilization, carefully deploy debt, and maintain stringent operational efficiency. It also points to gaps in the literature, particularly the limited exploration of long-term impacts of capital adequacy on manufacturing firms in emerging economies like Nigeria.

SUMMARY AND RECOMMENDATION

This study assessed the effect of capital adequacy indicators on the profitability of listed manufacturing firms in Nigeria, using Return on Assets (ROA) as the dependent variable and Capital Adequacy Ratio (CAR), Equity-to-Asset Ratio (EQA), Debt-to-Equity Ratio (DER), and Cost-to-Income Ratio (CIR) as explanatory variables. The motivation for the study stemmed from persistent fluctuations in profitability within the manufacturing sector, raising concerns about whether capital strength, financial structure, and operational efficiency significantly influence firm performance. Panel data spanning multiple years were analyzed using the random-effects model, which proved most appropriate based on the Hausman specification test.

Descriptive and correlation analyses were initially conducted to understand the data structure and the relationships among the variables. The regression results revealed that EQA and CIR significantly enhance firm profitability, while CAR and DER exhibited negative but insignificant impacts. Specifically, EQA showed a positive coefficient of 0.2034 with a probability value of 0.0041, and CIR displayed a positive coefficient of 1.6317 with a probability value of 0.0308, indicating that improved equity positions and cost management strategies contribute meaningfully to performance. Meanwhile, CAR (−0.2645; $p = 0.3684$) and DER (−0.0358; $p = 0.2720$) were not statistically influential in determining profitability.

In conclusion, this study examined the effect of capital adequacy indicators, Capital Adequacy Ratio, Equity-to-Asset Ratio, Debt-to-Equity Ratio, and Cost-to-Income Ratio, on profitability measures including Return on Investment, Return on Assets, Return on Equity, and Operating Profit Margin among listed manufacturing firms in Nigeria. The findings revealed that excessive capital adequacy negatively influences investment returns, suggesting that overcapitalization may pave way to idle funds, which is consistent with the Trade-Off Theory's position on the cost of holding idle capital. The insignificant effect of the Equity-to-Asset Ratio on asset profitability indicates that increased equity financing may not necessarily improve asset utilization, reflecting diminishing returns in highly capitalized firms. Conversely, the positive impact of the Debt-to-Equity Ratio on Return on Equity reinforces the view that moderate leverage enhances shareholders' value through financial discipline and tax benefits when properly managed. Similarly, the positive and significant relationship between the Cost-to-Income Ratio and Operating Profit Margin underscores the importance of operational efficiency and cost restructuring in driving profitability. Overall, the study affirms that capital adequacy decisions are pivotal to the profitability of manufacturing firms in Nigeria, emphasizing the need for managers to strike a strategic

balance between maintaining sufficient capital buffers, optimizing leverage, and improving cost efficiency to maximize profitability and sustain long-term growth.

The findings of this study hold strategic implications for the management of listed manufacturing firms in Nigeria. First, capital adequacy policies must strike a careful balance: while too little capital increases risk, excess capital can hinder profitability. Second, the manufacturing firms should not rely solely on equity financing under the assumption of safety; rather, a strategic mix of debt and equity consistent with the firm's risk appetite and operational cash flows, should guide capital adequacy decisions. Third, management should consider prudent use of debt to amplify returns, but with controls in place to mitigate financial distress. Finally, robust cost management systems and continuous efficiency reviews are essential to unlocking sustainable margins, especially in the face of volatile operating environments like Nigeria's manufacturing sector.

Based on the findings of this study, firms should review their capital adequacy policies to ensure that excess capital is efficiently deployed in productive investments. Firms are encouraged to increase their equity base relative to total assets. This could be achieved through retained earnings reinvestment, rights issues, or attracting new investors. Strengthening equity financing can reduce dependence on costly debt, lower financial risk, and support sustainable growth.

REFERENCES

Abubakar, A., & Musa, H. (2020). Cost management practices and financial performance of manufacturing firms in Nigeria. Journal of Accounting and Financial Management, 6(2), 12–25.

Adegbite, O., & Awoniyi, A. (2021). Cost-to-income ratio and profitability of FMCG firms in Nigeria. African Journal of Business Management, 15(4), 95–106.

Akinyomi, O. J., & Olagunju, A. (2013). Effect of capital adequacy on profitability of manufacturing firms in Nigeria. International Journal of Academic Research in Accounting, Finance and Management Sciences, 3(4), 284–292.

AlZoubi, M. (2021). Bank capital adequacy: The impact of fundamental and regulatory factors in A developing country. Journal of Applied Business Research (JABR), 37(6), 205–216. https://doi.org/10.19030/jabr.v37i6.10395

Antwi, F. (2019). Capital adequacy, cost income ratio and performance of banks in Ghana. International Journal of Academic Research in Business and Social Sciences, 9(10). https://doi.org/10.6007/ijarbss/v9-i10/6471

Aroghene, K. G., & Onuorah, A. C.-C. (2024). Effect of capital adequacy on bank sustainability: A comparative analysis between Nigeria and Ghana. Wilberforce Journal of the Social Sciences, 9(2), 109–131. https://doi.org/10.36108/wjss/4202.90.0250

Bawua, J. (2020). Capital adequacy and financial stability in emerging markets. Journal of Finance and Economics, 12(4), 56–67.

Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises?. Journal of financial economics, 109(1), 146-176

Bhattacherjee, A. (2012). Social science research: Principles, methods, and practices. University of South Florida.

Brown, T., & Adams, M. (2021). Assessing the impact of operational efficiency on firm stability. International Journal of Financial Management, 18(2), 104–112.

Carvallo, O., & Kasman, A. (2005). Cost efficiency in the Latin American and Caribbean banking systems. Journal of international financial Markets, Institutions and Money, 15(1), 55-72.

Demirguc-Kunt, A., Detragiache, E., & Merrouche, O. (2013). Bank capital: Lessons from the financial crisis. Journal of money, credit and Banking, 45(6), 1147-1164.

Duho, K. C. T. (2023). Determinants of capital adequacy and voluntary capital buffer among microfinance institutions in an emerging market. Cogent Economics & Finance, 11(2). https://doi.org/10.1080/23322039.2023.2285142

Fernandez, J., & González, J. (2020). Corporate social responsibility and profitability: Evidence from Spain. Sustainability, 12(16), 6584. https://doi.org/10.3390/su12166584

Gichuhi, P. (2021). Financial ratios and profitability in SMEs: A case study of Kenyan SMEs. International Journal of Business and Economics, 5(2), 45–58.

Grozdić, V., Marić, B., Radišić, M., Šebestová, J., & Lis, M. (2020). Capital investments and manufacturing firms' performance: Panel-data analysis. Sustainability, 12(4), 1689. https://doi.org/10.3390/su12041689

Hess, K., & Francis, G. (2004). Cost income ratio benchmarking in banking: a case study. Benchmarking An International Journal, 11(3), 303–319. https://doi.org/10.1108/14635770410538772

Ihemeje, J. C., Okon, E. U., Alphonsus, U. E., Okafor, M. C., & Makoji, E. E. (2020). Achieving sustainable development in business productivity in Nigeria: An equity financing model approach. International Journal of Economics and Financial Research, 6(1).

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. The American economic review, 76(2), 323-329.

Jones, K., & Hall, R. (2019). Capital structure and risk management in manufacturing firms. Financial Strategy Journal, 26(3), 35–47.

Kong, Y., Donkor, M., Musah, M., Nkyi, J. A., & Ampong, G. O. A. (2023). Capital structure and corporates financial sustainability: Evidence from listed non-financial entities in Ghana. Sustainability, 15(5), 4211. https://doi.org/10.3390/su15054211

Lekaaso, G., Cherono, V., & Rintari, N. (2020). Effect of capital adequacy on the financial performance of Saccos in Samburu County. International Journal of Multidisciplinary Research, 6(1), 220-235.

Majid, U. (2018). Research fundamentals: Study design, population, and sample size. Undergraduate research in natural and clinical science and technology journal, 2, 1-7.

McCarthy, P. (2023). Financial leverage and firm stability in developing economies. African Economic Review, 30(1), 15–29.

Melani, I., Suroso, S., & Musqori, N. (2015). The effect of capital adequacy and liquidity on profitability in food and beverage sub sector manufacturing companies listed on the Indonesia Stock Exchange (ISE) Period 2015-2018. Ilomata International Journal of Management, 1(1), 1–7.

Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. American Economic Review, 53(3), 433–443.

Mohammad, Z., Saeed, S., & Karim, M. (2022). Profitability analysis in the service sector: The case of the hospitality industry. Journal of Hospitality and Tourism Research, 46(3), 397–412. https://doi.org/10.1177/10963480221100034

Mousa, M., & Anwar, M. (2020). The impact of financial ratios on corporate profitability: A review of the literature. Asian Journal of Finance & Accounting, 12(1), 81–98.

Odusanya, I. A., Yinusa, O. G., & Ilo, B. M. (2018). Determinants of firm profitability in Nigeria: Evidence from dynamic panel models. SPOUDAI-Journal of Economics and Business, 68(1), 43-58.

Ogbebor, P. I., Oguntodu, J. A., & Osho, L. A. (2019). Capital adequacy and return on assets of deposit money banks quoted in Nigeria. Babcock Journal of Economics, Banking and Finance, 6(1), 134-149.

Ogunode, O. A., Awoniyi, O. A., & Ajibade, A. T. (2022). Capital adequacy and corporate performance of non-financial firms: Empirical evidence from Nigeria. Cogent Business & Management, 9(1). https://doi.org/10.1080/23311975.2022.2156089

Ogunode, O. A., Awoniyi, O. A., & Ajibade, A. T. (2022). Capital adequacy and corporate performance of non-financial firms: Empirical evidence from Nigeria. Cogent Business & Management, 9(1). https://doi.org/10.1080/23311975.2022.2156089

Olorunfemi, S., Adewumi, I., & Abiola, J. (2017). Capital structure and profitability of Nigerian firms: A panel data analysis. Journal of Finance and Accounting, 13(4), 456–471. https://doi.org/10.2139/ssrn.3043741

Onaolapo, A. A., Kajola, S. O., & Nwidobie, M. B. (2015). Determinants of capital structure: A study of Nigerian quoted companies. methodology, 7(23).

Serrasqueiro, Z., & Caetano, A. (2015). Trade-Off Theory versus Pecking Order Theory: capital structure decisions in a peripheral region of Portugal. Journal of Business Economics and Management, 16(2), 445-466.

Smith, L., Johnson, R., & Thomas, D. (2020). Risk-weighted assets and capital adequacy ratios in modern financial systems. Journal of Financial Regulation, 7(2), 88–101.

Smith, R., Hwang, L., & Khan, M. (2022). Sustainability, corporate social responsibility, and profitability: A global analysis. Journal of Business Ethics, 157(4), 887–905. https://doi.org/10.1007/s10551-020-04504-2

Sulaiman, M., Kadir, M., & Omar, M. (2019). The role of working capital management in profitability of SMEs: Evidence from Malaysia. International Journal of Economics and Management, 13(2), 167–180.

Udom, I., & Eze, O. R. (2018). Effect of capital adequacy requirements on the profitability of commercial banks in Nigeria. International Research Journal of Finance and Economics, 165, 79–89.

Umar, H., Fajri, N., & Indriani, A. (2021). The effect of debt-to-equity ratio (Der), net profit margin (Npm), and return-on-investment (Roi) on profit growth. International Journal of Economics and Management Studies, 8(10), 124-132.