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# Assessing the Relationship Between Credit Risk Indicators and Financial Performance of Tanzanian Commercial Banks

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***Abstract***

*The study examines the effects of credit risks on the financial performance of commercial banks in Tanzania. Secondary data, which were obtained from the audited financial statements of twenty-eight commercial banks in Tanzania from 2010 to 2022, were employed in this study. The data were collected from the websites of the Bank of Tanzania and the commercial banks. Return on assets (ROA) or return on equity (ROE) were used as financial performance measures, while the Non-Performing Loans (NPLs) to Gross Loan Loss Reserve (LLR) to Gross Loans (GL) and Loss Reserve (LLR) to Gross Loans (GL) were used to measure credit risk. Since there were no audited financial statements available for some banks, we had to leave out 12 banks from this study .This study used balanced panel data regression to explore how credit risks affect the financial performance of commercial banks in Tanzania. A balanced panel helped to make sure that each bank is observed within the same time frame, which improves the consistency and comparability of estimates. This method works well since it controls for differences between banks and changes over time. It also accounts for unobserved differences and lowers bias when measuring the impact of credit risk factors on bank performance. The panel regression assumption such as normality test, multicollinearity test, heteroscedasticity test and serial correlation test were used. The study also used the Hausman test to select the appropriate model between the fixed effect and random effect model where the fixed effect mode was appropriate. The Prais-Winsten regression, correlated panels and corrected standard errors (PCSEs) were used to handle multicollinearity, heteroscedasticity and serial correlation which existed in the study. The study found that the Non-Performing Loans (NPLs) to Gross Loans (GL) ratio had significant negative effects on both Return on Assets (ROA) and Return on Equity (ROE). On the other hand, the study found that Non-Performing Loans to Net Provisions had positive effects on ROA and ROE. The study also found a non-significant positive effect of ROE from the Loan Loss Reserve (LLR) on Gross Loans (GL) and that Loans and Advances to Total Assets had non-significant effect on ROA or ROE. The study concludes that the credit risk has an effect on financial performance of commercial banks in Tanzania. To cut down on non-performing loans and raise profits, the banks should tighten their assessment of credit risks, set aside reserves, and recoup loans. Regulators should watch provisioning policies to keep the bank profits stable. Future research should examine other bank-specific and macroeconomic factors that affect the financial performance of the banks in Tanzania and determine if similar trends exist in other emerging markets.*

***Keywords:*** *Commercial banks; Credit risk; financial performance*

## 1.0 Introduction

Credit risk is a key concern for commercial banks, as it involves possible losses if borrowers fail to meet their obligations. Good handling of credit risk is vital for stable financial performance, enough capital, and supporting economic growth (Al-Malkawi, 2019; Saunders & Amp; Allen, 2020). Banks naturally face credit risk because lending is central to how they operate. High levels of unpaid loans hurt bank profits and threaten financial stability (Tegambwage & Kasoga, 2024; Barakova et al.,

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2020).

Globally, many countries have seen banking problems because of poor credit risk practices. For example, Mexico, Venezuela, Spain, the United Kingdom, Sweden, and Norway have experienced financial crises due to high loan default rates, which led to bank failures and instability (Barakova et al., 2020). Studies in areas such as the Balkans and Afghanistan also show that credit risk is a common challenge for banks, thus, good risk practices are needed (Farooq, Khan, & Gilal, 2020).

In Africa, banks often deal with high default rates, which greatly affect their stability. In Ghana, banks had big losses between 2017 and 2022 because of unpaid loans. This shows why managing credit risk is important for keeping the banks strong.

In Tanzania, commercial banks have had ongoing credit risk issues, with bad debt harming earnings and causing changes in the banking sector. Some banks have merged or closed because of poor asset quality. For instance, Twiga Bancorp and TIB Commercial Limited merged into TPB in 2019, and Bank M merged with Azania Bank. Covenant Bank also lost its license because it lacked enough capital. Despite some gains, such as a drop in unpaid loans from 11.1per cent in 2018 to 9.8 per cent in 2019, these figures are still above the 5 per cent limit set by the Bank of Tanzania (2019). The Bank of Tanzania has set rules to deal with these problems, such as a minimum capital level of 12per cent, a maximum unpaid loan ratio of 5per cent, and minimum levels for liquidity and profit (Bank of Tanzania, 2019).

Although it is clear that credit risk affects bank performance globally, there is little evidence on how specific credit risk factors affect the financial performance of the banks in Tanzania. Previous studies generated mixed findings, with some showing a positive effect between credit risk and performance (Sabore, 2025; Batekele & Maseka ,2025) and others showing a negative effect (Arafat & Barite,2023; Munangi & Sibindi.2020; Agbamuche et al. 2022; Kaimu & Muba, 2021; Rasa, 2021). Also, most studies have looked at only one or two credit risk measures instead of a full set; thus, we do not know how unpaid loans, loan loss reserves, capital levels, and other credit risk factors affect bank performance in Tanzania. This is important because understanding a full impact of credit risk is a key for regulators, Bank Managers, and policymakers to keep banks stable and improve financial stability in the country.

From a theoretical perspective, credit risk can be examined using Merton's (1974) structural credit risk theory, which models the probability of default as a function of a firm's asset value relative to its debt obligations. According to Merton, a firm (or bank borrower) defaults when the market value of its assets falls below a critical threshold (debt level) at maturity. While Merton's model provides a robust theoretical framework for assessing credit risk, most empirical studies in Tanzania have not fully applied this theory to measure how different credit risk indicators jointly affect bank performance (Kaaya & Pastory, 2013). Specifically, there is a lack of research that integrates Non-Performing Loans to Gross Loans (NPLs/GL), Non-Performing Loans to Loan Loss Provisions (NPLs/LLP), Loan Loss Reserves to Gross Loans (LLR/GL) and Liquid assets to Total Assets (LA/TA) into a theoretically grounded analysis using the principles of structural credit risk models. This indicates a theoretical gap that this study seeks to address, providing a more comprehensive understanding of effect credit risk on financial performance within Tanzanian commercial banks.

Through this theoretical gap, the study contributes not only to the local empirical literature but also enhances the application of Merton's theory in a developing country context. Understanding how multiple credit risk measures affect bank performance can inform both regulatory frameworks and bank-level strategies to improve financial stability and profitability. The study aimed to examined the effect of credit risk on financial performance of commercial banks in Tanzania from 2010 to 2022 and aims to provide insights for making the banking sector in Tanzania more stable and efficient. The study specifically aimed to:

1. Examine the effect of Non-Performing Loans to Gross Loans on the financial performance of commercial Banks in Tanzania.
2. Examine the effect of non-performing loan to Loan Loss Provision on the financial performance of commercial Banks in Tanzania

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3. Examine the effect of Loan Loss Provision to Gross Loan on the financial performance of commercial Banks in Tanzania
4. Examine the effect of loan loss reserve to gross loan on the financial performance of commercial banks in Tanzania.

### *1.1 Research Hypothesis*

To achieve the objectives of this study, the following research hypotheses were postulated:

$H_{01}$ The ratio of non-performing loans to gross loans has no statistically significant negative effect on the financial performance of commercial bank in Tanzania.

$H_{02}$ The ratio of non-performing loan to loss provision has no statistically significant negative effect on the financial performance of commercial banks in Tanzania.

$H_{03}$ The ratio of loan loss provision to gross loan has a statistically significant negative effect on the financial performance of commercial banks in Tanzania.

$H_{04}$ The ratio of loan loss reserve to gross loan has a statistically significant negative effect on the financial performance of commercial banks in Tanzania.

## 2.0 Literature Review

### *2.1 Theoretical Perspective*

#### *2.1.1 Melton's Default Risk Theory*

Merton's Default Risk Theory was developed by Robert C Merton in 1974, which builds on the Black-Scholes option pricing framework, provides a structural approach to evaluating credit risk by modelling a firm's equity as a call option on its asset relies on several foundational assumptions to simplify real-world complexities. The theory assumes that the firm is solely financed by equity and a single, outstanding zero-coupon bond, and that the value of the firm's assets follows a geometric Brownian motion. It operates within a frictionless market, implying no transaction costs, taxes, or bankruptcy expenses. Default is considered as an event that can only occur at the maturity of the debt. Furthermore, equity shareholders are assumed to have limited liability, meaning their maximum loss is restricted to the value of their shares; they hold the option to either repay the debt and retain the firm's assets or default and transfer control to the debt holders. Finally, the model assumes that both the risk-free interest rate and the volatility of the firm's assets remain constant throughout the life of the debt. Merton's model relies on certain rigid assumptions, like efficient markets, steady asset swings, and everyone having all the facts. This theory implies that, the model is not easily applicable to developing economies such as Tanzania. In Tanzania, the market is not very open, it is hard to find common rules for what has to be public, and that big economic or rule changes can really mess with credit risk. Also, the model does not consider local groups or rules that affect performance of the banks. Even with these limitations, Merton's model is still good in determining how credit risk numbers – such as bad loans (NPLs), money set aside for loan losses (LLR), and how well banks are capitalized (CAR) – can change how well banks perform. The model shows that higher chances of default raise financial risk, but saving enough money and having good capital can help reduce these risks. This gives us a base to study credit risk in growing banking areas such as Tanzania. This theory was used by previous studies such as Rasa (2021) and Agbamuche et al.(2022). Merton's default risk theory provides a powerful quantitative and market-based framework for understanding how credit risk impacts a firm's financial performance. It establishes a causal link between the fundamental economic condition of a firm and its probability of default (PD), which directly affects profitability. The study used Merton's Default Risk Theory to understand the effect of credit risk on the financial performance of commercial banks in Tanzania. The theory helps the banks to figure out and manage credit risk by assessing the chances of default and financial consequences. The theory show that credit risk has negative effects on financial performance. It highlights the link between the bank's success and how well it manages default risk, making it a practical approach to understand credit risks and their effects on commercial banks.

### *2.2 Empirical Review*

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Batekele and Maseka (2025) examined the impact of credit risk management practices on profitability of commercial banks in the Democratic Republic of Congo (DRC). The credit risk measures such as the Non-Performing Loan Ratio (NPLR), Loan Loss Provision Ratio (LLPR), Capital Adequacy Ratio (CAR), and Cost-to-Income Ratio (CIR) are analysed for their effect on Return on Equity (ROE) and Return on Assets (ROA). The study used a quantitative approach with multiple regression analysis, and collected data from commercial banks annual reports. The units of analysis used in the study were the annual reports of the three largest banks of the DRC. The results show that CAR positively affects profitability, whereas CIR has a negative impact, underscoring the role of operational efficiency and capital strength in high-risk environments. However, the NPLR and LLPR have varying effects on profitability. This study contributes to the understanding of the role of credit risk in emerging markets and offers practical insights for policymakers to strengthen risk management frameworks in the Congolese banking sector. This study offers practical insights for policymakers to strengthen credit risk management frameworks, enhance financial resilience, and promote profitability in the DRC banking sector.

Sabore (2025). examined the effect of credit risk on the financial performance of listed Commercial Banks in Tanzania between 2017 and 2024. The study used descriptive research and gathered secondary data from annual reports of these banks. The analysis included descriptive statistics, correlation analysis, and multiple regression, and they checked whether to use a random effect model or a fixed effect model with the Hausman test. The study found that non-performing loans (NPLs), capital adequacy ratio (CAR), firm size (F_SIZE), and debt-to-equity ratio (DER) have an effect on return on equity (ROE). Interestingly, NPLs had a positive but not significant link to ROE, indicating there are other factors that matter more for profitability. Firm size seemed to have a mixed impact on ROE, while DER showed complicated effects regarding leverage. CAR was found to have a negative effect on financial stability and profitability, but again, it was not significant.

Oyasor (2024) investigated the impact of credit risk management on the financial performance of commercial banks in Nigeria. The study sought to assess how key credit risk indicators capital adequacy ratio (CAR), cost-to-income ratio (CIR), and non-performing loans (NPL) affect bank profitability. To achieve this, the researcher employed a panel regression model using secondary financial data obtained from the Central Bank of Nigeria and other official bank records covering the period from 2010 to 2022.

The study adopted a rigorous analytical approach involving descriptive statistics, normality tests, correlation analysis, and panel regression techniques to examine the relationships between the selected credit risk indicators and measures of financial performance specifically return on equity (ROE) and return on assets (ROA).The findings revealed a strong negative correlation between capital adequacy ratio (CAR) and cost-to-income ratio (CIR), suggesting that the banks with higher capital adequacy tend to operate with greater financial efficiency. However, the panel regression results indicated that none of the credit risk management variables (CAR, CIR, and NPL) had a statistically significant effect on financial performance, as measured by ROE and ROA. This outcome implies that while effective credit risk management contributes to cost efficiency within banks, its direct influence on profitability is limited or inconclusive.

The study recommended that commercial banks should refine their credit risk assessment and mitigation frameworks, enhance monitoring systems for non-performing loans, and adopt more robust loan recovery mechanisms to improve financial stability. By employing a comprehensive panel data analysis, this study makes a significant contribution to the empirical literature on credit risk management in Nigeria. Unlike earlier research, it examined both correlation and regression effects, revealing that credit risk management practices have a stronger effect on cost efficiency than on direct profitability. This study provides important insights for policymakers and banking practitioners, particularly in developing economies such as Tanzania, where managing credit risk remains critical to ensuring sustainable bank performance and financial system stability.

Arifaj and Baruti. (2023) examined the effect of credit risk on the financial performance of commercial banks in the Western Balkan nations, using data from 26 banks in Kosovo, Albania, North Macedonia, Serbia, Croatia, Montenegro, and Bosnia and Herzegovina from 2010 to 2022. The study

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classified the banks based on ownership (state-owned, private, or international) and employed return on assets (ROA) and return on equity (ROE) as indicators of financial performance, while non-performing loans indicated credit risk. The study showed that higher returns on assets and equity are linked to lower credit risk. It suggests that the banks should focus on improving their credit risk management to reduce bad loans. This method of the study is limited because it only looks at the percentage of bad loans to measure credit risk and uses ROA/ROE to stand in for financial results. It leaves out other key signs such as how much money is set aside for loan losses, how strong the capital is, ratios of loans that are not being paid back, or the risk of not having enough cash on hand. Looking at these things might give a wider view of credit risk and results. This study was used because it used the same measure of financial performance it was also conducted in the commercial banks which are the populations used by the current study .

Agbamuche et al. (2022) examined the effect of credit risk on financial performance, concentrating on five premier listed banks. The study used data from audited financial statements and looked at them with some basic stats, correlation tests, and panel regression. The study found that non-performing loans and charges for bad loans hurt financial performance, while having enough capital helped a little. The report recommended that the banks get better at evaluating loans and updating their terms to cut down on non-performing loans. But the suggestions were rather vague and did not connect well with the study results, making them difficult to implement.

Rasa (2021) examined the effects of credit risk on the financial performance of commercial banks in Afghanistan from 2014 to 2018, adopting fixed effect estimation on panel data. The study found that LLRTL has a negative impact on ROAA and ROAE, but it had an insignificant positive effect on NIM, even if it was not strong enough to be significant. TLTA showed a positive effect on NIM, but it did not seem to affect ROAA much and had an insignificant positive influence on ROAE that was not significant. TLTD was found to affect negatively ROAA, ROAE, and NIM, but only the effect on NIM was significant. The size of the bank was also linked to a negative effect on all financial performance measures. The study focused on only five listed banks, which is too small to generalize findings across the banking sector. This restricts the external validity of the results of this study. This study provides useful theoretical and methodological insights into credit risk management. Its findings cannot be directly generalized to Tanzania due to contextual differences in banking regulation, sector development, and market structure. Specifically, the banks in Tanzania follow different rules, handle risk differently and deal with market situations that are different from those in Afghanistan. Therefore, the current study emphasizes evidence from Tanzanian commercial banks to ensure contextual relevance. Non-Tanzanian studies are referenced primarily to support theoretical understanding rather than empirical generalization. This approach ensures that the current study builds directly on the Tanzanian banking context, addressing gaps in the existing literature where local empirical evidence remains limited.

Kaimu and Muba (2021) investigated the effects of credit risks on the financial performance of Tanzanian commercial banks from 2005 to 2019. The study looked at data from 15 banks to determine how credit risk affects their performance over time. The study used fixed and random effects models with several credit risk indicators: NPLR, LLPR, CAR, and BAS. The findings showed that NPLR have a negative effect on performance, LLPR's effect was not strong, CAR has a positive influence , and BAS did not make a difference. NPLR and CAR are key factors on how well banks perform, imploring that there is a long-term connection and a cause-and-effect relationship, except when it comes to LLPR. Banks in Tanzania need to focus more on managing credit risk and making sure they have enough capital to improve their financial performance.

Munangi and Sibindi (2020) investigated the effects of credit risk on the financial performance of 18 South African banks from 2008 to 2018 using panel data techniques. The study found a negative relationship between non-performing loans (NPLs) and financial performance, suggesting that a rise in NPLs reduces profitability. Capital adequacy has shown a positive relationship with performance. The ratio of loan loss provisions had a more significant negative effect than the ratio of total loans on total assets, implying the importance of credit quality. The study found that the effect of credit risk on performance varied over time, often revealing negative and significant negative effects. This study

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gives insight into credit risk in South Africa. Still, because of the differences in economics, regulations, and banking sectors, these results might not apply to Tanzania. South Africa has a much more developed and regulated banking sector than is the case with the banking sector in Tanzania. Therefore, this research is centred on studies carried out in Tanzania and East Africa to make sure that the results are applicable and helpful to Tanzanian commercial banks. Studies outside Tanzania, such as Munangi and Sibindi (2020), are referenced to give theoretical background and comparisons.

Cheng et al., (2020) examined the impact of credit risk, liquidity risk and operational risk on the profitability of banks using data collected from the banks registered on the Johannesburg Stock Exchange (JSE) for the period of 2012-2018. The analysis was conducted using Smart PLS-SEM to examine the impact of the dependent variable on the independent variables. The research showed that credit risk has a significant positive association with bank profitability. Similarly, liquidity risk has shown a positive and significant connection with bank profitability. However, operational risk indicated a negative affiliation with bank profitability. The bank-specific risk has a positive and significant nexus with credit risk, operational risk, and liquidity risk but its correlation with profitability was insignificant.

Ekinci and Poyraz (2019) examined the effects of credit risk on the financial performance of 26 commercial deposit banks in Turkey between 2005 and 2017. The study employed panel regression, drawing on data from the Banks' Statistical Report Association for classifying banks as state-owned, privately owned, or foreign-owned. The study found that there is a negative correlation between credit risk and both return on assets (ROA) and return on equity (ROE). This finding shows how credit risk affects the performance of the Turkish deposit banks during the period of 2005 to 2017.

Oduro et al. (2019) examined the effects of credit risks on the financial performance of the banks listed on the Ghana Stock Exchange from 2003 to 2017. The study used a net profit margin, return on assets (ROA), and return on equity (ROE) for evaluating financial performance, while loan and advance loss provision (LLP) was employed to measure credit risk. The analysis of the panel data revealed that credit risk has a negative effect on the financial performance of companies. This study looked at how credit risk affects the financial performance of commercial banks in Tanzania, using ROA and ROE as key measures. It also set itself apart by focusing on Tanzania's unique social and economic conditions compared to Ghana.

## 3.0 Research Methodology

The study employed a positivism research philosophy, which is appropriate given its focus on examining measurable effect of credit risk on the financial performance of commercial banks in Tanzania. This is because the positivism philosophy emphasizes objectivity, neutrality, and detachment from the research context, allowing the researcher to remain independent of the data collection process and minimizes personal biases in interpreting results. The use of a large sample and quantitative analysis methods further supports this philosophy, ensuring that conclusions are based on observable, verifiable evidence rather than subjective interpretation (Saunders et al., 2019). The study used deductive approach because it is used in the existing theories to develop and test the research hypotheses to align with the research problem, which seeks to quantify the effect of credit risk on financial performance (Saunders et al., 2019). The study adopted the explanatory research design to examine the cause-and-effect relationship between credit risk indicators and the financial performance of commercial banks in Tanzania. The explanatory design helps to understand how credit risk variables affect the financial performance variable.

To analyse the data, the study employed panel data methods, which consider both cross-sectional and time-series variation . This approach helps to control unobserved heterogeneity across the banks and generates more robust estimates of the relationships. The study variables and their corresponding measurements are presented in Table 1.

**Table 1.** Variables and Measurement

| Variable | Type | Measurement | Source |
|---|---|---|---|

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| Variable | Type | Measurement | Source |
|---|---|---|---|
| Return on Equity (ROE) | Dependent | Net income / Shareholder equity | Bank financial statements & BoT reports |
| Return on Assets (ROA) | Dependent | Net income / Total assets | Bank financial statements & BoT reports |
| Non-Performing Loans to Gross Loans (NPLs/GL) | Independent | Ratio of non-performing loans to gross loans | Bank financial statements & BoT reports |
| Non-Performing Loans to Loan Loss Provisions (NPLs/LLP) | Independent | Ratio of non-performing loans to loan loss provisions | Bank financial statements & BoT reports |
| Loan Loss Reserves to Gross Loans (LLR/GL) | Independent | Ratio of loan loss reserves to gross loans | Bank financial statements & BoT reports |
| Liquid assets to Total Assets (LA/TA) | Independent | Ratio of total loan assets to total assets | Bank financial statements & BoT reports |

### *3.1 Data Collection Methods*

#### *3.1.1 Model Specification*

The relationship between credit risk metrics displayed in Table 1 and financial performance is estimated using the following models:

ROE model

$$ROE_{it} = \alpha + \beta_1 \left(\frac{NPL_s}{GL}\right)_{it} + \beta_2 \left(\frac{NPL_s}{LLP}\right)_{it} + \beta_2 \left(\frac{LLR}{GL}\right)_{it} + \beta_3 \left(\frac{LLR}{GL}\right)_{it} + \beta_2 \left(\frac{LA}{GLTA}\right)_{it} + \mu_{it}$$

ROA model

$$ROA_{it} = \alpha + \beta_1 \left(\frac{NPL_s}{GL}\right)_{it} + \beta_2 \left(\frac{NPL_s}{LLP}\right)_{it} + \beta_2 \left(\frac{LLR}{GL}\right)_{it} + \beta_3 \left(\frac{LLR}{GL}\right)_{it} + \beta_2 \left(\frac{LA}{GLTA}\right)_{it} + \mu_{it}$$

Where:

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

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

$\left(\frac{NPL_s}{GL}\right)_{it}$ = Non-Performing Loans to Gross Loans ratio of bank i at time t

$\left(\frac{NPL_s}{LLP}\right)$ = Non-Performing Loans to Loan Loss Provisions ratio of bank i at time t

$\left(\frac{LLR}{GL}\right)$ = Loan Loss Reserves to Gross Loans ratio of bank i at time t

$\left(\frac{LA}{GLTA}\right)$ = Liquid assets to Total Assets ratio of bank i at time t

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α = Constant term

β1, β2, β3, β4 = Coefficients to be estimated

$\mu_{it}$= Error term

These models allow the study to quantify the effect of multiple credit risk indicators on both ROE and ROA while maintaining objectivity and minimizing researcher influence.

The population used in this study comprised 40 commercial banks licensed by the Bank of Tanzania; however, only 28 banks with comprehensive audited financial data from 2010 to 2022 were included, owing to the necessity for balanced panel data. Secondary data were obtained from the audited financial statements of the commercial banks, sourced from the Bank of Tanzania, commercial bank websites, and the Dar es Salaam Stock Exchange. Before performing the panel regression, diagnostic tests including the Jarque-Bera test for normality, Variance Inflation Factor (VIF) for multicollinearity (Shrestha,2020; Pallant, 2020), and the White test for heteroscedasticity were performed. (Saunders et al., 2019).

The Prais-Winsten regression with Panel Corrected Standard Errors (PCSEs) was used to handle the heteroscedasticity, serial correlation, and cross-sectional dependence, while Hausman's test was used to select the appropriate model between the Fixed Effects and Random Effects models. (Plumper et al. 2005). The Prais-Winsten regression with Panel Corrected Standard Errors (PCSEs) i provide more reliable estimates even when the number of cross-sections exceeds the number of time periods, and this study was used because N was 28 while T was 13; therefore, N was greater than T. (Moundigbaye, et al., 2018).

## 4.0 Findings and Discussion

### *4.1 Descriptive Statistics*

Table 2 shows the results for credit risk and performance measures. The mean ROA of 1.69per cent with a standard deviation of 1.99per cent indicates relatively low profitability among commercial banks, coupled with notable variation across the sample. The average NPL ratio of 6.79per cent suggests moderate credit risk, although the wide dispersion (SD = 5.67%) implies inconsistent loan quality among the banks. A very high standard deviation (36.93%) in loan loss reserves suggests extreme variability in provisioning practices, possibly due to different risk management strategies or regulatory compliance levels.

However, the NPLs to loan loss provisions ratio averaged 5.36per cent with a standard deviation of 8.12per cent, pointing to uneven adequacy of provisioning relative to bad loans, as some banks provisioned effectively while others covered only a fraction of their non-performing loans. Loan loss reserves to gross loans averaged 11.08per cent, but the very high standard deviation of 36.93per cent reflects extreme variability in provisioning practices, which may be attributed to differences in risk management approaches and regulatory requirements.

The loans-to-total-assets ratio averaged 45.65per cent with a standard deviation of 16.22per cent, showing that nearly half of the assets of the banks were allocated to loans on average. However, the broad range from as low as 5.6per cent to as high as 83.8per cent illustrates substantial diversity in asset allocation, with some banks maintaining more conservative loan portfolios while others relied heavily on lending activities.

**Table 2.** Descriptive Statistics

| Variable | | Mean | Standard Deviation | Minimum | Maximum | Observations |
|---|---|---|---|---|---|---|
| ROA | overall | 0.016911 | 0.019926 | -0.14 | 0.0526 | N = 364 |

| Variable | | Mean | Standard Deviation | Minimum | Maximum | Observations |
|---|---|---|---|---|---|---|
| | between | | 0.012708 | -0.02046 | 0.032662 | n = 28 |
| | within | | 0.01552 | -0.10263 | 0.054051 | T = 13 |
| ROE | overall | 0.117595 | 0.124956 | -1.0712 | 0.3463 | N = 364 |
| | between | | 0.071539 | -0.07505 | 0.222454 | n = 28 |
| | within | | 0.103273 | -0.87855 | 0.511649 | T = 13 |
| NPLs/GL | overall | 0.067907 | 0.056669 | -0.0073 | 0.381 | N = 364 |
| | between | | 0.036759 | 0.006287 | 0.143359 | n = 28 |
| | within | | 0.043644 | -0.03605 | 0.345018 | T = 13 |
| NPLs /LLP | overall | 0.053576 | 0.081245 | 8.85E-05 | 0.758 | N = 364 |
| | between | | 0.075734 | 0.018742 | 0.435739 | n = 28 |
| | within | | 0.032477 | -0.13916 | 0.375838 | T = 13 |
| LLR/GL | overall | 0.110829 | 0.369256 | -0.01415 | 3.005 | N = 364 |
| | between | | 0.353977 | 0.005445 | 1.914146 | n = 28 |
| | within | | 0.123256 | -0.96442 | 1.201683 | T = 13 |
| LA/TA | overall | 0.456482 | 0.162168 | 0.0558 | 0.8382 | N = 364 |
| | between | | 0.135969 | 0.1208 | 0.6599 | n = 28 |
| | within | | 0.091772 | 0.165651 | 0.739551 | T = 13 |

### *4.2 Correlations*

Table 3 presents the correlation coefficients between financial performance indicators (ROA and ROE) and the selected credit risk measures. The analysis reveals a weak and statistically insignificant positive correlation between the Non-Performing Loans to Gross Loans ratio (NPLR) and Return on Assets ($r = 0.138$, $p > 0.05$), suggesting that higher credit risk does not necessarily reduce profitability in terms of asset returns.

In contrast, the Loans to Total Assets (LTA) ratio and NPLR both showed weak negative correlations with ROA ($r = -0.066$ and $r = -0.040$, respectively), but these relationships were also statistically insignificant. Similarly, the study found a weak and statistically insignificant positive correlation between NPLR and Return on Equity (ROE) ($r = 0.153$), as well as between the Loan Loss Reserves to Gross Loans ratio and ROE ($r = 0.143$). These findings indicate that while increases in credit risk measures might be associated with slight improvements in equity returns, the relationships lack statistical reliability. Overall, the results suggest that credit risk indicators have no statistically significant linear relationship with either ROA or ROE in the sampled Tanzanian commercial banks,

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implying that other factors may be more influential in explaining variations in the financial performance of the banks.

**Table 3.** Pairwise Correlation

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| ROA | 1.000 | | | | | |
| ROE | 0.776 | 1.000 | | | | |
| NPLs/ GL | -0.066 | -0.072 | 1.000 | | | |
| NPLs /LLP | 0.138 | 0.153 | 0.157 | 1.000 | | |
| L LR/ to GL | 0.138 | 0.143 | 0.166 | 0.866 | 1.000 | |
| LA /TA | 0.040 | 0.041 | 0.228 | 0.219 | 0.174 | 1.000 |

### *4.3 Regression Analysis*

#### *4.3.1 Regression for ROA*

Table 4 presents the regression analysis results after examining the effect of credit risk indicators on Return on Assets (ROA). The overall model is statistically significant, with an F-statistic p-value below the 5per cent level, indicating that at least one of the explanatory variables significantly predicts ROE. However, the model's R-squared value is 0.03, suggesting that the included credit risk measures explain only 3.0 per cent of the variation in ROE. This implies that other factors beyond credit risk may play a more dominant role in determining equity returns in the sampled banks.

Among the predictors, the ratio of non-performing loans to gross loans (NPL/GL) shows a statistically significant negative relationship with ROE ($p < 0.05$), with a coefficient of -0.035. This implies that, all else being equal, a one-unit increase in the NPL/GL ratio leads to a 0.035 per cent decline in ROE. This result is consistent with theoretical expectations, indicating that higher credit risk (via non-performing loans) erodes shareholder profitability.

Other variables, including the ratio of non-performing loans to loan loss provision of loan (NPL/LLP), loan loss reserves to gross loans (LLR/GL), and loans and advances to total assets (LA/TA) has no statistically significant relationships with ROE, as their p-values exceed the 0.05 threshold. Although their coefficients are positive (0.017, 0.005, and 0.004, respectively), the lack of statistical significance limits the strength of inferences drawn from these values.

Diagnostic tests confirmed the validity of the regression assumptions. The Variance Inflation Factor (VIF) values were within the acceptable limits, indicating no multicollinearity concerns. The Durbin-Watson statistic did not suggest serial correlation, and the Breusch-Pagan test results indicated no heteroscedasticity. These diagnostic results enhance the reliability of the regression findings.

**Table 4.** Regression for ROA

| ROA | Coefficient | Standard error. | t-value | p-value | [95% Conf. Interval] | Sig |
|---|---|---|---|---|---|---|
| NPLs/ GL | -.035 | .019 | -1.83 | .068 | -.072 – .003 | * |
| NPLs /LLP | .017 | .026 | 0.67 | .504 | -.033 – .068 | |
| L LR/ to GL | .005 | .006 | 0.85 | .396 | -.006 – .016 | |
| LA /TA | .004 | .007 | 0.58 | .564 | -.009 – .017 | |
| Constant | .016 | .003 | 5.03 | 0 | .01 – .022 | *** |
| Mean dependent | 0.017 | SD dependent | | 0.020 | | |

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| ROA | Coefficient | Standard error. | t-value | p-value | [95% Conf. Interval] | Sig |
|---|---|---|---|---|---|---|
| var | | var | | | | |
| R-squared | 0.030 | Number of observations | | 364 | | |
| F-test | 2.741 | Prob > F | | 0.029 | | |
| Akaike crit. (AIC) | -1819.630 | Bayesian crit. (BIC) | | -1800.145 | | |
| *** p<.01, ** p<.05, * p<.1 | | | | | | |

### *4.4 Multicollinearity Test using Variance Inflation Factor (VIF)*

Table 5 shows the results from the multicollinearity test. This test checked how much the independent variables are related to each other. The VIF values ranged from 1.073 to 4.064, all below the critical limits of 5 and 10, according to Rogerson (2001) and Pallant (2020). This suggests that there are no major issues with multicollinearity among the independent variables, as the VIF values are less than 5.

**Table 5.** Multicollinearity Test

| | VIF | 1/VIF |
|---|---|---|
| NPLs/LLP | 4.064 | .246 |
| LLR/GL | 4.009 | .249 |
| LA/TA | 1.097 | .912 |
| NPLs/GL | 1.073 | .932 |
| Mean VIF | 2.561 | . |

### *4.5 Heteroscedasticity Test*

The study used white test to test the heteroscedasticity under the null hypothesis of $H_0$: homoscedasticity and the alternative of $H_1$: unrestricted heteroscedasticity. Table 6 shows the presence of heteroscedasticity in the data $\left(\chi^2_{(14)} = 18.350, \rho > .001\right)$ as the null hypothesis was rejected.

**Table 6.** Heteroscedasticity Test

| Source | chi2 | df | p |
|---|---|---|---|
| Heteroscedasticity | 18.350 | 14 | 0.191 |
| Skewness | 6.630 | 4 | 0.157 |
| Kurtosis | 2.780 | 1 | 0.095 |
| Total | 27.760 | 19 | 0.088 |

### *4.6 Regression for ROE*

Table 7 presents the regression analysis results examining the effect of credit risk indicators on Return on Equity (ROE). The overall model is statistically significant, with an F-statistic *p*-value below the

5per cent level, indicating that at least one of the explanatory variables significantly predicts ROE. However, the model's R-squared value is 0.035, suggesting that the included credit risk measures explain only 3.5per cent of the variation in ROE. This implies that other factors beyond credit risk may play a more dominant role in determining equity returns in the sampled banks.

Among the predictors, the ratio of non-performing loans to gross loans (NPL/GL) shows a statistically significant negative effect on ROE ($p < 0.05$), with a coefficient of -0.235. This implies that, all else being equal, a one-unit increase in the NPL/GL ratio leads to a 0.235 per cent decline in ROE. This result is consistent with theoretical expectations, indicating that higher credit risk (via non-performing loans) erodes shareholder profitability.

Other variables, including the ratio of non-performing loans to loan loss provision (NPL/LLP), loan loss reserves to gross loans (LLR/GL), and loans and advances to total assets (LA/TA) do not show statistically significant effect on ROE, as their *p*-values exceed the 0.05 threshold. Although their coefficients are positive (0.177, 0.019, and 0.023, respectively), the lack of statistical significance limits the strength of the inferences drawn from these values.

Diagnostic tests confirmed the validity of the regression assumptions. Variance Inflation Factor (VIF) values were within the acceptable limits, indicating no multicollinearity concerns. The Durbin-Watson statistic did not suggest serial correlation, and the Breusch-Pagan test results indicated no heteroscedasticity. These diagnostic results enhance the reliability of the regression findings.

**Table 7.** Regression for ROE

| ROE | Coef. | Standard error | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| NPLs/ GL | -.235 | .118 | -1.98 | .048 | -.468 | -.002 | ** |
| NPLs /LLP | .177 | .161 | 1.10 | .271 | -.139 | .493 | |
| L LR/ to GL | .019 | .035 | 0.54 | .592 | -.05 | .088 | |
| LA /TA | .023 | .042 | 0.56 | .579 | -.059 | .106 | |
| Constant | .111 | .02 | 5.58 | 0 | .072 | .151 | ** |

| | | | | |
|---|---|---|---|---|
| Mean Credit risks | 0.118 | SD ROE | | 0.125 |
| R-squared | 0.035 | Number of observations | | 364 |
| F-test | 3.211 | Prob > F | | 0.013 |
| Akaike crit. (AIC) | -484.900 | Bayesian crit. (BIC) | | -465.414 |

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

### *4.7 Multicollinearity Test*

Table 8 shows the results from the Multicollinearity test using the Variance Inflation Factor (VIF). This test checks if there is too much correlation between the financial risk indicators. The VIF values ranged from 1.073 to 4.064, which are below the limits of 5 (Rogerson, 2001) and 10 (Pallant, 2020). If the values had been higher, the study would have had serious multicollinearity issues. Thus, the test confirmed that there is no multicollinearity in the data**.**

**Table 8.** Multicollinearity

| | VIF | 1/VIF |
|---|---|---|
| NPLs/LLP | 4.064 | .246 |
| LLR/GL | 4.009 | .249 |
| LA/TA | 1.097 | .912 |

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| | | |
|---|---|---|
| NPLs/GL | 1.073 | .932 |
| Mean VIF | 2.561 | . |

### *4.8 Heteroscedasticity Test*

Table 9 shows the results from the Heteroscedasticity test. The study used the White test to check for heteroscedasticity, with the null hypothesis being that the data are homoscedastic and the alternative hypothesis being that they are not. The test indicated that heteroscedasticity was present in the data, $\left(\chi^2_{(14)} = 4.600, \rho > .001\right)$, thus, the null hypothesis was rejected.

**Table 9.** Heteroscedasticity Test

| Source | chi$^2$ | df | p |
|---|---|---|---|
| Heteroscedasticity | 4.600 | 14 | 0.991 |
| Skewness | 3.520 | 4 | 0.474 |
| Kurtosis | 1.570 | 1 | 0.210 |
| Total | 9.700 | 19 | 0.960 |

### *4.9 Fixed Effect Regression Results*

Table 10 shows the results from a fixed effect panel regression that studied ROA in relation to four credit risk measures over 12 years. The results revealed a P-value of 0.001, which is below 5per cent, making the model significant. The R-squared value is 2.5 per cent, meaning the independent factors explain only 2.5per cent of the variance in the dependent variable. In the ROE model, the ratios of NPL to GL and LA to TA are significant at 5 per cent level because their p-values are below 5per cent. On the other hand, in the ROA model, the ratios of NPLs to LLP and LR to GL do not show any significance at 5per cent level since their p-values are above 5per cent. Specifically, a one-unit increase in the total NPLs to GL leads to a drop of ROE by 0.038 units (Tsh), while a one-unit increase in LLR to GL boosts ROA by 0.018 units (Tsh). For the insignificant variables, a one-unit rise in the NPLs to LLP ratio raises ROE by 0.016 units (Tsh), and a one-unit increase in LA to TA, increases ROE by 0.018 units (Tsh).

**Table 10.** Fixed Effect Regression Results

| ROA | Coef. | Standard error. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| NPLs/ GL | -.038 | .019 | -1.95 | .052 | -.076 | .0 | * |
| NPLs /LLP | .016 | .026 | 0.61 | .544 | -.035 | .067 | |
| L LR/ to GL | -.005 | .007 | -0.68 | .495 | -.018 | .009 | |
| LA /TA | .018 | .009 | 1.95 | .052 | 0 | .036 | * |
| Constant | .011 | .005 | 2.39 | .017 | .002 | .02 | ** |

| | | | | |
|---|---|---|---|---|
| Mean dependent var | 0.017 | SD dependent var | | 0.020 |
| R-squared | 0.025 | Number of observations | | 364 |
| F-test | 2.138 | Prob > F | | 0.001 |
| Akaike crit. (AIC) | -1999.833 | Bayesian crit. (BIC) | | -1980.347 |

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

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### *4.10 Fixed Effects and Random Effect Test for ROA*

The study used the Hausman test to figure out whether to go with the Fixed effect or Random Effect model. This test helps to pick the best model for analysing panel data. According to Boahene et al. (2012), the hypotheses were: H0: The Fixed Effect Model is appropriate; H1: The Random Effect Model is appropriate. In Table 4.10, the p-value is 64.5per cent, which is above 5per cent, so we reject the alternative hypothesis and conclude that the fixed effect model is a suitable model.

**Table 11.** Hausman (1978) specification test

| | **Coef.** |
|---|---|
| Chi-square test value | 2.499 |
| P-value | .645 |

### *4.11 Serial Correlation Test*

The study used Pesaran CD and Breusch-Pagan LM tests to determine whether or not there is a serial correlation . The following were the hypothesis; H0: No Serial correlation and H1: There is a serial correlation. The study results show that both Pesaran CD and Breusch-Pagan LM tests for Serial correlation or cross-sectional independence Pesaran's test of cross-sectional independence = 3.914, Pr = 0.0001. The average absolute value of the off-diagonal elements = 0.321their p-values is 0.000 which is less than 5per cent, we conclude that there is a serial correlation. Thus, we use the Prais-Winsten regression, correlated panels corrected standard errors (PCSEs) model or the model that handles issues serial correlation.

#### *4.11.1 Fixed Effect Regression Results*

Table 12 shows the results from a fixed effect regression panel where return on assets (ROA) was regressed against four credit risk measures over 12 years. The results suggest that the overall model is significant since the p-value (P=0.001) is below 5per cent. The R-squared value is 2.5per cent, meaning the independent factors explain 2.5per cent of the changes in the dependent variable.

In the ROA model, the ratios of non-performing loans (NPL) to gross loans (GL) and loans to total assets (LA to TA) are important for explaining ROA at a 5per cent level, with their p-values below 5per cent. On the other hand, the ratios of NPLs to loan loss provision and loan loss reserves (LR) to GL do not significantly explain return on equity (ROE) at this level, as their p-values are above 5per cent.

Specifically, for the significant variable, a one-unit increase in total NPLs to GL results in a drop in ROE by 0.038 units (Tsh), while a one-unit increase in LR to GL increases ROA by 0.018 units (Tsh). For the insignificant variables, a one-unit increase in the NPLs to LLP ratio pushes ROE up by 0.016 units (Tsh), and a one-unit increase in LA to TA raises ROE by 0.018 units (Tsh).

**Table 12.** Fixed effect Regression Result

| **ROA** | **Coef.** | **Standard error.** | **t-value** | **p-value** | **[95% Conf** | **Interval]** | **Sig** |
|---|---|---|---|---|---|---|---|
| Ls/ GL | -.038 | .019 | -1.95 | .052 | -.076 | .0 | * |
| NPLs /LLP | .016 | .026 | 0.61 | .544 | -.035 | .067 | |
| L LR/ GL | -.005 | .007 | -0.68 | .495 | -.018 | .009 | |
| LA /TA | .018 | .009 | 1.95 | .052 | 0 | .036 | ** |
| Constant | .011 | .005 | 2.39 | .017 | .002 | .02 | * |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.017 | SD dependent var | 0.020 |

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| ROA | Coef. | Standard error. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| R-squared | | 0.025 | Number of observations | | | 364 | |
| F-test | | 2.138 | Prob > F | | | 0.001 | |
| Akaike crit. (AIC) | | -1999.833 | Bayesian crit. (BIC) | | | -1980.347 | |

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

### *4.12 Fixed Effect and Random Effect Tests for ROE*

The study used the Hausman test to decide between the Fixed Effect and Random Effect models. In Table 13, the p-value is 76.9per cent, which is higher than 5per cent. This means we reject the alternative hypothesis and conclude that the Fixed Effect Model is the right choice.

#### *4.12.1 Serial Correlation*

The study checked for serial correlation using the Pesaran CD and Breusch-Pagan LM tests. The hypotheses were: H0: No Serial Correlation, and H1: There is Serial Correlation. Pesaran's test showed a value of 4.081 (p = 0.0000) and an average off-diagonal value of 0.306. Since the p-values from both tests are 0.000, which is below 5per cent, we found that there is a serial correlation. So, we used the Prais-Winsten regression with corrected standard errors to handle this issue.

**Table 13.** Fixed Effect and Random Effect Tests for ROE

| | Coef. |
|---|---|
| Chi-square test value | 1.819 |
| P-value | .769 |

### *4.13 Fixed effect Regression Results for ROE*

Table 14 shows the results from the fixed effect regression for ROE over 12 years. The overall model did not show any significance (p = 0.261), with an R-squared value of 3.1per cent, meaning the independent variables explained only a small part of the variation in ROA. In the ROE model, the NPL to GL and LA to TA ratios were significant at 5per cent level, while the NPLs to NPs and LLR to GL ratios were not significant. A one-unit rise in the NPL to GL ratio resulted in a drop of 0.247 units (Tsh) in ROE for the significant variables. For the insignificant ones, a one-unit increase in the NPLs to NPs ratio lifted ROE by 0.147 units (Tsh), the LA to TA ratio pushed ROE up by 0.022 units (Tsh), and the LLR to GL ratio helped ROA by 0.002 units (Tsh).

**Table 14.** Fixed Effect Regression Results for ROE

| ROE | Coef. | St. Err. | t-value | p-value | [95%Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| NPLs/ GL | -.247 | .123 | -2.01 | .044 | -.488 | -.006 | ** |
| NPLs /LLP | .147 | .152 | 0.96 | .336 | -.152 | .445 | |
| L LR/ GL | .002 | .036 | 0.05 | .962 | -.069 | .072 | |
| LA /TA | .022 | .053 | 0.41 | .682 | -.083 | .127 | |
| Constant | .116 | .029 | 4.05 | 0 | .06 | .173 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.118 | SD dependent var | 0.125 |
| Overall r-squared | 0.031 | Number of obs | 364 |
| Chi-square | 5.271 | Prob > chi2 | 0.261 |
| R-squared within | 0.010 | R-squared between | 0.082 |

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

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### *4.14 Serial Correlation Test*

*4.14.1 Prais-Winsten Regression, Correlated Panels Corrected Standard Errors (Pcses)*

Table 15 shows the results from the Prais-Winsten regression with corrected standard errors for the Return on Assets (ROA). The data show that, the ratio of Non-Performing Loans (NPLs) to Gross Loans (GL) has a notable negative impact on ROA, with a coefficient of -0.051 (p = 0.026). This means that for every unit increase in the NPLs/GL ratio, ROA drops by about 0.051 units. This suggests that if the ratio of non-performing loans to gross loans (NPLs/GL) increase by one unit, the return on assets (ROA) decrease by about 5.1 per cent units. This means that, the higher the credit risk the lower the profits, since more problem loans mean higher credit risk and less productive assets.

On the other hand, the ratio of Non-Performing Loans to Net Provisions (NPLs to NPs) has a positive coefficient of 0.017, but it is not statistically significant (p = 0.118), thus, it does not affect the ROA. This suggests that higher NPLs/ NPs) may marginally improve ROA, which show that the credit risk has a weak positive effect on the financial performance. The ratios for Loan Loss to The P-value for Loan Loss Reserves to Gross Loans (LLR/GL) was positive, but the effect was not statistically significant (p = 0.217). This result implies that although higher reserves might have a cushioning effect on bank profitability, the impact is not strong enough to yield significant improvements in ROA. Likewise, the Loans and Advances to Total Assets (LA/TA) ratio recorded a positive coefficient, suggesting a potential positive effect on ROA, but the effect was also statistically insignificant (p = 0.259). This means that increasing the share of loans in total assets may not translate into higher profitability unless credit risk is effectively managed. Overall, the model explains only 3.7 per cent of the variation in ROA (R-squared = 0.037). Despite the relatively low explanatory power, the chi-square statistic ($\chi^2$ = 17.612, p = 0.001) confirms that the model is significant. This finding implies that credit risk indicators collectively have an effect on bank profitability, even if the strength of individual effects varies. The most critical effect is observed in the NPLs to GL ratio, which significantly reduces returns, while the other indicators show weaker or insignificant effects.

The Prais–Winsten regression with PCSEs was chosen because banking panel data often suffer from autocorrelation, heteroskedasticity, and cross-sectional dependence, which can bias results if not corrected. Using this method ensures that the estimated effects of credit risk on financial performance are statistically reliable and accurately reflect the dynamics of commercial banks (Boateng,2019).

**Table 15.** Prais-Winsten Regression, Correlated Panels Corrected Standard Errors (PCSEs)

| ROA | Coefficient | Standard Error | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| NPLs/ GL | -.051 | .023 | -2.23 | .026 | -.095 | -.006 | ** |
| Ls /LLP | .017 | .011 | 1.56 | .118 | -.004 | .039 | |
| L LR/ to GL | .003 | .003 | 1.24 | .217 | -.002 | .009 | |
| LA /TA | .009 | .008 | 1.13 | .259 | -.007 | .025 | |
| Constant | .015 | .004 | 4.15 | 0 | .008 | .022 | *** |
| Mean dependent variance | | 0.017 | SD dependent variance | | | .020 | |
| R-squared | | 0.037 | Number of observations | | | 364 | |
| Chi-square | | 17.61 | Prob > chi2 | | | 0.001 | |

2

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

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### *4.15 Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)*

Table 16 shows the results from the Prais-Winsten regression, correlated panels, and corrected standard errors (PCSEs). The study found that the overall model is significant since the p-value is under 5per cent. The R-squared value is 0.031, which means the independent variables explain about 3.1per cent of the changes in ROE. The Loan Loss Reserves to Gross Loans ratio (LLR/GL) and Loans and Advances to Total Assets (LA/TA) appear to have a positive but statistically insignificant relationship with Return on Equity (ROE), as indicated by p-values of 0.205 and 0.451. The data indicate that credit risk is a factor in financial results. A high ratio of Non-Performing Loans to Gross Loans (NPLs/GL) has a clear negative on ROE, suggesting that lower loan quality decreases shareholder returns. This makes it an important element in understanding financial declines. Although NPLs/LLP, LLR/GL, and LA/TA show positive associations, their statistical insignificant association indicates that provisioning and asset allocation have only a small on returns. Overall, the findings confirm that credit risk has a significant effect on financial performance. Specifically, the strong negative effect of the NPLs/GL ratio on ROE demonstrates that poor loan quality directly reduces shareholder returns, making it the most critical driver of financial decline. Although the effects of NPLs/LLP, LLR/GL, and LA/TA are positive, they are not statistically significant, which implies that while provisioning and asset allocation strategies may help to cushion or enhance returns, their contribution is limited. Since the model explains only 3.1per cent of the variation in ROE, this further indicates that credit risk affects bank performance, but additional risk indicators and external banking factors are also affecting the financial performance.

**Table 16.** Prais-Winsten Regression, Correlated Panels Corrected Standard Errors (PCSEs)

| ROE | Coefficient | | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| NPLs/ GL | -.305 | .132 | -2.31 | .021 | -.565 | -.046 | ** |
| NPLs /LLP | .111 | .069 | 1.61 | .108 | -.024 | .246 | |
| L LR/ to GL | .022 | .017 | 1.27 | .205 | -.012 | .055 | |
| LA /TA | .038 | .051 | 0.75 | .451 | -.061 | .137 | |
| Constant | .116 | .03 | 3.84 | 0 | .057 | .175 | *** |

| | | | |
|---|---|---|---|
| Mean dependent variance | 0.118 | SD dependent variance | 0.125 |
| R-squared | 0.031 | Number of observations | 364 |
| Chi-square | 15.735 | Prob > chi2 | 0.003 |

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

## 5.0 Discussion

The NPLs to GL had a significant negative effect on both ROA and ROE, indicating that higher levels of non-performing loans erode financial performance. These findings are consistent with findings of prior studies (i.e., Agbamuche et al., 2022; Ekinci & Poyraz, 2019; Oduro et al., 2019; Kaimu & Muba, 2021; Munangi & Sibindi, 2020; Sabore, 2025), although Munangi and Sibindi (2020) reported an insignificant effect on ROA. The similarity of results is most likely due to using similar methods. Most studies used panel regressions to measure how NPLs to GL affect financial performance. Since NPLs to GL and performance indicators such as ROA and ROE come from standard financial reports, the results tend to be similar across studies. However, the difference in findings across studies can often be attributed to variations in methodology, sample size, study period, and country-specific banking environments. Differences in regulatory frameworks, macroeconomic conditions, and risk management practices may influence how NPLs affect profitability, making some studies to report divergent results.

Non-Performing Loans to Loan Loss Provisions (LLP) had positive effects on ROA and ROE; this finding diverges from prior research (Kaimu & Muba, 2021; Agbamuche et al., 2022; Batekele &

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Maseka, 2025), which reported a negative effect of NPLs to LLP on both ROA and ROE. This result implies that effective loan loss provisioning can enhance bank profitability by mitigating credit risk, strengthening financial stability, and increasing investor and depositor confidence. However, the findings diverge from the findings in studies by Sabore (2025), Batekele and Maseka (2025), and Sabore (2025), which found that the NPLs loan to LLP has a significant negative effect on ROE and ROA. This indicates that the higher levels of non-performing loans and associated provisions erode bank profitability, signalling weaknesses in credit risk management and highlighting the need for stricter loan monitoring, recovery strategies, and capital adequacy measures to maintain financial stability. This difference is caused by these studies being conducted in different countries with different economic policies and technology, which affected the economic development of commercial banks.

The insignificant impact of Loans and Advances to Total Assets on both ROA and ROE suggests that this particular credit risk measure may not influence the financial performance of commercial banks in Tanzania, unlike other ratios. In contrast, Sabore (2025), Batekele and Maseka (2025), and Sabore (2025) showed significant negative effects.

These findings reinforce the importance of active credit risk management, particularly in minimizing non-performing loans, to sustain profitability. From a theoretical standpoint, the results support the risk-return trade-off theory, which posits that increased risk, if unmanaged, can erode returns (Oyasor, 2024; Arifaj & Baruti, 2023; Rasa, 2021; Cheng et al., 2020; Ekinci & Poyraz, 2019; Oduro et al., 2019; Agbamuche et al., 2022; Batekele & Maseka, 2025).

## 6.0 Conclusion and Recommendations

### *6.1 Conclusion*

This study examined the effect of credit risk on the financial performance of Tanzanian commercial banks, highlighting that the impact varies across different credit risk indicators. The Non-Performing Loans to Gross Loans (NPL/GL) ratio exerts a significant negative effect on both Return on Assets (ROA) and Return on Equity (ROE), indicating that higher levels of non-performing loans reduce profitability. This finding aligns with Merton's (1974) credit risk theory, which posits that poor credit quality increases the probability of default and directly threatens bank performance. Conversely, the Non-Performing Loans to Net Provisions (NPL/NP) ratio shows a positive relationship with both ROA and ROE, suggesting that maintaining adequate provisions can mitigate adverse consequences of credit risk and enhance financial resilience. The Loan Loss Reserve to Gross Loans (LLR/GL) ratio exhibits an insignificant effect on ROE, while the Loans and Advances to Total Assets (LATA) ratio does not significantly influence either ROA or ROE. These results indicate that not all credit risk measures equally affect the bank performance, highlighting the need for a nuanced approach to risk management.

The findings imply that bank management should prioritize the monitoring and reduction of non-performing loans and ensure capital adequacy to sustain profitability. Meanwhile, strategies related to loan loss reserves and total loan exposures should be considered within the context of their limited influence on performance. Overall, this study underscores the critical role of targeted credit risk management in enhancing financial performance, offering both theoretical support from Merton's model and practical guidance for Tanzanian commercial banks.

### *6.2 Recommendations*

#### *6.2.1 Regulatory Recommendations*

It is recommended that regulatory authorities continue enforcing and, where necessary, strengthening capital adequacy requirements. The positive and significant relationship between Capital Adequacy Ratio (CAR) and financial performance indicates that maintaining sufficient capital buffers is essential for financial stability and resilience against credit risk shocks in Tanzanian commercial banks.

#### *6.2.2 Operational Recommendations for Banks*

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Given the significant negative effect of Non-Performing Loans to Gross Loans (NPL/GL) on financial performance, it is recommended that banks should enhance their credit appraisal and loan monitoring processes. This includes implementing rigorous borrower evaluation frameworks and establishing early warning systems to detect emerging default risks promptly, thereby reducing the accumulation of non-performing loans. In the light of the insignificant effect of Loan Loss Reserves to Gross Loans (LLR/GL) on performance, the banks are advised to regularly review and align their loan loss reserve policies with the prevailing economic conditions and emerging credit risk patterns to ensure adequacy and relevance.

### *6.2.3 Recommendation for further Studies*

Future research should investigate why the Loan Loss Reserves to Gross Loans (LLR/GL) ratio was found to have an insignificant effect on financial performance, despite being widely considered an important risk management tool. Additional studies could explore other factors that may influence the effectiveness of loan loss reserves, such as the quality of credit risk assessment frameworks, economic conditions, or management practices within Tanzanian commercial banks. Moreover, research could examine the dynamic relationship between Non-Performing Loans (NPL/GL), Capital Adequacy Ratio (CAR), and financial performance over a longer period to capture structural changes in the banking sector. This would provide deeper insights into how credit risk indicators interact with financial performance under different economic cycles.

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