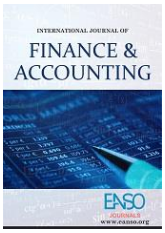
International Journal of Finance and Accounting, Volume 4, Issue 1, 2025
Article DOI: https://doi.org/10.37284/ijfa.4.1.2849



International Journal of Finance and Accounting
ijfa.eanso.org
Volume 4, Issue 1, 2025
Print ISSN: 2790-9581 | Online ISSN: 2790-959X
Title DOI: https://doi.org/10.37284/2790-959X

EAST AFRICAN NATURE & SCIENCE ORGANISATION

Original Article

Assessment of the Impact of Credit Risk on the Financial Performance of Listed Commercial Banks in Tanzania

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Article DOI: https://doi.org/10.37284/ijfa.4.1.2849

Date Published:

09 April 2025

Keywords:

Credit Risk, Financial Performance, Commercial Banks.

ABSTRACT

This study explored the impact of various financial and risk management factors on the financial performance of commercial banks in Tanzania between 2017 and 2024. Specifically, the research addresses four primary questions: To what extent do non-performing loans (NPLs) affect the financial performance of commercial banks in Tanzania? What is the effect of capital adequacy on financial performance? How does a firm's size impact financial performance? And what is the impact of the debt-to-equity ratio on financial performance? The study employed a descriptive research design; the study utilized secondary data sourced from annual reports of the listed commercial banks. Descriptive statistics, correlation analysis, and multiple regression were used to analyze the data, but because panel data were used, the Hausman test was also used to decide whether or not the use of a random effect model or a fixed effect model would yield more accurate results. The analysis focuses on the effects of NPLs, capital adequacy ratio (CAR), firm size (F_SIZE), and debt-to-equity ratio (DER) on return on equity (ROE). Findings have revealed a non-significant positive relationship between NPLs and ROE, suggesting that factors beyond NPLs predominantly influence profitability. Firm size exhibits a marginally positive yet inconclusive impact on ROE, while DER demonstrates complex leverage effects. Additionally, CAR shows a negative but insignificant effect on the balance between financial stability and profitability. The research highlights the importance of addressing credit risk management within the Tanzanian banking sector, given its unique regulatory and economic challenges. Recommendations include adopting advanced credit risk assessment tools, improving asset quality management, effectively leveraging economies of scale, and implementing regulatory reforms to foster innovation and strengthen risk management. These strategies are aimed at improving the financial resilience and sustainable growth of commercial banks in Tanzania's competitive financial landscape.

Article DOI: https://doi.org/10.37284/ijfa.4.1.2849

APA CITATION
Sabore, M. M. (2025). Assessment of the Impact of Credit Risk on the Financial Performance of Listed Commercial Banks in Tanzania. *International Journal of Finance and Accounting*, *4*(1), 34-44. https://doi.org/10.37284/ijfa.4.1.2849

CHICAGO CITATION
Sabore, Meinyali Mevaashi. 2025. "Assessment of the Impact of Credit Risk on the Financial Performance of Listed Commercial Banks in Tanzania". *International Journal of Finance and Accounting* 4 (1), 34-44. https://doi.org/10.37284/ijfa.4.1.2849

HARVARD CITATION
Sabore, M. M. (2025), "Assessment of the Impact of Credit Risk on the Financial Performance of Listed Commercial Banks in Tanzania", *International Journal of Finance and Accounting*, 4(1), pp. 34-44. doi: 10.37284/ijfa.4.1.2849.

IEEE CITATION
M. M., Sabore "Assessment of the Impact of Credit Risk on the Financial Performance of Listed Commercial Banks in Tanzania", *IJFA*, vol. 4, no. 1, pp. 34-44, Apr. 2025.

MLA CITATION
Sabore, Meinyali Mevaashi "Assessment of the Impact of Credit Risk on the Financial Performance of Listed Commercial Banks in Tanzania". *International Journal of Finance and Accounting*, Vol. 4, no. 1, Apr. 2025, pp. 34-44, doi:10.37284/ijfa.4.1.2849

INTRODUCTION

Commercial banks are the largest financial institutions, operating through a network of branches, subsidiaries, and agents worldwide. They mobilize financial resources from the public and provide credit, thereby promoting financial stability and fostering economic growth (Msomi, 2022). Commercial banks act as mediators who collect the extra money from the savers and lend it to borrowers in return for the principal amount and the interest rates, which is the gain to a bank for such business. The crucial role is to enable smooth transactions between diverse businesses and organizations by allowing the circulation of money throughout the economies (Karim, 2019). Commercial banks encourage both local and international investment, promoting both economic growth and industrial growth and development. The banks must keep a greater share of liquid assets to prevent liquidity issues in the future. As intermediary banks make loans available and frequently strive to improve and increase their financial performance and profitability. When utilizing this method, there is a significant risk of credit risk and the possibility that counterparties or borrowers won't fulfil their agreed-upon obligations (Ndyagyenda, 2020).

The creation of credit, which includes lending money, is the primary source of revenue for banks. However, there are serious risks involved in this transaction for the borrower as well as the lender. Financial institutions take a risk when providing money to borrowers since they might skip payments (Taiwo *et al*., 2017). Furthermore, banks that accept deposits and lend them to other consumers run the risk of threatening the cash of their customers. If a trade partner breaches a contract, whether by the deadline or at any point thereafter, it can seriously weaken a bank's ability to conduct business. A financial crisis can arise from even a small number of defaulting debtors and cause failure to the whole financial system. When debtors face difficulties in paying back their future cash flow requirements, credit risk arises (Awrey, 2021).

Internal and external variables both have a substantial impact on the financial success of commercial banks. Internal factors can be controlled by the company and are unique from one company to another, though in some facts they can be the same. The external factors cannot be controlled by the company (Hac *et al*., 2021). Improper management of internal variables results in moral hazards and unfavourable selection, Moreover, there has been an increased ratio of non-performing loans (NPL), which has been marked as a source of several financial crises. A high percentage of NPLs has caused failure in the financial sector, a rise in unemployment, and a slowdown in bank intermediation (Ozili, 2019).

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The financial institution runs the danger of credit risk growing since the borrower can always break his or her promises for any number of reasons. Changes in portfolio value or defaults may be the cause of these losses, which could be real or perceived reductions in credit quality. In credit risk management, an organization's approach to minimizing risk and optimizing its risk-adjusted rate of return is to take on and maintain its credit exposure within reasonable bounds (Noor, & Das, 2018). To grow and prosper, banks must have efficient loan processing management due to the possibility that credit activity could destabilize the financial system. The profitability of banks is significantly influenced by credit risk, which refers to the risk associated with loans and advances (Boateng & Dean, 2020).

Despite the critical nature of this issue, existing research presents conflicting findings on the relationship between credit risk factors and financial performance. For example, a study by Jain & Sangeetha (2021), suggests a negative relationship between NPLs and financial performance, whereas Rasyid (2021) found no such relationship. These inconsistencies create a knowledge gap that complicates the development of effective risk management strategies.

The extent of the problem among commercial banks in Tanzania is significant and alarming. Recent data revealed that the average non-performing loan (NPL) ratio in Tanzanian commercial banks often exceeds the recommended beginning set by regulatory authorities. This high incidence of NPLs not only strains the banks' balance sheets but also severely limits their ability to extend new credit, thereby stifling economic growth (BOT, 2023). Additionally, the persistent issue of insufficient capital adequacy undermines the banks' resilience to financial shocks, increasing the risk of insolvency and wearing down depositor confidence. These challenges highlight the urgent need for an improved credit risk management strategy to ensure the stability and profitability of commercial banks in Tanzania. This addressed this gap by empirically analyzing the relationship between credit risk and the financial performance of commercial banks in Tanzania. It specifically examines the effects of non-performing loans, capital adequacy, firm size, and debt-to-equity ratio on the return on equity of these banks.

LITERATURE REVIEW

Adverse Selection Theory

Adverse selection is primarily associated with the work of economist George Akerlof, who presented the theory in his seminal paper "The Market for Lemons: Quality Uncertainty and the Market Mechanism", published in 1970. Akerlof illustrated how the presence of asymmetric information—where one party in a transaction has more or better information than the other—can lead to market failure (Julius, 2014). Specifically, he used the example of used cars, where sellers typically know more about the vehicle's condition than buyers. This information imbalance allows sellers of low-quality cars (lemons) to take advantage of uninformed buyers, leading to a decline in the overall quality of goods in the market (Kong *et al*., 2023). Adverse Selection Theory is intricately linked to the impact of credit risk on the financial performance of listed commercial banks, primarily because it highlights the challenges banks face in distinguishing between high-risk and low-risk borrowers (Temba *et al*., 2024). When banks cannot accurately assess the creditworthiness of potential borrowers, they inadvertently attract individuals or entities that are more likely to default on loans, thereby increasing the institution's credit risk. This heightened risk can lead to higher default rates, resulting in increased provisions for loan losses and consequently affecting the bank's profitability and overall financial performance. Furthermore, adverse selection can deter banks from lending altogether, potentially limiting their revenue streams and stifling overall economic growth (Singh *et al*., 2021).

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Modern Portfolio Theory

The theory is well documented in Markowitz's writings, which were later improved by Sharpe in 1934 (Masinde, 2017). The Mean-Variance portfolio theory. It is a financial theory that considers the mix of various assets to balance the risk and return to the portfolio. According to Markowitz, investors will be able to balance the risk associated with individual stock investments by investing in assets with diversified returns. Therefore, it is advised that investors select financially measurable assets for their portfolios while considering variations and mean contributions of the assets (Surtee, & Alagidede, 2023). Through a selection of asset ratios, the main goal of the theory is to maximize the desired returns of a certain level of portfolio risk and to reduce the level of risk to the desired returns. Diversification may effectively lower the risk attached to certain equities (Wen, 2023). The theory is highly relevant to the assessment of the impact of credit risk on the financial performance of listed commercial banks, as it provides a framework for understanding the trade-off between risk and return in investment portfolios. Furthermore, the theory emphasizes the importance of asset correlation, which is crucial for banks in evaluating how credit risk exposure in their lending activities can affect the stability and profitability of their financial performance. In essence, the theory equips banks with a systematic approach to balance the pursuit of returns while actively managing credit risk, ultimately contributing to more resilient financial outcomes (Francis, & Kim, 2013).

Empirical Review

This extensive analysis of credit risk and bank financial performance across various contexts examines multiple studies focusing on the relationship between non-performing loans (NPLs), capital adequacy ratios (CAR), and profitability indicators like return on assets (ROA) and return on equity (ROE). In the Balkan study by Arifaj, & Baruti (2023), a negative correlation between NPLs and bank profitability was established, indicating that higher NPLs lead to decreased ROA and ROE. Similarly, Smarika, & Sangeetha (2021) underscored a significant negative impact of non-performing assets on ROE in Indian banks, although the effect of CAR was reportedly insignificant. Rasyid, & Kurniawati (2022) analyzed Indonesian banks and found no significant influence of credit risk or CAR on financial performance during the COVID-19 pandemic, while liquidity and operational efficiency emerged as vital factors. Temba *et al*. (2023) highlighted the importance of effective credit risk management in Tanzanian banks in enhancing financial outcomes and linking robust management to lower NPL levels and higher ROE. Majondo *et al*. (2023) reaffirmed that rigorous credit assessment and proactive monitoring are crucial for financial stability in Tanzania, emphasizing compliance and advanced tools in risk management. Mrindoko *et al*. (2020) focused on NPLs in Tanzania, indicating a strong negative correlation with profitability due to the impact on net interest margins. Meanwhile, Kwashie *et al*. (2022a) identified similar trends in Ghana, where higher NPLs negatively influenced profitability, stressing the necessity of effective credit risk management strategies to maintain financial stability amidst varying operational challenges. Collectively, these studies reinforce the significant interplay between credit risk, particularly through NPLs, and the financial health of banks while also suggesting areas for further research, including the influence of external economic factors on bank performance.

Conceptual Framework

Figure 1 illustrates a conceptual framework that delineates the relationships between various financial metrics and outcomes within a firm. It identifies firm size as a control variable, acknowledging that it may influence both the independent and dependent variables. The independent variables consist of credit risk indicators, namely the debt-to-equity ratio (DER),

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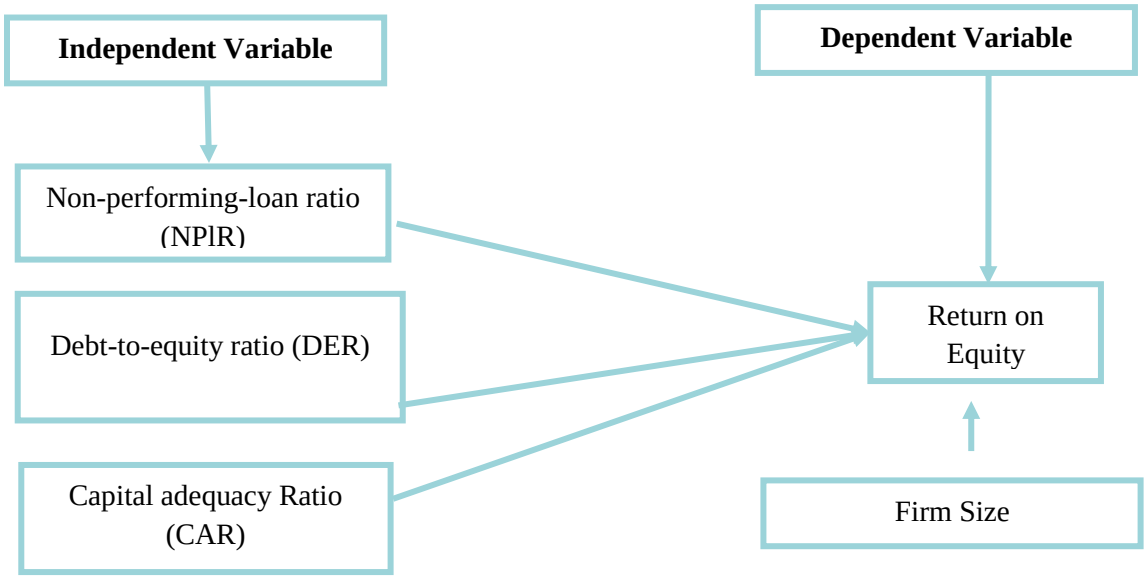
non-performing loan ratio (NPLR), and capital adequacy ratio (CAR), which are posited to impact the firm's risk profile. The dependent variable is financial performance, specifically measured through return on equity (ROE). This framework suggests that variations in credit risk, as indicated by the chosen ratios, can directly affect the financial performance of a firm, with firm size serving as a contextual factor that may further modulate these relationships.

Figure 1: Conceptual Framework



***Source**: Researcher's Construct (2025)*

Hypotheses

The study develops the following hypotheses;

- **Null hypothesis ($H0_i$)**: non-performing loans have no significant effect on the return on equity of the commercial banks in Tanzania,

Alternative hypothesis ($H1_i$): non-performing loans have a significant effect on the return on equity of commercial banks in Tanzania.

- **Null hypothesis($H0_{ii}$):** Capital adequacy has a significant effect on the return on equity of the commercial banks in Tanzania.

Alternative hypothesis ($H1_{ii}$): Capital adequacy has a significant effect on the return on equity of commercial banks in Tanzania.

- **Null hypothesis ($H0_{iii}$)** Firm size has no significant effect on the return on equity of the commercial banks in Tanzania,

Alternative hypothesis ($H1_{iii}$): Firm size has a significant effect on the return on equity of commercial banks in Tanzania.

- Nu**ll hypothesis ($H0_{iv}$): The** Debt ratio does not affect the return on equity of Commercial Banks of Tanzania.

Alternative hypothesis ($H1_{iv}$); The Debt ratio has a positive effect on the return on equity of commercial banks in Tanzania.

RESEARCH METHODS

The Descriptive research design and a quantitative approach were used. The target population of this study comprised the 29 firms listed under the DSE.

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The study applied purposive sampling to choose firms to constitute a sample for the study. The information about the variables from 2017 to 2024 was obtained from the websites of the DSE. The study applied descriptive statistics and panel data regression analysis.

Variables and Measurement

Table 1: Indicators and Measurement of Variables

Variable	Type	Measurement
Return on equity (ROE)	Dependent	Net income/total shareholders' equity (Toufaili, 2021)
Bank size (BS)	Independent	Natural log of total assets (Gurung, 2021)
Non-performing loan ratios (NPLR)	Independent	Non-performing loan – Gross loans and advances (Jain, & Sangeetha, 2021)
Debt to equity (DER)	Independent	Total liability / Shareholder's equity(Kwashie *et al*., 2022b)
Capital adequacy ratio (CAR)	Independent	Tier 1 capital + Tier 2 capital/Risk-weighted asset (Rasyid, & Kurniawati, 2022)

Specification of the Model

The study applied the regression model, which is given by;

$$ROE_{it} = \alpha + \beta_{1it}NPL_{it} + \beta_{2it}DER_{it}\ \beta_{3it}CAR_{it} + \beta_{4it}FS_{it} + \varepsilon$$

Where;

ROE = Return on equity

NPLR = Non-performing loan ratio

DER = Debt to equity ratio

CAR = Capital adequacy ratio

FS = Firm size

α = Slope of coefficient/ constant term

β_{1-4} = Coefficient of variables

ε = Error term

$_I$ = Represents the commercial banks, which are from 1 to 5, and $_t$ represents the period, which is 2017 to 2024.

FINDINGS

Summary Descriptive Statistics

The study applied means, standard deviations, and maximum and minimum values of the study variables from 2017 to 2024 to present descriptive results of 40 observations in Table 2.

Table 2: Descriptive Statistics

Variables	Obs	Mean	Std. Dev	Min	Max
ROE	40	.2392	.2271	.0016	.9884
NPLR	40	.0795	.0364	.015	.1421
CAR	40	.1467	.0348	.1	.246
FS	40	16.0613	2.9161	3.7136	19.1338
DER	40	.05082	.0866	.0000171	.5548

Table 2 shows the descriptive statistics for the key financial variables from the financial reports of five banks over the period 2017 to 2024. The mean return on equity (ROE) is 0.2392, indicating a 23.92% average return on shareholders' equity, with substantial variability as indicated by a standard deviation of 0.2271, ranging from 0.0016 to 0.9884. The Non-Performing Loans (NPL) ratio averages 0.0795, reflecting 7.95% of loan portfolios being non-performing, with moderate variability (standard deviation of 0.0364). The Capital Adequacy Ratio (CAR) averages 0.1467, showing a generally strong capital base with a standard deviation of 0.0348 and values ranging from 0.1 to

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0.246. Firm Size (FS), measured by the natural logarithm of total assets, averages 16.0613, indicating a significant size variability (standard deviation of 2.9161). The debt-to-equity ratio (DER) averages 0.05082, suggesting low average leverage among the banks, with a standard deviation of 0.0866, ranging from virtually no debt (0.0000171) to higher leverage (0.5548). These statistics highlight the financial performance and risk profiles' variability among the banks studied.

Panel Unit Root Test

The Im-Pesaran-Shin (IPS) unit root test was employed to analyze the stationarity of the panel data. The results of this analysis are presented in Table 3. The IPS test helps determine if the variables under examination exhibit unit root characteristics, which informs the reliability of further statistical testing and modelling.

Table 3: Im- Persaran-Shin Unit Root Test Results

Variables		ROE	NPLR	CAR	FS	DER
IPS	Statistics	-1.169	-1.726	-2.404	-1.725	-2.309
	p-value	0.741	0.302	0.086	0.402	0.079

Table 3 presents the results from the Im-Pesaran-Shin (IPS) Unit Root Test, which is pivotal for determining the stationarity of the variables under study. The variables analyzed include Return on Equity (ROE), Non-Performing Loans (NPL), Capital Adequacy Ratio (CAR), Firm Size (FS), and Debt-to-Equity Ratio (DER). The IPS statistics for these variables are -1.169 for ROE, -1.726 for NPL, -2.404 for CAR, -1.725 for FS, and -2.309 for DER. These statistics are used to assess whether each variable exhibits unit root behaviour, which would indicate a lack of stationarity in the time series data. The p-values associated with these IPS statistics provide insight into the statistical significance of the unit root test results. For ROE, NPL, and FS, the p-values are 0.741, 0.302, and 0.402, respectively. These values are significantly higher than commonly used significance levels, such as 0.05 or 0.10, suggesting that these variables exhibit unit roots. This implies that ROE, NPL, and FS are non-stationary, indicating that their statistical properties may change over time, which could affect the reliability of any subsequent statistical analyses or models using these variables. In contrast, the p-values for CAR and DER are 0.086 and 0.079, respectively, which are below the 0.10 significance threshold. This suggests that CAR and DER are likely stationary at the 10% significance level, meaning their statistical properties are more consistent over time. Stationarity in these variables implies that they are more suitable for time series analysis as their mean and variance are likely stable, enhancing the reliability of the analyses performed using these variables.

Fixed Effect Regression Model

The study employed a fixed effect regression model to derive its estimates, aiming to rigorously analyze the relationship between the variables under investigation. The model's goodness of fit (R2), evaluated at a significance level of 5% based on the Hausman test results, was found to be 0.579. This R2 value indicates that approximately 57.9% of the variability in the dependent variable can be explained by the independent variables included in the model. The use of a fixed effect approach is particularly suited for controlling time-invariant variables that could otherwise bias results in the panel data analysis. The comprehensive findings from this analysis, including detailed statistical outcomes and coefficient estimates, are presented in Table 4.

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Table 4: Fixed Effect Regression Model

ROE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
NPLR	.135	.625	0.22	.83	-1.146	1.416	
F_SIZE	.238	.311	1.78	.085	-.396	.873	*
DER	.019	.016	1.19	.243	-.014	.053	
CAR	-.012	.018	-0.64	.529	-.049	.026	
Constant	.959	.189	5.07	0	.572	1.345	***
Mean dependent var		0.450	SD dependent var			0.194	
R-squared		0.579	Number of obs			40.000	
F-test		5.494	Prob > F			0.000	
Akaike crit. (AIC)		-67.830	Bayesian crit. (BIC)			-54.319	

*** $p<.01$, ** $p<.05$, * $p<.1$

The model's dependent variable, Return on Equity (ROE), is represented as follows:

$$ROE=0.959+(0.135) \times NPLR+(0.238) \times F\_SIZE+(0.019) \times DER-(0.012) \times CAR+\mu$$

Table 4 shows the results of the fixed effect regression model used to analyze the relationship between Return on Equity (ROE) and various financial ratios. The model's goodness of fit, indicated by an R-squared value of 0.579, suggests that approximately 57.9% of the variability in ROE is explained by the independent variables included in the model: Non-Performing Loan Ratio (NPLR), Firm Size (F_SIZE), Debt-to-Equity Ratio (DER), and Capital Adequacy Ratio (CAR). This high R-squared value reflects a strong explanatory power of the model. The Hausman test results confirmed the suitability of the fixed effect approach, which effectively controls for time-invariant variables that might otherwise introduce bias into the analysis.

The coefficients in the regression model provide insight into the impact of each independent variable on ROE. The coefficient for NPLR is 0.135, indicating a positive but statistically insignificant relationship with ROE (p-value = 0.83). Firm Size (F_SIZE) has a coefficient of 0.238, showing a positive relationship with ROE and marginal significance (p-value = 0.085). The Debt-to-Equity Ratio (DER) has a small positive coefficient of 0.019, also statistically insignificant (p-value = 0.243). The Capital Adequacy Ratio (CAR) has a negative coefficient of -0.012, with an insignificant p-value of 0.529. The constant term of 0.959 is highly significant (p-value = 0.000), indicating the baseline level of ROE when all other variables are zero. The overall F-test is significant (p-value = 0.000), confirming that the model as a whole is statistically significant. The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values suggest a good model fit.

DISCUSSION

The analysis of the Non-Performing Loan Ratio (NPLR) reveals a surprising positive relationship with Return on Equity (ROE) (coefficient of 0.135, p-value of 0.83), suggesting that higher non-performing loans may be associated with increased ROE, contrary to established literature like Uwimpundu (2023) which indicates that non-performing loans typically harm bank profitability due to increased credit risk. This unexpected result may reflect banks engaging in high-risk lending yielding high returns, supported by Adverse Selection Theory and Modern Portfolio Theory. Similarly, while Firm Size (F_SIZE) shows a marginally significant positive relationship with ROE (coefficient of 0.238, p-value of 0.085), it aligns with past findings that larger banks achieve profitability through economies of scale, though the evidence here is less conclusive. The Debt-to-Equity Ratio (DER) presents a slight positive coefficient (0.019, p-value of 0.243), suggesting

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effective debt management, though this opposes Rwashie *et al*. (2022), who linked higher debt levels to increased insolvency risk. Conversely, the Capital Adequacy Ratio (CAR) has a negative coefficient (-0.012, p-value of 0.529), indicating a slight decrease in ROE with higher capital adequacy, reflecting the trade-off between financial stability and profitability, yet this relationship lacks statistical significance, echoing mixed findings in prior research regarding the impact of CAR on bank performance.

CONCLUSION

The study concludes that non-performing loans (NPLs) do not significantly impact return on equity (ROE), implying that other factors play a more crucial role in determining profitability. Firm size has a modest and unclear influence on ROE, while the debt-equity ratio (DER) exhibits complex effects related to leverage. Furthermore, the capital adequacy ratio (CAR) demonstrates a negative yet statistically insignificant effect on the balance between financial stability and profitability, suggesting that further investigation may be needed to understand the underlying dynamics at play within these relationships. The minimal effect of credit risk indicators on financial performance indicates that, although banks have implemented various prudential measures to manage and mitigate credit risk, the improvements in credit risk management have not been substantial in recent years. It appears that traditional risk management strategies may not be sufficient to address the evolving complexities of credit risk effectively. This study highlights that while existing practices are in place, they have not significantly enhanced the banks' ability to mitigate adverse credit risk effects on their financial performance. This underscores a critical gap in the effectiveness of current risk management practices and suggests a need for more robust and innovative approaches.

Recommendation

Banks should adopt advanced tools, such as data analytics and machine learning, to improve credit risk evaluations and predict defaults. Regular training programs for staff will ensure they are equipped with the latest risk assessment techniques, enhancing their ability to manage credit risks effectively.

Although capital adequacy does not significantly impact profitability, maintaining strong capital buffers is crucial for stability. Banks should refine lending policies to ensure a balance between low-risk and high-return assets. Regulators should support banks in managing capital and risk effectively.

Also, larger banks tend to achieve better profitability due to economies of scale. To leverage this, banks should consider organic growth and strategic mergers and acquisitions, thus diversifying product offerings and improving risk management. Policymakers should create a favourable regulatory environment to facilitate these expansions.

Moreover, a positive relationship exists between the debt-to-equity ratio and return on equity, indicating that strategic leverage can enhance profitability. Banks should manage debt levels wisely, ensuring funds are channelled into high-yield, low-risk investments supported by a robust risk management framework.

Furthermore, improving financial literacy among borrowers can reduce non-performing loans. Banks should develop educational programs targeting various demographics, especially underserved communities while collaborating with regulatory authorities to promote financial education initiatives and inclusion.

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