




“Assessing the impact of bank-specific bad debts determinants on the profitability of South Africa’s medium and large-sized banks”

AUTHORS	Nokuthokoza Sinegugu Khuzwayo  Jean Damascene Mvunabandi  Thomas Habanabakize
ARTICLE INFO	Nokuthokoza Sinegugu Khuzwayo, Jean Damascene Mvunabandi and Thomas Habanabakize (2026). Assessing the impact of bank-specific bad debts determinants on the profitability of South Africa’s medium and large-sized banks. <i>Banks and Bank Systems</i> , 21(1), 246–256. doi: 10.21511/bbs.21(1).2026.19
DOI	http://dx.doi.org/10.21511/bbs.21(1).2026.19
RELEASED ON	Monday, 30 March 2026
RECEIVED ON	Thursday, 19 June 2025
ACCEPTED ON	Tuesday, 10 February 2026
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Banks and Bank Systems"
ISSN PRINT	1816-7403
ISSN ONLINE	1991-7074
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

32



NUMBER OF FIGURES

0



NUMBER OF TABLES

4

© The author(s) 2026. This publication is an open access article.



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Type of the article: Research Article

Received on: 19th of June, 2025

Accepted on: 10th of February, 2026

Published on: 30th of March, 2026

© Nokuthokoza Sinegugu Khuzwayo,
Jean Damascene Mvunabandi, Thomas
Habanabakize, 2026.

Nokuthokoza Sinegugu Khuzwayo,
Master Candidate in Finance, Banks
and Investments, School of Commerce,
Faculty of Law and Management
Studies, University of KwaZulu-Natal,
South Africa.

Jean Damascene Mvunabandi, Ph.D.
in Accounting, Associate Professor,
Department of Financial Accounting,
Faculty of Accounting and Informatics,
Durban University of Technology,
South Africa; External Supervisor,
School of Commerce at University
of KwaZulu-Natal, South Africa.
(Corresponding author)

Thomas Habanabakize, Ph.D. in
Economics, Associate researcher at
DST/NRF South African Research
Chair in Industrial Development,
College of Business and Economics,
University of Johannesburg, South
Africa.



This is an Open Access article,
distributed under the terms of the
[Creative Commons Attribution 4.0
International license](https://creativecommons.org/licenses/by/4.0/), which permits
unrestricted re-use, distribution, and
reproduction in any medium, provided
the original work is properly cited.

Conflict of interest statement:

Author(s) reported no conflict of interest

Nokuthokoza Sinegugu Khuzwayo (South Africa),
Jean Damascene Mvunabandi (South Africa), Thomas Habanabakize (South Africa)

ASSESSING THE IMPACT OF BANK-SPECIFIC BAD DEBTS DETERMINANTS ON THE PROFITABILITY OF SOUTH AFRICA'S MEDIUM AND LARGE-SIZED BANKS

Abstract

The connection between bad debts and bank profitability is vital for ensuring financial stability. However, while lending is a key source of banks' revenue, rising bad debts can weaken their financial health, limit new credit issuance, and increase systemic risk. Therefore, understanding how bank-specific factors drive bad debts and affect profitability is crucial, particularly in distinguishing their impact on large and medium-sized banks. The purpose of this study is to assess the impact of bank-specific bad debts determinants on the profitability of South African banks. To achieve this objective, the study employs a Panel Autoregressive Distributed Lag (PARDL) model and an Error Correction Model (ECM) using bank data spanning the period from 2013 to 2023. The sample selection was informed by the data availability. The findings indicate that both the loan-to-deposit ratio and the capital adequacy ratio exert a positive impact on bank profitability, with large banks benefiting from stronger capital positions. The results further indicated that rising non-performing loan ratios correspond with decreased profitability in banks, particularly within medium-sized banks with limited risk absorption capacity. This research contributes to banking literature by offering a comparative perspective on the linkage between loans and both large and medium-sized banks in South Africa. The study suggests that, to mitigate potential defaults, medium-sized banks should exercise caution when issuing loans.

Keywords

bank-specific factors, profitability, commercial banks,
non-performing loans, South Africa

JEL Classification

E44, F30, G21

INTRODUCTION

The essential role of commercial banks in the economy is to offer credit, accept deposits, facilitate payments, and assist customers in managing risks. Such services are necessary for long-term economic growth and improvement of people's living standards (Amelia & Marlius, 2018). Credit represents the largest portion of bank assets and serves as their primary source of income. However, a major risk arises when borrowers default on their loan repayments to banks, resulting in bad debts or non-performing loans. Excessive bad debts can threaten the banking system's stability and profitability, posing significant risks to financial security and equity (Blyth, 2023).

South Africa's banking industry is well-established, appropriately regulated, and underpinned by a strong legal framework (Blyth, 2023). However, over the past 20 years, the banking system has been exposed to tough economic conditions exacerbated by factors such as persistent price increases, rising interest rates, high unemployment, and

slow economic growth (Van Heerden et al., 2022). In recent years, there has been a growing reliance on credit to finance daily consumption, particularly among lower-income and middle-income consumers. As of 2020, the total debt of credit-active consumers reached an estimated R1.9 trillion, with over 11.6 million individuals deemed excessively indebted (Majola, 2021). Disturbingly, default rates have trended upwards since 2018, peaking at 5.17% during the 2020 COVID-19 lockdown, and continuing to rise post-pandemic, reflecting the combined pressure of high unemployment, stagnating economic growth, inflation, and widespread reliance on high-interest credit loans (Chitimira & Ncube, 2020). Evidently, the recent report of the Major Banks Analysis by PwC reveals that South Africa's 'Big Four' banks, comprising Absa, FirstRand, Nedbank, and Standard Bank, collectively lost R27 billion in the first half of 2024 due to bad debt charges. Additionally, by early 2024, over 10.1 million customers had impaired credit records. To the best of the authors' knowledge, few studies were conducted to assess the linkage between bank-specific bad debts and profitability of South African medium banks, except those of Mogagabe (2020) Nayagar (2017) and Ntabanyane (2022), who focused only on the capital adequacy ratio. Consequently, to fill this gap, the current study seeks to answer the following research question: What should be the impact of a high level of non-performing loans on the stability and profitability of South Africa's commercial banks?

1. LITERATURE REVIEW

1.1. Loan-to-deposit ratio (LDR)

The LDR is a key measure of liquidity, indicating the proportion of a bank's loans in relation to its total deposits (Mogagabe, 2020). Theoretically, banks with high LDRs tend to lend more, potentially increasing profitability through interest income generation. This aligns with the Financial Intermediation Theory, which emphasizes that high LDR indicates that banks are effectively utilizing their deposits to issue loans, reflecting efficient financial intermediation and liquidity creation. However, excessive reliance on loans compared to deposits may elevate liquidity risks, leading to a higher incidence of non-performing loans (NPLs) and negatively affecting profitability (Mogagabe, 2020; Bhattarai, 2020). Maintaining a balance between financial returns and risk exposure is especially important in the South African banking sector, where institutions encounter differing degrees of liquidity challenges.

Globally, Messai and Jouini (2013) conducted panel data research on 85 European banks. The authors found that high LDRs were associated with an increase in non-performing loans (NPLs), especially during recessionary periods where aggressive lending practices were not backed by adequate deposit mobilization. Soatov (2025) examined the link between LDR and bank profitability, using panel data on 32 banks in Uzbekistan be-

tween 2017 and 2021. The study employed fixed-effects regression and found that LDR had a positive but diminishing effect on profitability. These findings support the notion that high LDRs result in liquidity mismatches and increased exposure to credit risk.

In emerging economies, Ristevska (2020) argues that high LDRs exacerbate the problem of non-performing loans, particularly when macroeconomic conditions deteriorate, leading to a higher risk of defaults. Using panel data regression, the author investigated the key drivers behind non-performing loans in 5 Southeastern European countries. The findings revealed that high LDRs weaken credit quality and expose banks to macroeconomic shocks. Similarly, Bhattarai (2018) conducted a study on 20 Nepalese banks using a pooled panel regression. Findings indicate that high LDR results in high bad debts due to weaker credit assessment frameworks in emerging countries. These findings parallel the experience of South African banks, especially medium-sized ones, which face greater difficulty in managing liquidity risks due to their limited access to diversified funding sources. In South Africa, Mogagabe (2020) examined the relationship between LDR, profitability, and bad debts in medium and large South African banks using cointegration and granger causality method. The findings indicate that LDR positively impacts profitability for large banks, due to better risk management systems. In contrast, medium-sized banks experienced a surge in bad debts

and declining profits when LDRs increased, due to weaker risk management systems. Similar results were found by Mishi and Khumalo (2019), who analyzed South African banks from 2010 to 2017, applying fixed effects panel regression to measure the effect of liquidity risk on bank stability. Findings revealed that high LDRs were linked to increased credit risk, highlighting the adverse relationship between LDR and bank profitability.

The CAR is viewed as a key indicator of a bank's ability to absorb losses arising from credit risk. It measures banks' capital relative to risk-weighted assets and helps protect banks from insolvency during financial stress. A higher CAR signals a stronger cushion against unexpected losses, supporting Profit Maximization Theory, which links adequate capital to long-term stability and profitability (Ashraf & Butt, 2019; Ntabanyane, 2022; Bhattarai, 2018). Banks with high CARs are better equipped to withstand periods of increased bad debts, as they possess the necessary capital reserves to cover potential loan defaults (Ekinici & Poyraz, 2019).

Global studies such as Messai and Jouini (2013), Menicucci and Paolucci (2016), and Abbas et al. (2019), provide consistent evidence of a positive relationship between CAR and profitability. For example, Messai and Jouini (2013), in their study of European banks, found that institutions with higher CARs were significantly less affected by credit risk. Menicucci and Paolucci (2016) also conducted a study on European banks, and their findings support those of Messai and Jouini (2013), confirming a positive and significant impact of capital ratio and bank profitability. Abbas et al. (2019) compared how bank capital, credit risk, and liquidity affect the profitability of commercial banks in Asia and the U.S. They found that capital and credit risk had a strong impact on profitability in both Asian and U.S. banks. Notably, the effect of bank capital varied by bank size, positively impacting profitability in large banks, while showing a negative association in medium-sized banks.

In developing economies, Ashraf and Butt (2019) conducted a large-scale empirical analysis of 50 Pakistani banks using a random effect panel regression. The authors concluded that increasing CAR reduces non-performing loans (NPLs)

while increasing bank profitability. This supported Bhattarai (2018), whose findings indicated that well-capitalized banks in Nepal maintain high profitability even when non-performing loans (NPLs) rise, as they can allocate more resources to loan loss provisions.

In South Africa, large banks such as Nedbank and FirstRand typically maintain higher CARs, allowing them to manage bad debts more effectively than medium-sized banks. Mogagabe (2020) conducted a comparative study on large and medium-sized South African banks. The findings showed that large banks with higher CARs were more resilient to rising non-performing loans (NPLs), while medium-sized banks with lower capital buffers experienced sharper declines in profitability during economic downturns. The author emphasized that capital adequacy is essential for mitigating credit risk and sustaining earnings, particularly in volatile economic environments. Nayagar (2017) conducted a study on South Africa's big four banks. The findings confirmed the findings of Mogagabe (2020) on large banks, indicating that CAR has a positive impact on bank profitability. Similarly, Ntabanyane (2022) found that higher CAR levels were negatively associated with bad debts, indicating that well-capitalized banks were better able to absorb loan losses and maintain asset quality. The viewed empirical literature affirms that higher CARs enhance a bank's capacity to absorb financial losses and maintain stable earnings.

Bank size plays an important role in determining banks' ability to manage bad debts (Kingu et al., 2018). Numerous studies have established a significant link between bank size and profitability, measured by Return on Assets and Return on Equity (Ullah et al., 2020), with mixed findings regarding its impact on performance and profitability (Sarkar & Rakshit, 2024). On the contrary, Al-Matari (2023) found a positive correlation. However, Ullah et al. (2020) and Al-Matari (2023) reported an inverse or neutral effect reflecting the complex nature of banks' profitability and performance determinants.

Large banks leverage economies of scale, allowing them to diversify their assets and spread risks across a wider portfolio (Kingu et al., 2018; Ntabanyane, 2022; Bhattarai, 2018). This risk di-

verification allows large banks to better manage credit risk compared to medium-sized banks, which often have more concentrated loan portfolios and limited capital resources.

Empirical evidence suggests that larger banks are generally more profitable and better able to manage credit risk. Kingu et al. (2018) found that large banks, due to their greater financial resources, are more likely to absorb losses from non-performing loans without significantly affecting their profitability. These banks can also access capital markets at lower costs, providing them with additional liquidity to manage bad debts. Kana (2017) also highlights that large South African banks, such as the 'big four', leverage their size to absorb shocks from NPLs without significant impacts on profitability. Ntabanyane (2022) supports this finding, noting that larger banks can access capital markets more easily, providing them with greater liquidity to manage bad debts during periods of economic uncertainty.

In contrast, medium-sized banks face greater challenges in managing bad debts due to their smaller asset bases and limited access to external capital. Mogagabe (2020) notes that medium-sized South African banks tend to have higher operating costs relative to their assets, which makes it more difficult for them to maintain profitability when bad debts increase. The study also highlights that smaller banks are more vulnerable to economic fluctuations, as their loan portfolios are less diversified, and they often rely more heavily on interest income from loans. Gupta and Mahakud (2020) argue that while large banks are generally more profitable, there are diminishing returns to size beyond a certain point. This means that large banks may experience inefficiencies that reduce their ability to manage bad debts effectively.

Non-performing loans are a significant factor influencing bank profitability, as they represent loans that borrowers are unable to repay, either in full or partially, which increases the bank's financial risk (Mpofu & Nikolaidou, 2019). A rise in NPLs leads to lower and higher operational costs associated with debt recovery (Nyoka, 2019). Globally, empirical studies consistently highlight an inverse link between NPLs and bank profitability. For instance, the studies by Ekinici and

Poyraz (2019), Messai and Jouini (2013), Nguyen et al. (2020), and Ullah et al. (2020) found that bad debts reduce a bank's profitability, erode a bank's net income, and reduce ROA.

In South Africa, Ntabanyane (2022) and Mogagabe (2020) found that rising NPLs significantly affected the profitability of both bank sizes, though the effects are more pronounced in medium-sized institutions. Large banks can manage NPLs through diversified revenue streams and stronger capital bases, which allow them to continue lending despite an increase in bad debts. On the contrary, medium-sized banks, with smaller loan portfolios and higher dependence on interest income, are more vulnerable to profitability shocks from NPLs. Ashraf and Butt (2019) assert that the rise in NPLs often points to shortcomings in a bank's credit risk management systems, including weak borrower assessments and ineffective loan monitoring. For medium-sized banks, these challenges are particularly acute, as they often lack the sophisticated risk management frameworks available to larger banks. Mogagabe (2020) notes that banks with inadequate credit risk management are more likely to experience rising NPLs, leading to higher provisioning and lower profitability.

Research on South African banks by Mogagabe (2020) shows that effective management of NPLs requires robust credit assessment processes, especially during periods of economic downturn when default risks increase. Large banks typically have the resources to implement more rigorous credit evaluation systems, which help mitigate the impact of NPLs on profitability. In contrast, medium-sized banks may not have the same level of access to advanced risk management technologies, leaving them more exposed to bad debts. Several studies have reported a positive and statistically significant link between bank-specific variables and profitability (Kana, 2017; Sarkar & Rakshit, 2024; Ullah et al., 2020). Irrespective of the vast literature discussed above, there is a gap in the literature, as no study of this kind has been conducted focusing on the South African context.

Therefore, this study aims to assess the impact of bank-specific bad debts determinants on the profitability of South Africa's medium and large-sized banks.

2. METHODOLOGY

This study employed a quantitative research methodology to empirically analyze numerical data and identify statistical relationships between the selected variables. The data for bank-specific factors was obtained from the bank’s annual financial statements, McGregor BFA, and Bloomberg, focusing on a sample of seven commercial banks covering the years 2013 through 2023. The data availability motivated the sample selection.

The study’s dependent variable is bank profitability and is measured by Return on Assets (ROA). ROA is widely recognized in banking research and aligns well with the study’s focus on bad debt. It reflects how efficiently a bank generates profit from its total assets, despite challenges posed by increasing bad debts. The independent variables are bank-specific factors that drive bad debts and impact bank profitability.

- (i) Bank Size (SIZE) represents the bank’s ability to generate income and absorb financial shocks. It is measured by total assets (in R billion). In South Africa, the big four banks hold assets exceeding R1 trillion, controlling 89.7% of sector assets (SARB, 2024). Larger banks benefit from economies of scale and diversified revenue streams, suggesting a positive association with profitability (Kingu et al., 2018; Bhattarai, 2020).
- (ii) Loan-to-Deposit Ratio (LDR) is calculated as total loans divided by total deposits, measuring the proportion of deposits transformed into loans (Ntabanyane, 2022). A higher LDR indicates greater lending activity, potentially increasing profitability through increased interest income, suggesting a positive relationship (Ntabanyane, 2022).
- (iii) Non-performing loan ratio (NPLR) is measured as loans with interest payments overdue by 90 days divided by total loans. The NPLR indicates credit risk (SARB, 2024). Higher NPLR increases default risk, reducing profitability, suggesting a negative relationship (Mpfu & Nikolaidou, 2019).
- (iv) Capital adequacy ratio (CAR) is calculated by dividing capital by risk-weighted assets, indi-

cating banks’ ability to withstand losses while ensuring ongoing financial stability (Bhattarai, 2020). An increase in CAR enhances resilience to bad debt shocks, suggesting a positive relationship with profitability.

The Panel Autoregressive Distributed Lag (ARDL) model was utilized to assess the impact of bank-specific factors on bank profitability. The Panel ARDL model is chosen for several reasons. Firstly, the Panel ARDL model is suitable for datasets where variables are stationary at level $I(0)$ or at first difference $I(1)$, making it suitable for banking data where variables like non-performing loan ratios may have different stationarity properties (Pesaran et al., 2001). Secondly, the model captures the short-run fluctuations and long-run trends between variables, enabling a comprehensive understanding of how bank-specific factors influence profitability over time (Brooks, 2019). Thirdly, the ARDL performs well with small time dimensions ($T = 11$) and cross-sections ($N = 7$). Furthermore, by including both fixed and random effects, the model accounts for unobservable heterogeneity across banks, such as differences in management practices or regional economic conditions. This helps avoid bias in the estimated results. Lastly, by combining time-series data and cross-sectional data, panel data reduces collinearity among independent variables, enhancing the precision of estimates.

To analyze the short-run and long-run relationships between the selected bank-specific study variables, the panel ARDL model was employed as shown in equation (1).

$$\begin{aligned}
 ROA_{it} = & \alpha_i + \sum_{j=1}^p \phi_1 ROA_{it-j} + \sum_{j=0}^{q_1} \beta_1 NPLR_{it-j} \\
 & + \sum_{j=0}^{q_2} \beta_{2ij} CAR_{it-j} + \sum_{j=0}^{q_3} \beta_{3ij} LDR_{it-j} \\
 & + \sum_{j=0}^{q_4} \beta_{4ij} SIZE_{it-j} + \delta_1 NPLR_{it-1} + \delta_2 CAR_{it-1} \\
 & + \delta_3 LDR_{it-1} + \delta_4 SIZE_{it-1} + \varepsilon_{it},
 \end{aligned} \tag{1}$$

where ROA_{it} is the return on assets for each bank i at time t ; α_i denotes the bank-specific fixed effect; $\phi_{i,j}$ represents the coefficient on the lagged

dependent variable; *NPLR*, *CAR*, *LDR*, and *SIZE* are the lagged explanatory variables; $\beta_1 \dots \beta_4$ denote short-run coefficients; $\delta_1 \dots \delta_4$ are long-run coefficients, while ε_{it} represents the idiosyncratic error term.

3. RESULTS AND DISCUSSION

In Table 1, the descriptive statistics for each variable are shown to offer a preliminary insight into the data's distribution and variability.

Table 1. Descriptive statistics

Variable	MEAN	STD. DEV	MIN	MAX
ROA	1.847792	1.446967	-0.3	5.71
NPLR	5.276364	3.918702	1.89	21.04
LDR	107.9455	39.19204	63.57	253.6
CAR	18.36208	7.69661	12	41.3
lnSize	26.43957	1.936754	22.599946	28.75131
SIZE	R910 billion	R867 billion	R6.53 billion	R3.07 trillion

The descriptive statistics show that both bank sizes have a total bank size of 910 billion. The combined banks have the following average means: ROA (1.85%), NPLR (5.28%), LDR (107.95%), and CAR (18.36%). LDR is the most volatile factor with a deviation from the mean of 39.19%. The inclusion of lnSize also highlights the logarithmic transformation of bank size, which facilitates comparison by minimizing the scale differences between banks of varying sizes. The mean value of lnSize is 26.44, indicating an overall significant asset base among sampled banks, with a relatively low standard deviation (1.94), suggesting less variability in bank size across the sample.

Table 2. Long-run results for medium banks

Variable	Coefficients	P-value
NPLR	-0.187209	0.000***
LDR	-0.0028137	0.634
CAR	0.0595814	0.149
lnSize	1.484505	0.013**
ECM and short-run dynamics		
Error Correction Term (ECT)	-1.020618	0.000***
NPLR	0.0778782	0.078*
LDR	0.005738	0.208
CAR	-0.2218115	0.000***
lnSize	0.8529363	(0.393)
Constant	-34.3946	0.026**

Note: ***, **, and *: p-value significant at <1%, <5%, and <10%, respectively.

Table 2 presents the Panel ARDL results for medium-sized banks. In the long run, the NPLR exhibits a statistically significant and negative effect on profitability, with a coefficient of $\beta = -0.187$ ($p < 0.01$). This finding aligns with the Credit Risk Theory, which posits that an increase in credit defaults compels banks to raise loan-loss provisions, reduce interest income, and ultimately erode profitability. The result is consistent with empirical evidence from Nyoka (2019), Mogagabe (2020), and Mpofo and Nikolaidou (2019), all of whom document the detrimental effect of poor asset quality on bank performance. For medium-sized banks, which often have less sophisticated credit risk systems and lower capital cushions, this negative impact is likely to be even more pronounced, underlining the significance of effective credit risk management frameworks. Bank size (lnSize) positively and significantly impact profitability of medium-sized banks, with a coefficient of $\beta = 0.1485$ and a p-value = 0.013. This aligns with Profit Maximization Theory, which suggests that banks benefit from economies of scale, enabling them to manage costs more effectively and achieve higher profitability. (Kingu et al., 2018). The findings are supported by Ashraf and Butt (2019), who indicate that bank sizes positively influence bank profitability.

The LDR exerts a negative, though statistically insignificant, effect on ROA ($\beta = -0.003$, $p = 0.634$). This suggests that aggressive lending relative to deposit mobilization does not significantly enhance profitability for medium-sized banks in the long term. The result runs counter to the Financial Intermediation Theory, which assumes that banks generate profits by effectively converting deposits into loans. Supporting evidence from Messai and Jouini (2013), Mishi and Khumalo (2019), and Ristevska (2020) suggest that the profitability impact of higher LDRs may be muted when credit growth is not matched with prudent lending practices or is hindered by inefficiencies in credit pricing and risk evaluation.

The CAR has a positive coefficient ($\beta = 0.056$), but its effect on ROA is statistically insignificant ($p = 0.149$). While the positive relationship is directionally consistent with the hypothesis that well-capitalized banks are more resilient and stable, the lack of significance implies that, in the context of

medium-sized banks, capital buffers do not play a pivotal role in enhancing profitability over the long term. This finding challenges the predictions of the Profit Maximisation Theory, which emphasizes capital strength as a driver of long-term performance. It is, however, supported by authors such as Mogagabe (2020) and Abbas et al. (2019) who argue that in certain cases, capital may be idle, underutilized, or mandated by regulation without directly contributing to profit generation.

In the short term, the error correction term is both significant and negative ($\beta = -1.021$, $p < 0.001$), suggesting a stable long-term equilibrium with a speed of adjustment rate of about 102% per year. This means that deviations from the long-term relationship between bank-specific factors and profitability are corrected within one year, which is indicative of high responsiveness in profitability metrics among medium-sized banks. Interestingly, NPLR shows a marginally significant positive short-run effect on ROA ($\beta = 0.078$, $p < 0.10$). While this may seem counterintuitive, it may reflect short-term profitability gains from riskier lending strategies before defaults are realized. Similar findings by Mogagabe (2020) indicate that banks engaging in high-risk lending can exhibit temporary boosts in earnings, which are often unsustainable in the longer term. Conversely, in the short run, CAR negatively and significantly impacts ROA ($\beta = -0.222$, $p < 0.001$). This suggests that higher capital reserves may impose opportunity costs in the short term, particularly if such capital is not actively deployed in profitable ventures. These findings align with Abbas et al. (2019), who assert that excess capital can dampen returns when banks are overly conservative or unable to convert idle capital into income-generating assets.

The regression results for large banks are illustrated in Table 3. In the long run, the results for large banks show that the CAR positively and significantly influences profitability, with a coefficient of $\beta = 0.252$ ($p < 0.05$). This supports the hypothesis that banks with strong capital levels are more capable of mitigating risks, absorbing unforeseen losses, and sustaining operational stability. The findings are consistent with Profit Maximization Theory, which suggests that banks with greater capital buffers are more resilient to shocks. For example, Ashraf and Butt (2019) emphasize that

strong capital positions enhance banks' risk-bearing capacity and stability, while Nyoka (2019) finds that capital adequacy positively correlates with profitability due to increased investor and depositor confidence. Additionally, Mogagabe (2020) and Ntabanyane (2022) confirm the importance of adequate capital buffers, particularly during downturns, in supporting long-term profitability.

Table 3. Panel ARDL results for large banks

Long-run impact		
Variable	Coefficient	P-value
NPLR	-0.0079258	0.967
LDR	0.0065896	0.755
CAR	0.2515272	0.031**
lnSize	-0.2195963	0.748
Short run (SR)		
Error Correction Term (ECT)	-0.449746	0.032**
NPLR	-0.2663675	0.002***
LDR	-0.0137226	0.045**
CAR	-0.062445	0.203)
lnSize	-1.712358	0.057*

Note: ***, **, and *: p-value significant at <1%, <5%, and <10%, respectively.

In the long run, NPLR negatively affects profitability, though the effect is not statistically significant. ($\beta = -0.008$, $p > 0.10$). This may indicate that large banks, due to advanced credit screening and provisioning, are more insulated from the persistent effects of credit risk. These findings align with Mpofu and Nikolaidou (2019) and Ntabanyane (2022), who argue that in larger institutions, asset quality deterioration may have a delayed or subdued impact due to better risk governance structures. However, in the short run, NPLR illustrates a negative and significant influence on profitability ($\beta = -0.266$, $p < 0.001$), confirming the Credit Risk Theory, which posits that deteriorating loan quality reduces earnings through increased provisions and reduced interest income. This short-run effect is echoed in the studies by Kana (2017), who highlight that rising non-performing loans lead to immediate profit erosion.

The LDR positively affects profitability in the long run, but the effect is not statistically significant ($\beta = 0.007$, $p > 0.10$). Although this indicates that higher lending activity may enhance profitability, the lack of significance contradicts the Financial Intermediation Theory, which posits that efficient

transformation of deposits into loans boosts earnings. Supporting studies such as Abdilahi and Davis (2022) and Mogagabe (2020) suggest that the profitability gains from lending depend on effective asset-liability management, which may vary across institutions and macroeconomic contexts. Moreover, in the short run, LDR exhibits a small but significant negative impact on ROA ($\beta = -0.014, p < 0.05$), suggesting that aggressive lending may increase liquidity pressures or elevate short-term funding costs, thus diminishing profits.

Bank size negatively affects the profitability of large banks. This aligns with the moral hazard theory, which posits that to make more profit, large banks make risky decisions under the impression that they are “too big to fail” (Zheng et al., 2019). This often results in higher default rates, especially in environments where creditworthiness is difficult to assess, as in the case of high-risk borrowers.

The error correction term (ECT) is negative and statistically significant ($\beta = -0.450, p < 0.05$), suggesting a moderate adjustment speed of 45% toward restoring the long-run equilibrium. This implies a stable long-term linkage between bank-specific variables and profitability, with any short-term deviations being gradually corrected over time.

The findings reveal that bank-specific factors significantly influence profitability in both large and medium-sized banks, albeit with notable differences in the magnitude and direction of their effects. For medium-sized banks, the long-run analysis revealed that the NPLR significantly and negatively affects profitability, with a coefficient of $-0.187 (p < 0.001)$. This finding aligns with theoretical expectations and prior studies (Mpofu & Nikolaidou, 2019), which indicate that credit risk poses a substantial challenge for smaller banks with limited resources to manage bad debts. Conversely, NPLR ($\beta = -0.08, p\text{-value} = 0.096$) did not have a statistically significant influence on large banks' profitability in the long run. This deviation from the expected norm suggests that large banks benefit from superior risk management frameworks, diversified income streams, and economies of scale that mitigate the adverse effects of bad debts (Mogagabe, 2020).

Bank size (lnSize) was found to significantly influence profitability in medium-sized banks, with a positive coefficient of 1.485 ($p < 0.05$) in the long run. This suggests that economies of scale play a critical role in enhancing profitability for medium-sized banks as they expand. In contrast, size did not significantly affect the profitability of large banks, likely due to diminishing marginal returns to scale once a certain asset threshold is reached. The findings are consistent with existing literature, which posits that while small and medium-sized banks can leverage growth to improve profitability, larger banks tend to plateau in efficiency gains as they grow (Kingu et al., 2018).

The CAR was a significant determinant of profitability for large banks, with a coefficient of 0.252 ($p < 0.05$) in the long-run. This finding supports the notion that well-capitalized large banks maintain profitability by absorbing losses and maintaining lending activity during periods of economic stress (Ntabanyane, 2022; Bhattacharai, 2020). However, CAR was insignificant for medium-sized banks, possibly reflecting that their capital reserves are not as impactful in driving profitability, as they prioritize aggressive lending strategies over maintaining large buffers.

The LDR does not show statistically significant long-term effects on profitability for both bank sizes. The lack of significance for LDR indicates that medium-sized and large-sized banks' aggressive lending practices, as reflected by higher LDRs, do not necessarily translate into profitability improvements in the long run (Ristevska, 2020).

In the short run, the error correction term was significant and negative for both large ($\beta = -0.450, p < 0.05$) and medium-sized banks ($\beta = -1.021, p < 0.001$), confirming the existence of long-run equilibrium relationships. Notably, the speed of adjustment was faster for medium-sized banks, suggesting that their profitability metrics are more sensitive to short-term shocks compared to large banks, which can absorb and recover from disruptions more gradually.

Post-estimation tests provide critical insights into the reliability, stability, and overall robustness of the model used to analyze the study objectives.

Table 4. Diagnostic test results

Test	T-Stat	p-value	Interpretation
Jacque-Bera	2.15	0.342	Residuals are normally distributed
Breusch-Godfrey LM	1.32	0.251	No serial correlation in residuals
Breusch-Pagan	2.89	0.167	Homoscedasticity is confirmed
CUSUM Test	Within bounds	–	Model parameters are stable over time (within critical bounds)

These ensure that the results are credible and inform broader conclusions about the dynamics of the banking sector in South Africa.

As shown in Table 4, the p-values are greater than 0.05 for all the diagnostic tests. This suggests that the null hypothesis cannot be rejected, concluding

that the model residuals are normally distributed and there is no serial correlation in the residuals. Lastly, the findings confirm that the variance of the residuals remains constant across observations and that parameters are stable over time. The diagnostic tests collectively affirm the validity and reliability of the Panel ARDL results.

CONCLUSION

The study aim was to assess the impact of bank-specific bad debts determinants on the profitability of South Africa's medium and large-sized banks for a period of ten year, that is from 2013 to 2023. The Panel Autoregressive Distributed Lag model and the Error Correction Model were used to examine the short-run and long-run relationships between bank-specific factors and bank profitability. The findings revealed significant differences between bank categories. The results indicated that NPLR negatively affected medium-sized banks' profitability in the long run. In contrast, the NPLR had no significant effect on large-sized banks. This implies that the large banks potentially benefit from diversified income sources, strong capital foundations, and advanced risk management systems, allowing them to reduce the effects of bad debts. On the other hand, CAR and LDR have long-term positive influence on profitability for both medium-sized and large banks. Additionally, the LDR ratio had no significant long-term impact on profitability for both bank sizes, suggesting that aggressive lending strategies alone do not guarantee sustained profitability.

Based on the study's findings, several implications can be drawn for policymakers, bank managers, and researchers. For medium-sized banks, the significantly negative influence of non-performing loan ratios (NPLR) on profitability implies that credit risk management practices need to be enhanced as a priority. More intense screening of borrowers, improving loan monitoring systems, and adopting new risk management technologies can mitigate the adverse influence of bad debts. Large financial institutions, while being more resistant to non-performing loan ratios (NPLR), should continue to maintain high capital adequacy ratios to ensure continued financial stability, particularly in times of economic shocks. The regulatory bodies, such as the South African Reserve Bank, would consider the establishment of certain regulations to help medium-sized banks set up capital reserves and reduce credit risk, thereby strengthening their ability to absorb economic shocks. Despite its important findings, the concentration on merely seven banks might not depict the entire South African banking industry. Thus, further research should include banks within the South African banking industry.

AUTHOR CONTRIBUTIONS

Conceptualization: Nokuthokoza Sinegugu Khuzwayo, Jean Damascene Mvunabandi, Thomas Habanabakize.

Data curation: Nokuthokoza Sinegugu Khuzwayo.

Formal analysis: Nokuthokoza Sinegugu Khuzwayo.

Investigation: Nokuthokoza Sinegugu Khuzwayo.

Methodology: Nokuthokoza Sinegugu Khuzwayo.

Project administration: Jean Damascene Mvunabandi, Thomas Habanabakize.

Supervision: Jean Damascene Mvunabandi, Thomas Habanabakize.

Validation: Jean Damascene Mvunabandi, Thomas Habanabakize.

Visualization: Jean Damascene Mvunabandi, Thomas Habanabakize.

Writing – original draft: Nokuthokoza Sinegugu Khuzwayo, Jean Damascene Mvunabandi.

Writing – reviewing & editing: Nokuthokoza Sinegugu Khuzwayo, Jean Damascene Mvunabandi, Thomas Habanabakize.

REFERENCES

1. Abbas, F., Iqbal, S., & Aziz, B. (2019). The impact of bank capital, bank liquidity and credit risk on profitability in postcrisis period: A comparative study of US and Asia. *Cogent Economics & Finance*, 7(1), 1-18. <https://doi.org/10.1080/23322039.2019.1605683>
2. Abdilahi, R. A., & Davis, E. P. (2022). *Econometric analysis of the determinants of bank profitability in three major African countries: Kenya, Nigeria, and South Africa* (NIESR Discussion Paper No. 536). National Institute of Economic and Social Research. Retrieved from <https://www.niesr.ac.uk/wp-content/uploads/2022/03/DP-536.pdf>
3. Al-Matari, E. M. (2023). The determinants of bank profitability of GCC: The role of bank liquidity as moderating variable—further analysis. *International Journal of Finance & Economics*, 28(2), 1423-1435. <https://doi.org/10.1002/ijfe.2485>
4. Amelia, L., & Marlius, D. (2018). *Pengendalian Kredit Dalam Upaya Menciptakan Bank Yang Sehat Pada PT [Credit Control in an Effort to Create a Healthy Bank at PT]*. Bank Pembangunan Daerah Sumatera Barat Cabang Utama Padang. (In Indonesian). <https://doi.org/10.31227/osf.io/kpc64>
5. Ashraf, N., & Butt, Q. (2019). Macroeconomic and idiosyncratic factors of non-performing loans: Evidence from Pakistan's banking sector. *Journal of Finance and Accounting Research*, 1(2), 44-71. Retrieved from <https://ojs.umt.edu.pk/index.php/jfar/article/view/92>
6. Bhattarai, B. P. (2018). Assessing banks internal and macroeconomic factors as determinants of non-performing loans: Evidence from Nepalese commercial banks. *International Journal of Accounting & Finance Review*, 3(1), 13-32. <https://doi.org/10.46281/ijaf.v3i1.28>
7. Bhattarai, B. P. (2020). Determinants of share price of commercial banks in Nepal. *Asian Journal of Research in Business Economics and Management*, 10(9), 12-28. <http://dx.doi.org/10.5958/2249-7307.2020.00013.4>
8. Blyth, D. (2023). *Inverting the bad debt ladder: Credit self-efficacy and healthier financial state* (Master's Thesis). Retrieved from <http://hdl.handle.net/11427/37969>
9. Brooks, C. (2019). *Introductory econometrics for finance*. Cambridge University Press. Retrieved from <https://assets.cambridge.org/97805217/90185/sample/9780521790185ws.pdf>
10. Chitimira, H., & Ncube, M. (2020). Legislative and other selected challenges affecting financial inclusion for the poor and low income earners in South Africa. *Journal of African Law*, 64(3), 337-355. <https://doi.org/10.1017/S0021855320000182>
11. Ekinçi, R., & Poyraz, G. (2019). The effect of credit risk on financial performance of deposit banks in Turkey. *Procedia Computer Science*, 158, 979-987. <https://doi.org/10.1016/j.procs.2019.09.139>
12. Gupta, N., & Mahakud, J. (2020). Ownership, bank size, capitalization and bank performance: Evidence from India. *Cogent Economics & Finance*, 8(1), 1808282. <https://doi.org/10.1080/23322039.2020.1808282>
13. Kana, K. M. (2017). *Determinants of bank profitability: An empirical study of South African banks* (Master's Thesis in Commerce). University of South Africa. Retrieved from <https://www.proquest.com/openview/2a3eac6f685f52e554415c055518f2869/1>
14. Kingu, P. S., Macha, S., & Gwahula, R. (2018). Impact of non-performing loans on bank's profitability: Empirical evidence from commercial banks in Tanzania. *International Journal of Scientific Research and Management*, 6(1), 71-79. <https://doi.org/10.18535/ijstrm/v6i1.em11>
15. Majola, G. (2021). *Consumer debt surges to R1.9 trillion with rapid increase in defaults*. Cape Times. Retrieved from <https://capetimes.co.za/business-report/economy/2021-06-14-consumer-debt-surges-to-r1-9-trillion-with-rapid-increase-in-defaults/>.
16. Menicucci, E., & Paolucci, G. (2016). The determinants of bank profitability: empirical evidence from European banking sector. *Journal of Financial Reporting and Accounting*, 14(1), 86-115. <https://doi.org/10.1108/JFRA-05-2015-0060>
17. Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International Journal of Economics and Financial Issues*, 3(4), 852-860. Retrieved from <https://dergipark.org.tr/en/pub/ijefi/issue/31960/351961>

18. Mishi, S., & Khumalo, S. A. (2019). Bank stability in South Africa: What matters? *Banks and Bank Systems*, 14(1), 122-136. [http://dx.doi.org/10.21511/bbs.14\(1\).2019.11](http://dx.doi.org/10.21511/bbs.14(1).2019.11)
19. Mogagabe, N. (2020). *Determinants of Non-Performing Loans and their impact on profitability in South African banks* (Masters' Thesis). North-West University. Retrieved from <https://wired-space.wits.ac.za/server/api/core/bitstreams/65bdba58-55bb-4a65-9fbf-c29fb6e073c0/content>
20. Mpofo, T. R., & Nikolaidou, E. (2019). *Macroeconomic and bank-specific determinants of non-performing loans in sub-Saharan Africa* (Discussion Paper Series No. 2019-02). School of Economics, University of Cape Town. Retrieved from <https://ideas.repec.org/p/ctn/dpaper/2019-02.html>
21. Nayagar, K. (2017). *The determinants of South African bank profitability* (Master's Thesis). University of Johannesburg, South Africa. Retrieved from <https://hdl.handle.net/10210/271878>
22. Nguyen, V. C., Nguyen, T. T., & Nguyen, H. T. (2020). Government Ability, Bank-Specific Factors and Profitability: An insight from banking sector of Vietnam. *Journal of Advanced Research in Dynamical and Control Systems*, 12(4), 415-424. <https://doi.org/10.5373/JARDCS/V12I4/20201455>
23. Ntabanyane, P. (2022). *Determinants of non-performing loans: evidence from the South African banking system* (Master's Thesis). University of the Witwatersrand. Retrieved from <https://wired-space.wits.ac.za/server/api/core/bitstreams/9127937f-bc43-4e77-8e16-3ed13355fdb9/content>
24. Nyoka, C. (2019). Bank capital and profitability: An empirical study of South African commercial banks. *Comparative Economic Research. Central and Eastern Europe*, 22(3), 99-116. <https://doi.org/10.2478/cer-2019-0025>
25. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326. Retrieved from <https://nomanarshed.wordpress.com/wp-content/uploads/2013/10/ardl-with-coin-tegrating-bounds-1.pdf>
26. Ristevska, M. (2020). Determinants of Non-Performing Loans and The Relationship with Macroeconomic Factors: Evidence from Southeastern Europe. *Journal of Contemporary Economic and Business Issues*, 7(1), 57-76. Retrieved from <https://www.ceeol.com/search/article-detail?id=849378>
27. SARB. (2024). *List of Registered Banks in South Africa*. Pretoria: South African Reserve Bank. Retrieved from https://www.resbank.co.za/en/home/what-we-do/Prudentialregulation/SA_registered_financial_institutions
28. Sarkar, S., & Rakshit, D. (2024). Bank-specific factors affecting the profitability of public sector banks in India: A dynamic panel approach. *Frontiers of Finance*, 2(1), 6303. <https://doi.org/10.59429/ff.v2i1.6303>
29. Soatov, F. K. (2025). The loan-to-deposit ratio and its impact on bank profitability. *World Economics & Finance Bulletin*, 47, 5-11. Retrieved from <https://www.researchgate.net/publication/393452772>
30. Ullah, M. A., Nath, S. D., & Biswas, M. R. (2020). Impact of bank-specific internal factors on the profitability of state-owned commercial banks in Bangladesh. *Indian Journal of Commerce and Management Studies*, 11(2), 24-32. <http://dx.doi.org/10.18843/ijcms/v11i2/03>
31. Van Heerden, Q., Karsten, C., Holloway, J., Petzer, E., Burger, P., & Mans, G. (2022). Accessibility, affordability, and equity in long-term spatial planning: Perspectives from a developing country. *Transport Policy*, 120, 104-119. <https://doi.org/10.1016/j.tranpol.2022.03.007>
32. Zheng, C., Bhowmik, P. K., & Sarker, N. (2019). Industry-specific and macroeconomic determinants of non-performing loans: A comparative analysis of ARDL and VECM. *Sustainability*, 12(1), 325. <https://doi.org/10.3390/su12010325>