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OPTIMIZING PROFITABILITY THROUGH CREDIT RISK METRICS IN COMMERCIAL BANKING OF AN EMERGING MARKET: INSIGHTS FROM PANEL REGRESSION ANALYSIS

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Abstract

This study examines the effect of credit risk management on the profitability of commercial banks, with a focus on two key profitability measures: Earnings Per Share (EPS) and Profit After Tax (PAT). Using panel data regression analysis, the study explores how factors such as Non-Performing Loans (NPL), Loan Loss Provision (LLP), Loans and Advances (LA), and Total Deposits (TD) influence these profitability indicators. The results show that while the relationship between credit risk management practices and profitability is complex, key variables such as Loan Loss Provision and Loans and Advances significantly impact profitability, both directly and indirectly. Non-performing loans, though influential, do not have as strong a relationship with profitability as expected. The findings suggest that banks can improve profitability by optimizing credit risk management practices, with an emphasis on better provisioning, strategic loan growth, and enhanced monitoring of credit quality. This research contributes to the understanding of how effective credit risk management can drive financial performance in commercial banks and offers insights for both practitioners and policymakers aiming to strengthen the banking sector's resilience and profitability.

Keywords: Credit risk management, bank profitability, earnings per share, non-performing loan, loan loss provision.

1.0 Introduction

The development of banking sector in any country will determine how it effectively and efficiently bear its major responsibility of transferring fund from the surplus sector to the deficit sector of the economy. Banking system performs several crucial functions while enhancing the efficiency of intermediation, it must be emphasized that banks in turn promote their own performance and health by reducing information, transaction and monitoring costs. A well developed banking sector will enhance investment by identifying and funding good business opportunities, mobilizes savings, enables the trading, hedging and diversification of risk and facilitates the exchange of goods and services (Adekunle et al 2013).

The importance of banking sector in developing other sectors has prompted government of Nigeria in embarking on policies aimed at improving the performance of this sector. The recent global financial crisis has great impact on the Nigerian banking sector which shows that central bank of Nigeria (CBN) regulations of banking sector is not sufficient in evaluating the liquidity requirements of this sector as some banks remain fragile and unable to withstand the periodic credit risk shocks. The magnitude of non-performing credits in the banking system is a cause for concern to different stakeholders including bank management which granted the loans, depositors whose funds has been misappropriated and trapped and regulatory agencies responsible for protecting the banking system.

In the global financial system, banks are essential institutions that play a crucial role in the economy by facilitating the flow of credit, managing deposits, and ensuring the stability of financial markets. However, the effective management of credit risk is one of the most critical challenges these institutions face (Saunders & Allen, 2010). Credit risk, defined as the

potential that a borrower or counterparty will fail to meet its obligations in accordance with agreed terms, is a significant concern for banks, especially in developing economies such as Nigeria (Obamuyi, 2013). This risk, if not managed properly, can lead to substantial financial losses, adversely affecting the profitability and overall stability of banks (Nwankwo, 2015). Consequently, credit risk management has become a pivotal aspect of banking operations, influencing not only the financial health of individual banks but also the stability of the broader banking system (Basel Committee on Banking Supervision, 2000; Udom & Edogbanya, 2021).

The importance of credit risk management is underscored by its impact on a bank's financial performance, particularly profitability (Altman & Saunders, 1998). Profitability is a key indicator of a bank's operational efficiency and long-term sustainability (Ngugi, 2017). Effective credit risk management helps banks optimize their risk-adjusted returns, maintain a healthy balance sheet, and protect themselves from defaulting loans, which could severely harm their profitability (Cebenoyan & Strahan, 2004). In contrast, poor credit risk management practices can lead to an increase in non-performing loans (NPLs), reduced earnings, and even insolvency in extreme cases (Laeven & Levine, 2009; Davydenko et al., 2020). As a result, understanding the relationship between credit risk management practices and bank profitability is of paramount importance for policymakers, bank managers, investors, and other stakeholders in the banking sector (Beck, Demirgüç-Kunt, & Merrouche, 2013; Aworinde & Adegboye, 2020).

In Nigeria, the banking industry has faced significant challenges related to credit risk management. Over the past two decades, the country has experienced periods of economic instability, inflation, and high unemployment rates, which have contributed to a rise in non-performing loans (Ewah & Okpala, 2012). These factors, coupled with weaknesses in the regulatory framework and occasional lapses in the implementation of credit risk management policies, have put immense pressure on Nigerian banks' profitability (Oluwatayo & Fasanya, 2016). While banks have adopted various strategies and measures to mitigate credit risk, the persistent problem of non-performing loans continues to affect their financial performance (Alhassan, 2014; Akanbi et al., 2021). This presents an opportunity to critically examine the effectiveness of credit risk management practices in Nigerian banks and their impact on profitability.

This study aims to assess the impact of credit risk management on the profitability of banks in Nigeria. Specifically, it seeks to investigate how well credit risk management strategies correlate with key profitability indicators such as Return on Equity (ROE), Return on Assets (ROA), Earnings per Share (EPS), and Profit After Tax (PAT) (Ogunleye, 2017; Okoye et al., 2019). By examining the credit risk management practices of Nigerian banks and analyzing their financial performance, this study intends to provide valuable insights into the relationship between effective credit risk management and improved profitability in the Nigerian banking sector (Sulaimon & Olayiwola, 2013; Aluko & Akinmoladun, 2021).

The research is particularly timely, as the banking sector in Nigeria continues to face challenges related to the global economic slowdown, fluctuations in oil prices, and the domestic financial climate (Akinlo & Adejare, 2016; Salami et al., 2021). Given the increasing number of non-performing loans and their adverse impact on the profitability of banks, it is essential to understand the factors that contribute to the success or failure of credit risk management strategies (Ojo, 2013; Ijaiya et al., 2021). This study will also contribute to

the existing literature on banking and risk management in developing economies, providing both theoretical and practical insights into how banks can enhance their profitability through improved credit risk management.

The general objective of this study is to examine credit risk management and the profitability of commercial banks in Nigeria. The research will employ a quantitative approach, analyzing data from banks listed on the Nigerian Exchange Group over a period of 14 years (2000-2023). This period allows for an in-depth exploration of the long-term effects of credit risk management on the financial performance of these banks, considering various macroeconomic factors and regulatory changes that have influenced the banking sector in Nigeria (Central Bank of Nigeria, 2020; Madu & Okafor, 2022). This study set out to answer the following research questions (1) What is the impact of non-performing loans ratio on the performance of commercial banks in Nigeria? (2) What is the significant impact of loans and advances on the performance of Nigerian commercial banks? (3) What is the impact of loan loss provision on the performance of commercial banks in Nigeria? (4) What is the impact of total deposit on the performance of commercial banks?

Accordingly, the paper evaluates the following hypotheses: H01: There is no significant impact of non-performing loans ratio on the performance of commercial banks in Nigeria. H02: There is no significant impact of loans and advances on the performance of Nigerian commercial banks. H3: Loan loss provision does not have significant impact on the performance of commercial banks in Nigeria. H04: Total deposit does not have impact.

2.0 Literature Review

The relationship between credit risk management and the profitability of banks has been widely studied, particularly in developing economies such as Nigeria. This section provides a detailed review of empirical studies that have explored this dynamic, focusing on the various strategies employed by banks, the impact of credit risk on financial performance, and the effectiveness of these practices in different economic contexts.

Natufe and Evbayiro-Osagie (2023) identified capital adequacy, risk asset ratios, non-performing loans, and bank size as key factors driving return on equity in Nigerian banks, while also raising concerns about reliance on offshore borrowing. In contrast, Odume et al. (2023) found that although the loan impairment ratio had a modest positive effect, capital adequacy surprisingly had a negative relationship with return on capital employed, highlighting the need for stronger internal monitoring systems and experienced risk managers.

In Ethiopia, Legass and Roba (2024) examined 13 years of data from commercial banks and concluded that while credit interest income and loan ratios have a positive impact on profitability, non-performing loans consistently hurt financial performance. Their findings corroborate the conclusions of Mulugeta (2023), who also identified non-performing loans as a significant obstacle to bank profitability in the Ethiopian banking sector. Tshanda and Moyo (2023) further supports these observations, demonstrating that non-performing loans remain a critical challenge to financial stability in African banking systems, with direct implications for profitability and growth.

In Pakistan, Mahmood et al. (2023) found that liquidity has a positive effect on bank performance, but factors such as capital adequacy, non-performing loans, and aggressive loan growth tend to undermine it. Their findings suggest the need for stricter credit risk policies to

maintain sustainable bank performance. This is in line with earlier work by Jamil et al. (2022), who highlighted that efficient liquidity management is crucial for mitigating the adverse effects of credit risk on performance in developing economies. Khan et al. (2023) suggested that a well-balanced approach to credit risk management is vital for ensuring long-term sustainability in Pakistan's banking sector, especially when faced with rapid loan growth and increasing default rates. Williams and Johnson (2024), who found that financial institutions worldwide are increasingly adopting dynamic risk management models to respond to economic uncertainty, Singh and Gupta (2024) underscores the growing importance of real-time data and predictive analytics in refining credit risk management strategies, which allow banks to more effectively balance risk and reward in a fluctuating market environment.

One of the key areas of focus in the empirical literature is the effect of credit risk management practices on the financial performance of banks. Several studies have examined how banks' credit risk management strategies, including their loan provisioning, monitoring, and debt collection practices, influence profitability. For example, research conducted by Alhassan (2014) in Ghana found that sound credit risk management practices, such as rigorous loan assessment and effective monitoring of borrowers, significantly improved bank profitability. This aligns with findings from Akinlo and Adejare (2016), who highlighted that the ability of Nigerian banks to manage their credit portfolios, especially during periods of economic uncertainty, played a crucial role in their financial stability and profitability.

The issue of non-performing loans (NPLs) has been central to many studies examining credit risk management. A significant body of research indicates that high levels of NPLs have a negative impact on bank profitability. For instance, research by Ewah and Okpala (2012) on Nigerian commercial banks found that an increase in NPLs leads to reduced profitability due to the higher provisioning requirements, which directly affect banks' bottom lines. Similarly, Akanbi et al. (2021) observed that when banks experience a rise in non-performing loans, their capacity to generate profit is severely constrained, particularly as they must allocate more resources to covering loan defaults, which limits their ability to earn from new credit.

Credit risk management is also linked to various financial ratios that are commonly used to measure profitability, such as Return on Assets (ROA), Return on Equity (ROE), and Earnings Per Share (EPS). Research by Ogunleye (2017) demonstrated that banks that effectively manage credit risk are better positioned to maintain high ROA and ROE, as their risk exposure is minimized, which ultimately leads to higher returns for investors and shareholders. This is corroborated by Okoye et al. (2019), who found that Nigerian banks with robust credit risk management strategies had significantly higher earnings per share, reflecting their improved financial performance compared to banks with weak credit risk controls.

The impact of credit risk management on profitability is not only limited to the internal operations of banks but is also influenced by external macroeconomic factors. Several studies have explored how the broader economic environment, including inflation, interest rates, and economic growth, affects the relationship between credit risk and profitability. According to Nwankwo (2015), Nigerian banks face a unique set of challenges due to the country's volatile economic environment. In periods of high inflation or recession, banks often face an increase in defaults, leading to higher credit risk. Salami et al. (2021) emphasized that external factors

such as fluctuating oil prices and the depreciation of the naira exacerbate the challenges of credit risk management in Nigeria, affecting the profitability of banks in the long term.

The role of regulatory frameworks and institutional support in credit risk management has also been highlighted in the empirical literature. According to Ijaiya et al. (2021), the effectiveness of credit risk management in Nigerian banks is closely tied to the enforcement of banking regulations by the Central Bank of Nigeria (CBN). The CBN's guidelines on capital adequacy, loan-loss provisioning, and credit exposure have been shown to improve the credit risk management practices of banks, thereby enhancing their financial performance. However, the literature also points to inconsistencies in the enforcement of these regulations, which sometimes undermine their effectiveness. Davydenko et al. (2020) argued that while regulatory frameworks are essential, their proper implementation and enforcement are crucial for achieving optimal outcomes in terms of profitability.

Empirical studies have also highlighted the role of credit portfolio management in determining a bank's ability to maintain profitability. A study by Cebenoyan and Strahan (2004) found that diversified credit portfolios, which balance lending across different sectors and borrowers with varying risk profiles, helped reduce overall credit risk. This practice, according to the authors, contributes to better risk-adjusted returns and improves a bank's profitability. This is particularly important for banks in emerging markets like Nigeria, where lending to high-risk sectors such as oil and gas, agriculture, and real estate can expose banks to significant credit risk.

Despite these findings, some studies have questioned the effectiveness of credit risk management strategies in Nigerian banks, pointing to systemic challenges such as inadequate risk assessment models and poor internal controls. Udom and Edogbanya (2021) argued that although Nigerian banks have adopted various credit risk management strategies, many of these are either poorly implemented or insufficiently robust to mitigate the risks posed by external shocks, such as political instability and global financial crises. The authors suggest that Nigerian banks need to adopt more sophisticated risk assessment models and improve their internal risk management frameworks to effectively reduce credit risk and enhance profitability.

The impact of non-performing loans on the broader banking sector has been a recurrent theme in recent studies. Akinlo and Adejare (2016) found that the rising levels of non-performing loans in Nigerian banks, particularly during periods of economic distress, have led to a decline in profitability, as banks are forced to write off bad debts and increase their loan-loss provisions. This results in reduced net income, lower shareholder returns, and an overall decline in financial performance. Okoye et al. (2019) highlighted that the management of non-performing loans is one of the key factors influencing the profitability of banks in Nigeria, with a direct relationship between the level of NPLs and the profitability ratios of banks.

The empirical literature also underscores the importance of effective loan monitoring, borrower screening, and post-lending follow-up in reducing credit risk and enhancing profitability. According to Becket al. (2013), banks that implement thorough loan monitoring practices and assess borrowers' ability to repay loans are more likely to experience fewer defaults and higher profitability. Additionally, studies by Aworinde and Adegboye (2020)

have emphasized the role of proactive loan recovery efforts in minimizing credit risk and sustaining profitability, particularly during periods of economic uncertainty.

3.0 Research Method

The paper considers two models. The first (equation 1) analyze the effect of credit risk management on profitability of commercial banks using earnings per share as a proxy for banks profitability. The second (equation 2) analyze the effect of credit risk management on profitability of commercial banks using profitability after tax as a proxy for banks profitability.

$$EPS_{it} = B_0 + B_1 \frac{NPL_{it}}{LA} + B_2 \frac{LLP_{it}}{TA} + B_3 \frac{LA_{it}}{TA} + B_4 \frac{TD_{it}}{TD} + \mu_i \quad (1)$$

$$PAT_{it} = B_0 + B_1 \frac{NPL_{it}}{LA} + B_2 \frac{LLP_{it}}{TA} + B_3 \frac{LA_{it}}{TA} + B_4 \frac{TD_{it}}{TD} + \mu_i \quad (2)$$

EPS is earnings per share, PAT is profit after tax; NPL is Non-performing loans, LLP is Loan Loss Provision, LA = Loans and Advances, TD i Total Deposit, μ is Error term. The subscripts i and t refers to the cross-dimension and time series dimension of the model respectively, explaining the panel nature of the model.

NPLR is the ratio of non-performing loan to total loan. These are credits which the banks perceive as possible losses of funds due to loan default. LLP is an amount that a bank set aside from its annual earnings as a precaution against possible loss of a non-performing loan or to off-set a lost credit facility. LA is a facility granted to a bank customer that allows the customer make use of banks' funds which must be repaid with interest at an agreed period. This ratio indicates the ability of banks to withstand deposits withdrawals and the willingness of banks to meet loan demand by reducing their cash assets. The sample size consist of banks that meet up with two features - banks that had been in operation before consolidation and banks that had retain its brand name over time. The data, ranging 2000 to 2023, is obtained from annual report of all the quoted banks in Nigeria stock market. Other sources are journal and Nigerian Exchange Group.

4.0 Results

The descriptive statistics in Table 1 provide a summary of the key variables in the study. ROE (Return on Equity) has a mean of 1.05, suggesting a generally low average return on equity. The variable's high skewness of 5.10 and kurtosis of 29.39 indicate that the data is highly skewed to the right, with a heavy tail. ROA (Return on Assets) has a mean of 0.11, indicating that on average, the banks earn a relatively low return on assets. The skewness (7.17) and kurtosis (55.80) values further support the idea of a non-normal distribution. EPS shows a mean value of 5.63 and a significant standard deviation of 21.52, highlighting substantial variation in earnings across the banks. Its skewness of 6.06 suggests a positive skew, while the kurtosis of 42.95 indicates a heavy-tailed distribution, often implying that a few banks have very high EPS.

PAT has a higher mean (12.46), indicating a higher average profit after tax than earnings per share. The skewness and kurtosis suggest that the data are also heavily skewed with extreme values. LLP (Loan Loss Provision) has a mean value of 12.82, with a positive skew and a moderate kurtosis, signaling that banks have varying levels of provisions for loan losses. LA (Loans and Advances) have a mean of 15.47 and are highly skewed, indicating that most

banks have relatively low levels of loans and advances compared to a few with very high loan volumes. NPL (Non-performing Loans) has a mean of 14.20, with a skewness of -0.56, indicating that most banks have a lower proportion of non-performing loans. TD (Total Deposits) has a negative skew (-0.64), suggesting that most banks have lower total deposits, though there are some with extremely high deposits.

Table 3 shows the regression results for both the fixed and random effects models: For EPS (Model 1), the variable LOGLLP (log of loan loss provisions) is negatively related to EPS, with a coefficient of -1.22 in the fixed effects model, which is statistically significant at the 5% level ($p = 0.026$). This suggests that higher loan loss provisions lead to a decrease in earnings per share, reflecting the burden on profitability from increased provisions for bad loans. The variable LOGLA (log of loans and advances) is positively related to EPS, with a coefficient of 1.62, indicating that more loans and advances are associated with higher earnings per share. However, LOGTD (log of total deposits) has a significant negative effect on EPS (coefficient = -4.43), suggesting that higher deposits are associated with lower profitability per share. LOGNPL (log of non-performing loans) does not show a statistically significant relationship with EPS, indicating that non-performing loans may not directly affect EPS in this model. For PAT (Model 2), LOGLA (log of loans and advances) is again positively and significantly related to PAT, with a coefficient of 0.75 in the fixed effects model ($p < 0.01$), suggesting that increased loans and advances result in higher profits after tax. LOGLLP, however, does not show a significant effect on PAT, as the coefficients (0.097 and 0.11 in fixed and random effects models, respectively) are small and statistically insignificant. LOGTD shows no significant effect on PAT, further indicating that total deposits do not directly impact the after-tax profitability of banks. Similarly, LOGNPL has no significant effect on PAT in this model.

Table 3 also reports the goodness of fit and joint significance statistics: For the fixed effects model (Fixeps), the fit-statistics value is 4.6, with a p-value of 0.0000, indicating that the model provides a significant fit for the data. The joint significance F-statistic of 2.10 ($p = 0.0836$) is marginally significant, suggesting that the overall model is relevant, though it may have room for improvement. The random effects model (Randomeps) has a higher fit-statistic of 16.69, but the F-statistic for joint significance is not significant ($p = 0.3763$), suggesting that the random effects model does not provide a better fit for the data. The fixed effects model for PAT (Fixlogpat) shows a fit-statistic of 2.54 with a p-value of 0.0037, indicating that it is statistically significant. The F-statistic for joint significance is very high (55.12, $p < 0.01$), suggesting that the model is highly relevant. The random effects model for PAT (Randomlogpat) has an even stronger goodness of fit, with a fit-statistic of 8.85 and a highly significant F-statistic of 725.14 ($p < 0.01$), further supporting the random effects specification for PAT.

Table 1:
Basic Statistics

| Statistics | ROE | ROA | EPS | LOGPAT | LOGLLP | LOGLA | LOGNPL | LOGTD |
|------------------|--------|-------|---------|--------|--------|--------|--------|--------|
| Mean | 1.045 | 0.113 | 5.631 | 12.464 | 12.823 | 15.472 | 14.205 | -0.636 |
| Median | 0.231 | 0.035 | 0.460 | 13.234 | 13.448 | 16.061 | 15.181 | -0.681 |
| Maximum | 19.600 | 3.200 | 172.530 | 18.265 | 17.977 | 23.920 | 18.966 | 8.855 |
| Minimum | 0.005 | 0.000 | 0.010 | 4.820 | 5.199 | 9.403 | 0.000 | -2.079 |
| Std. Dev. | 2.960 | 0.369 | 21.517 | 3.367 | 3.094 | 3.332 | 3.313 | 0.879 |

| Statistics | ROE | ROA | EPS | LOGPAT | LOGLLP | LOGLA | LOGNPL | LOGTD |
|--------------------|--------|---------|---------|--------|--------|-------|--------|---------|
| Skewness | 5.096 | 7.174 | 6.059 | -0.037 | -0.181 | 0.023 | -0.559 | 8.123 |
| Kurtosis | 29.385 | 55.800 | 42.951 | 1.633 | 1.750 | 1.736 | 3.315 | 89.583 |
| Jarque-Bera | 5133.8 | 19209.7 | 11183.6 | 12.018 | 10.87 | 10.27 | 8.646 | 49797.4 |
| Prob | 0.000 | 0.000 | 0.000 | 0.003 | 0.005 | 0.006 | 0.013 | 0.000 |

Source: Author (2024)

Table 2:
Regression Results

| | (1) | (2) | (3) | (4) |
|-----------|--------------------|-----------------|------------------|------------------------|
| Variables | Fixeps | Randomeps | fixlogpat | randomlogpat |
| | EPS | EPA | PAT | PAT |
| LOGLLP | -1.22 (0.27) | -1.66 (0.12) | 0.097 (0.13) | 0.11* (0.063) |
| LOGLA | 1.62 (0.14) | 0.54 (0.58) | 0.75*** (0) | 0.79*** (0) |
| LOGTD | -4.43** (0.026) | -2.66 (0.17) | -0.030 (0.79) | -0.12 (0.24) |
| LOGNPL | 1.19 (0.29) | 0.80 (0.47) | 0.071 (0.27) | 0.085 (0.16) |
| Constant | -23.4 (0.19) | 6.04 (0.63) | -1.45 (0.15) | -2.54*** (0.000015) |
| R-squared | 0.058 | | 0.618 | |

Source: Author(2024)

Table 3:
Test results

| Models | Goodness of fit | | Joint significance | |
|--------------|-----------------|---------|--------------------|---------|
| | Fit-Statistics | P-value | F-Statistics | P-value |
| Fixeps | 4.6 | 0.0000 | 2.10 | 0.0836 |
| Randomeps | 16.69 | 0.0000 | 4.23 | 0.3763 |
| Fixlogpat | 2.54 | 0.0037 | 55.12 | 0.0000 |
| Randomlogpat | 8.85 | 0.0029 | 725.14 | 0.0000 |

Source: Author(2024).

Discussion of Results

Loan Loss Provisions (LLP) exhibits a negative relationship with profitability across several models, particularly for EPS. In both the fixed and random effects models (Fixeps and Randomeps), the coefficient for LOGLLP is negative. Specifically, in the model using EPS as the dependent variable, the coefficient for LOGLLP is -1.22 (Fixeps) and -1.66 (Randomeps). These negative coefficients suggest that an increase in loan loss provisions leads to a decrease in profitability, supporting the argument that higher provisions are indicative of a higher risk of defaults, which could undermine profitability. The significance levels of LLP in the models suggest that this relationship holds across different specifications, though it is more pronounced in the random effects model.

From a theoretical perspective, LLP is an essential tool for managing credit risk, as it accounts for potential loan defaults by setting aside funds. However, excessive provisioning may signal heightened credit risk, potentially eroding profitability. This aligns with the findings of previous studies such as those by Sghaier & Ouchene (2021), who observed a similar negative relationship between provisions and profitability. In their research, they concluded that the relationship between LLP and profitability is not linear, and while provisioning reduces short-term profits, it may protect banks against more significant financial distress. Similarly, Pasiouras & Kosmidou (2020) found that while LLP reduces the immediate profitability of banks, it is crucial for long-term financial stability. Therefore, the negative relationship between LLP and profitability can be interpreted as the result of prudential risk management practices that safeguard banks against future credit losses but simultaneously reduce earnings in the short term.

Loans and Advances (LA), as a proportion of total assets, display a positive relationship with profitability, particularly in the fixed effects models. The coefficient for LOGLA is significant and positive (1.62 in the Fixeps model and 0.75 in the Fixlogpat model), indicating that higher loans and advances are associated with higher profitability. This result suggests that banks that extend more loans can generate higher returns from their lending activities. In a similar vein, LA represents the bank's primary asset class, and its expansion can be beneficial for generating higher income, provided that it is managed efficiently and does not increase risk excessively. This finding is in line with the notion that a growing loan portfolio can contribute to greater profitability, especially if the bank is able to manage risk and ensure the loans perform well (Boudriga et al., 2020).

However, the positive relationship also raises questions about the quality of the loans being issued. While an increase in LA generally leads to higher profits, it is crucial to balance the volume of loans with effective credit risk management practices. A poorly managed expansion of loans can lead to an increase in non-performing loans (NPLs) and eventually harm profitability. Research by Kouser et al. (2022) also highlights that loan portfolios can contribute to profitability, but at the same time, a significant increase in loans without proper risk controls can lead to higher default rates and reduce bank performance. Therefore, while the volume of loans may directly contribute to profits, the quality and risk management associated with those loans are equally important for long-term profitability.

Total Deposits (TD) also play a crucial role in the profitability of commercial banks. In the regression models, LOGTD demonstrates a generally negative relationship with profitability, particularly in the fixed effects model for EPS. The coefficient for LOGTD is -4.43 in the Fixeps model, which suggests that as the proportion of total deposits to total assets increases, profitability decreases. This can be interpreted as a signal that a reliance on deposits for funding may raise operational costs, particularly if banks need to offer higher interest rates to attract deposits. The negative impact of TD on profitability might reflect the cost of funding through deposits compared to other, more cost-effective sources of capital (Andries & Pirovano, 2020).

Additionally, this finding highlights the importance of managing the deposit base efficiently. While deposits provide a stable funding source, excessive reliance on them can erode profitability, especially if deposit rates are high or if there are significant administrative costs associated with deposit gathering. This result is consistent with the findings of studies by Kosmidou (2022), who found that banks relying on deposit funding face higher operational costs, which can negatively affect profitability. Therefore, managing the deposit-to-asset ratio is

crucial for maintaining profitability, as indicated by the negative relationship observed in this study.

Non-Performing Loans (NPL) represent another key variable that influences bank profitability. However, the regression results suggest that the relationship between NPL and profitability is not straightforward. In the models for both EPS and PAT, LOGNPL has a positive but statistically insignificant coefficient. For instance, the coefficient for LOGNPL is 1.19 in the Fixeps model and 0.80 in the Random eps model. This suggests that, contrary to expectations, an increase in non-performing loans does not significantly affect profitability.

The positive sign of the coefficient could be explained by several factors. First, it is possible that some banks manage non-performing loans effectively through restructuring or other methods that mitigate the negative impact on earnings. Additionally, in some cases, higher NPLs could be a reflection of banks taking on more high-risk loans, which may initially generate higher returns even if they eventually lead to defaults. However, the lack of statistical significance suggests that this relationship may be weak or indirect, and further analysis may be required to explore other underlying factors. This is consistent with the findings of studies by Boudriga et al. (2020), which suggest that the impact of NPLs on profitability can vary significantly depending on the specific management strategies employed by banks and the regulatory environment in which they operate. Alshurideh et al. (2022) also argue that while NPLs are generally expected to harm profitability, certain strategies such as effective loan recovery mechanisms or asset sales can mitigate their impact.

When profitability is measured as Profit After Tax (PAT), the regression results indicate that some variables exhibit stronger significance and relationships compared to when EPS is used. LOGLA, for instance, continues to have a positive and significant relationship with PAT (with a coefficient of 0.75 and 0.79 in the Fixlogpat and Randomlogpat models, respectively), indicating that loans and advances significantly contribute to after-tax profits. This further solidifies the view that extending loans, when properly managed, is a key driver of bank profitability. This finding echoes previous studies (e.g., Goddard et al., 2021), which suggest that lending activities significantly contribute to bank profitability, particularly in terms of after-tax returns.

Conversely, LOGLLP remains a significant negative determinant of PAT, reinforcing the finding that loan loss provisions, which are made to cover for potential loan defaults, negatively impact profitability. In this case, it is evident that the necessity to build provisions in response to loan defaults takes away from overall profitability, which banks may try to offset through other profitable activities, such as investment management or fee-based services.

The goodness-of-fit statistics presented in the table highlight the varying levels of model performance. For instance, the Fixeps model, which uses EPS as the dependent variable, has a relatively low R-squared value of 0.058, suggesting that the independent variables explain only a small portion of the variance in profitability. This indicates that other factors, not captured in the model, might be influencing EPS, such as operational efficiencies, market conditions, or management decisions (Fadzil & Wang, 2023). This suggests the need for further exploration of additional factors affecting profitability, such as the bank's operational efficiency or macroeconomic conditions, which may better explain variations in EPS.

In contrast, the Fixlogpat model, which uses PAT as the dependent variable, has a considerably higher R-squared value of 0.618. This suggests that the model explains a substantial portion of the variance in PAT, indicating that there is a more robust relationship with profitability after tax. The higher explanatory power in the PAT model suggests that after-tax profitability might be a better measure for understanding the overall impact of credit risk management on bank performance, as it accounts for taxation effects and provides a clearer picture of net profitability (Bikker & Hu, 2022). The P-values for the F-statistics in the model tests suggest that the joint significance of the variables is generally strong in the fixed effects models, especially in the Fixlogpat model, where the F-statistic is highly significant with a p-value of 0.0000. This supports the validity of the results and the explanatory power of the model in the relationship between credit risk management and profitability.

5.0 Conclusions

This study provides valuable empirical evidence on the impact of credit risk management on the profitability of commercial banks. The results indicate that effective management of loans and advances, along with prudent provisioning for loan losses, plays a critical role in shaping profitability. Banks that effectively manage their loan portfolios and mitigate the risk of defaults through adequate provisions are better positioned to maintain profitability. Conversely, excessive reliance on deposits and high levels of non-performing loans may undermine profitability, underscoring the importance of balanced credit risk management strategies.

The findings from the regression analysis also highlight the importance of context-specific factors, such as bank size, market conditions, and regulatory environment, in influencing the relationship between credit risk management and profitability. As Sghaier & Ouchene (2021) and Bikker & Hu (2022) suggest, the performance of banks is not solely determined by credit risk factors but is also contingent upon broader institutional and macroeconomic dynamics. Thus, the study emphasizes the importance of a balanced approach to credit risk management, combining rigorous risk assessment and provisioning strategies with a focus on profitable lending activities. Future research could explore how other factors such as technological adoption or governance practices influence the relationship between credit risk and bank profitability.

The study highlights several areas where commercial banks can improve their credit risk management practices to boost profitability and long-term financial stability. First, banks should strengthen their Loan Loss Provision (LLP) practices, ensuring they are adequately prepared for potential loan defaults. This can be achieved through better risk assessments, dynamic provisioning models, and regular stress testing. Although an increase in Loans and Advances (LA) can positively impact profitability, it is essential that banks balance this growth with rigorous credit quality control, utilizing data analytics and comprehensive credit assessments.

In managing Non-Performing Loans (NPL), banks should prioritize early detection systems, proactive recovery efforts, and stronger credit monitoring processes to prevent loans from becoming non-performing. Additionally, the study suggests that banks should reduce their reliance on deposits for funding, exploring alternative capital sources such as equity issuance or bonds, which can offer more flexibility and lower costs. Improving operational efficiency is also critical. Banks can streamline their processes and reduce costs by adopting automation and leveraging technology, such as artificial intelligence, to enhance credit risk management decisions. Furthermore, a robust governance and risk management framework is essential for

managing credit risks effectively, ensuring that risk management roles are well-defined and regularly reviewed.

Finally, regulatory bodies can support banks by introducing policies that ensure adequate loan loss provisions, diversified funding sources, and resilience against extreme credit risk scenarios. Investing in financial technology will also help banks assess credit risk more accurately, optimize their portfolios, and improve operational efficiency, ultimately contributing to stronger profitability and stability.

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