

BASEL III CAPITAL REGULATION AND BANK PROFITABILITY IN THE EMERGING MARKET

Zuko Mdandalaza *, Leward Jeke **

* Corresponding author, Nelson Mandela University, Port Elizabeth, South Africa

Contact details: Nelson Mandela University, P. O. BOX 77 000, Port Elizabeth, 6031, South Africa

** Department of Economics, School of Economics, Development Studies and Tourism, Nelson Mandela University, Port Elizabeth, South Africa



Abstract

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The Basel Committee on Banking Supervision (BCBS) introduced Basel III in 2010 in response to the 2007/2008 global financial crisis, to strengthen the banking sector by imposing higher capital and liquidity requirements (BCBS, 2010). The intention is to bolster resilience and avert the domino effect on the real economy. However, there are concerns regarding its potential influence on bank profitability (Al-Sharkas & Al-Sharkas, 2022). This study examines the impact of Basel III capital regulation on the profitability of South African banks and adds to the ongoing discourse on the nexus between banking regulations and bank performance. Utilizing the general methods of moments (GMM) estimation on a dataset of 10 banks spanning 2010 to 2022, the results show an insignificant negative effect of Basel III capital requirements on South African banks, possibly due to stringent oversight by the South African Reserve Bank (SARB). Additionally, the evidence implies that South African banks have successfully adapted to the new regulatory environment, complying with Basel III requirements without sacrificing their profitability. This resilience indicates a robust banking sector that is capable of withstanding regulatory changes without a detrimental impact on profitability.

Keywords: Basel III, Capital Requirements, Bank Profitability, General Methods of Moments, South Africa

Authors' individual contribution: Conceptualization — Z.M.; Methodology — Z.M. and L.J.; Investigation — Z.M. and L.J.; Writing — Z.M. and L.J.; Supervision — L.J.

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1. INTRODUCTION

The Basel Committee on Banking Supervision (BCBS) introduced Basel III in response to the 2007/2008 global financial crisis, to strengthen the banking sector by mandating higher capital and liquidity requirements (BCBS, 2010). While these reforms aim to enhance financial stability, there is ongoing debate about their impact on bank profitability, particularly in emerging markets. This study investigates the effect of Basel III capital regulations on the profitability of South African banks, addressing a significant gap in the existing literature.

Research on the relationship between Basel III regulations and bank profitability has produced

mixed findings across various regions. In some cases, higher capital requirements have been associated with increased profitability. For instance, Zheng et al. (2017) found that Bangladeshi banks experienced reduced costs of financial intermediation and improved profitability due to higher regulatory capital ratios. Similarly, Le and Pham (2021) demonstrated positive effects of Basel III capital and liquidity requirements on profitability in Asia-Pacific (APAC) banks, and Hussain and Muhammad (2022) found similar outcomes in Islamic banks. However, other studies show conflicting results. Alfouhaili (2020) reported that profitability decreased in Lebanese commercial banks after Basel III was implemented, particularly in smaller, high-risk

institutions. Studies on United Kingdom (UK) and Australian banks by Le et al. (2023) found that stricter capital ratios boosted operating earnings but did not significantly enhance overall profitability. In Nigeria, Ozili (2015) found that Basel III had no meaningful effect on bank profitability. These mixed results suggest that the impact of Basel III on bank performance varies (Al-Sharkas & Al-Sharkas, 2022; Mashamba, 2021; Okigbo & Bagheri, 2020), based on factors such as bank size, risk profile, and geographic location.

In South Africa, research on Basel III's impact remains limited. Previous studies by Maredza (2016) and Choudrogiannis and Merrino (2024) explored some aspects of Basel III, but neither focused specifically on profitability. Maredza (2016) examined the cost of financial intermediation under Basel II, while Choudrogiannis and Merrino (2024) investigated systemic risk reduction under Basel III, with an inconclusive focus on profitability. Both studies hint at potential trade-offs between stability and profitability but stop short of offering definitive insights into the latter. This study contributes to the literature by providing a focused analysis of Basel III's impact on bank profitability within the South African context, a critical area that has been underexplored. While numerous studies have examined the effects of Basel III in developed economies, there is a noticeable gap in research specific to emerging markets like South Africa, where unique economic conditions and regulatory environments may yield different outcomes (Jones, 2020; Ozili, 2015). Emerging markets often face higher levels of economic volatility, currency risk, and political instability, which can influence the way banks respond to increased capital and liquidity requirements (Fraisie et al., 2013). Additionally, regulatory frameworks in these markets may not be as mature or comprehensive as those in developed economies, potentially leading to challenges in Basel III implementation (Nketcha, 2020).

Furthermore, the effectiveness of Basel III appears to be influenced by factors such as bank size, business models, and the overall regulatory environment in different countries. Larger banks with more diverse portfolios may find it easier to adapt to the new requirements, while smaller institutions might struggle with compliance costs. Additionally, the interplay between Basel III and other regulatory measures, as well as the broader economic context, can significantly affect its impact on bank performance. This suggests that policymakers and regulators may need to consider tailored approaches and ongoing adjustments to ensure that Basel III achieves its intended goals of enhancing financial stability without unduly hampering bank operations and economic growth. South Africa, in particular, has a dual-tiered banking system, where large, well-capitalized banks coexist with smaller institutions that may struggle to meet stringent capital requirements (Maredza, 2016). These differences in bank size, coupled with South Africa's economic conditions — such as lower gross domestic product (GDP) growth and higher unemployment compared to developed economies — can significantly affect how banks comply with Basel III regulations while maintaining profitability.

This study addresses this gap by examining the following research question:

RQ: How do Basel III capital requirements impact the profitability of South African banks?

The theoretical framework applied in this study draws from the concepts of bank stability and profitability, utilizing both empirical analysis and theoretical insights to explore these relationships. The research methodology involves utilizing the generalized method of moments (GMM) estimation on a dataset comprising ten banks from 2010 to 2022, providing a robust analytical foundation for the findings. This methodological approach allows for a nuanced understanding of the interactions between regulatory compliance and bank performance. The main findings indicate that Basel III capital requirements have an insignificant negative effect on South African banks. This may be attributed to stringent oversight by the South African Reserve Bank (SARB), which ensures that banks maintain adequate capital while adapting to regulatory changes. Furthermore, the evidence suggests that South African banks have effectively adjusted their strategies to comply with Basel III without compromising their profitability. This resilience reflects a robust banking sector capable of withstanding regulatory pressures, ultimately contributing to financial stability.

The remainder of this paper is organized as follows. Section 2 provides a comprehensive review of the existing literature on the topic, synthesizes key findings, and identifies gaps in the current research. Section 3 outlines the research methodology employed in this study, detailing the data sources, sampling techniques, and analytical approaches used to investigate the relationship between the Basel III capital requirements and bank performance in South Africa. Section 4 presents and interprets the results of the analysis, highlighting the main findings and their implications. Finally, Section 5 concludes the study, summarizes the key takeaways, discusses the policy and practical implications of the results, and suggests avenues for future research.

2. LITERATURE REVIEW

The review of the literature reflects diverse findings on the impact of Basel III regulations across different banking sectors and economic contexts. A critical analysis reveals that the varied outcomes in these studies are driven by several key factors, including bank size, risk profile, economic conditions, and regulatory environments (Ikhwan et al., 2023; Nath & Das, 2023; Al Kharusi et al., 2022).

Alfouhaili (2020) provides a qualitative analysis from Lebanon, where a reduction in both risk and profitability was observed post-Basel III implementation, particularly in small, high-risk banks. This result aligns with Klomp and de Haan (2012), which similarly noted that Basel III has a disproportionate impact on smaller, riskier banks. The reliance on semi-structured interviews in Alfouhaili's (2020) study offers valuable insights from senior management but is inherently subjective. This limitation weakens the generalizability of the findings, especially when compared to studies employing more rigorous quantitative methods like Zheng et al. (2017). Zheng et al. (2017), who conducted a panel data analysis on Bangladeshi banks, offer a contrasting perspective by finding that higher capital ratios reduced the cost of financial intermediation and enhanced profitability. Their use of a dynamic panel GMM estimator adds robustness to the results, making them more reliable for concluding the broader banking sector. Unlike

Alfouhaili's findings, Zheng's (2017) study suggests that in certain developing markets, Basel III can foster profitability, highlighting the significant variation in Basel III's effects depending on the local economic environment. Hussain and Muhammad (2022) add a further perspective by investigating the differential impact of Basel III on Islamic versus conventional banks across multiple countries. Their findings highlight that while Basel III enhances profitability and cost efficiency for Islamic banks, conventional banks experience the opposite. The inclusion of different banking models introduces a fresh perspective, emphasizing that regulatory frameworks do not affect all types of financial institutions uniformly. This is a crucial observation that reflects the broader challenges of implementing a "one-size-fits-all" regulatory standard across diverse banking systems.

Meanwhile, Le et al. (2023) and Le and Pham (2022) offer broader evidence from developed markets like the UK, Australia, and APAC. Their findings found that stricter capital ratios increase operating earnings but fail to enhance overall profitability highlighting a trade-off. The capital requirements under Basel III ensure greater stability and operational strength but can reduce profitability due to the cost of maintaining higher capital reserves. This finding is particularly pertinent for policymakers, as it underscores the difficulty in balancing financial stability with the need for banks to remain profitable. On the contrary, Ozili (2015) presents evidence from Nigeria, where Basel III regulations had no significant effect on bank profitability. This further supports the idea that emerging markets, especially in Africa, might not experience the same benefits from Basel III as developed markets. Ozili's (2015) study is critical as it calls into question the blanket application of Basel III regulations in economies with nascent or less-developed banking sectors, indicating that such regions might require tailored regulatory approaches.

The variations in findings across different geographies further demonstrate that Basel III's impact is not universally positive or negative but highly context-dependent. Le et al. (2023), for example, provide evidence from developed markets, showing that stricter capital ratios increase operational earnings but fail to enhance overall profitability. This contrasts sharply with findings from developing economies, such as those by Ozili (2015) and Alfouhaili (2020), where the burden of compliance with Basel III regulations is more pronounced. The ability of banks to adapt to Basel III is closely tied to the maturity of the financial systems and the broader economic stability of the countries in question. Developed economies often have the infrastructure and financial resilience to absorb the costs of increased capital requirements, while emerging markets, where banking sectors are less developed, may struggle under the weight of these regulatory changes. This suggests that the regulatory environment, along with the economic context, plays a critical role in determining the success or failure of Basel III implementation.

The existing literature on the impact of Basel III capital regulations reveals significant insights but also highlights notable knowledge gaps, particularly regarding emerging markets like South Africa. While studies such as Zheng et al. (2017) and Le et al. (2023) provide robust quantitative analyses in developed economies, they often overlook the unique challenges faced by banks in developing

contexts. Research conducted in emerging markets, including the studies by Alfouhaili (2020) and Ozili (2015), indicates that the effects of Basel III regulations can differ dramatically based on regional economic conditions and the maturity of financial systems. However, there remains a scarcity of empirical studies specifically focusing on South Africa's banking sector, which operates under a complex regulatory environment that combines features of both emerging and developed markets.

South Africa stands out as a significant financial hub in Africa, with a banking system that is relatively advanced compared to its regional peers. Despite this, the impact of Basel III regulations on the profitability of South African banks has not been thoroughly examined. This gap is critical because the findings from other emerging markets cannot be directly extrapolated to South Africa due to its unique economic landscape, regulatory framework, and financial market dynamics. By focusing specifically on South African banks, this study aims to provide empirical evidence on how Basel III capital regulations influence bank profitability in this distinct context. Addressing this knowledge gap is essential for regulators and policymakers who seek to understand the implications of Basel III in an emerging market setting. The insights gained from this research could inform future regulatory decisions and help ensure that Basel III achieves its intended goals of enhancing financial stability without compromising bank performance and economic growth. Ultimately, this study not only fills a significant gap in the literature but also contributes to the broader discourse on the effectiveness of Basel III in diverse regulatory environments.

3. METHODOLOGY

3.1. Data, data sources, and sample

This study utilizes three primary sources of secondary data: 1) individual banks' financial statements, 2) the South African Reserve Bank (SARB), and 3) the World Bank's economic indicators for South Africa. Financial statements provide detailed bank-specific information, including profitability, capital, and liquidity ratios, which are available on the official websites of the selected banks (Table A.1 in Appendix). Macroeconomic data, such as the GDP growth rate, inflation rate, and interest rates, are sourced from the World Bank database. Additionally, data on interest rates, particularly the repo rate, were obtained from the SARB. This study covers a timeframe of 12 years, from 2010 to 2022. Log transformation is applied to variables with large values, such as bank size (total assets), and streamline data, to facilitate analysis. Furthermore, winsorization was employed to mitigate the impact of extreme outliers in variables exhibiting skewness and kurtosis beyond acceptable ranges (+/-2 for skewness and +/-7 for kurtosis), as recommended by Byrne (2010) and Hair et al. (2010). By replacing extreme values with the nearest non-outlier values, winsorization ensures that the dataset remains representative and not unduly influenced by outliers, thereby enhancing the robustness and reliability of the analysis of the impact of Basel III standards on bank profitability. Although the target population included 14 domestically controlled banks identified by the SARB, a sample of 10 banks that best represent domestic banks in South Africa was selected due to data availability.

3.2. Variables

3.2.1. Dependent variable

In this study, bank profitability is measured using the net interest margin (*NIM*), which is the ratio of interest income minus interest expenses to interest-bearing assets. This metric was chosen over return on equity (*ROE*) and return on assets (*ROA*) due to its relevance, stability, comparability, and regulatory orientation in South Africa (Alnabulsi et al., 2023). The *NIM* reflects the core business of banks in South Africa, which is intermediation between savers and borrowers, making it a more accurate measure of profitability in this context.

3.2.2. Independent variables

This study considers several drivers of bank profitability, categorized into four groups: 1) bank-specific, 2) market structure, 3) macroeconomic, and 4) macro-financial factors.

Bank-specific factors

Asset quality: Measured using two indicators: 1) non-performing loans (*NPLs*) and 2) credit loss ratio (*CLR*). High levels of *NPLs* and *CLR* signify a deterioration in asset quality, leading to increased loan losses and provisioning expenses, which ultimately reduce profitability (Ozili, 2021). Theoretically, poor asset quality raises the risk profile of banks, increasing the cost of capital and affecting lending practices. Practically, in South Africa, where economic challenges can elevate credit risk, banks with lower *NPLs* are better positioned to maintain profitability (P. Nguyen, 2024).

Bank size: The natural logarithm of total assets is used as a proxy for bank size (*SIZE*). Larger banks may benefit from economies of scale and diversification, leading to greater profitability. However, diseconomies of scale and increased regulatory costs can also occur, negatively affecting profitability (Borroni & Rossi, 2019). Theoretically, larger banks can spread fixed costs over a broader asset base, enhancing profitability. In South Africa, larger banks like Standard Bank and ABSA often demonstrate higher efficiencies, translating to better financial performance (Wilson et al., 2024).

Cost management: Efficiency is measured using the cost-to-income ratio (*CIR*). A lower *CIR* indicates better cost management and higher efficiency, positively impacting profitability (Masindi & Singh, 2021; Pasiouras & Kosmidou, 2007). Efficient banks can achieve higher margins by controlling operational costs and in the South African context, banks focusing on digital technology and process optimization are likely to see improved profitability (Taylor et al., 2024).

Bank risk: The ratio of risk-weighted assets (*RWA*) to total assets reflects a bank's risk profile. Higher risk can lead to potentially higher returns, but it also increases volatility and uncertainty in profits (Borroni & Rossi, 2019; Martynova et al., 2015). This suggests, that banks must balance risk and return; increased risk may deter investors or lead to higher capital requirements. In South Africa, regulatory changes under Basel III require banks to manage their risk profiles carefully, influencing their profitability strategies (Sibande & Milne, 2024).

Funding mix: The ratio of total core deposits to total assets represents the bank's reliance on deposit funding. A higher ratio indicates a more stable and cheaper funding source, leading to a positive impact on profitability through lower funding costs and wider interest margins (Masindi & Singh, 2021). Therefore, a stable funding base reduces liquidity risks and enhances a bank's lending capacity. In South Africa, banks with a strong deposit base can offer competitive interest rates, thereby attracting more borrowers (Mlambo & Ndlovu, 2011).

Activity mix: The ratio of non-interest income (*NI*) to total income reflects a bank's diversification of income sources. While *NI* from fees, commissions, and trading activities can offer higher margins than traditional lending, they can also be more volatile or cyclical. Therefore, the impact of the activity mix on profitability is uncertain (Borroni & Rossi, 2019). In theory, diversification can hedge against interest rate risks, implying that banks that successfully diversify their income streams can achieve more stable financial performance, especially during economic downturns (Octavianus & Fachrudin, 2022).

Market structure factors

Controlling for market structure is crucial in this study due to the unique competitive landscape of South African banking. Market concentration is measured by the concentration (*C3*) ratio, which indicates the market shares of the three largest commercial banks. The inclusion of this factor is justified by the observation that higher market concentration can lead to increased market power for these banks. This power allows them to charge higher prices, reduce costs, and potentially boost profitability. However, a highly concentrated market can also stifle competition, which may ultimately harm profitability if consumers have fewer choices (O'Connell, 2023). A concentrated market can enhance profitability for dominant firms by allowing them to optimize pricing strategies and manage costs effectively. In South Africa, the top three banks account for a significant portion of the market share, which suggests that their pricing power and economies of scale may positively influence profitability (Simatele et al., 2018). Therefore, understanding the dynamics of market structure is essential for accurately assessing the profitability of South African banks.

Macroeconomic factors

The inclusion of macroeconomic factors is equally important in this study due to South Africa's unique economic environment, characterized by fluctuations in growth rates, inflation, and regulatory changes. This study controls for *inflation (INF)*, *GDP growth*, *GDP per capita*, and the *repo rate (Repo)*, as these variables can significantly impact bank profitability. Controlling these macroeconomic factors is justified, as they play a critical role in shaping the demand for banking services and influencing operational efficiency. For instance, higher GDP growth rates are generally associated with increased demand for loans, which can enhance bank profitability through greater lending volumes (Masindi & Singh, 2021). Conversely, high inflation can erode real returns on

loans and increase operational costs, potentially harming profitability. Moreover, macroeconomic stability tends to enhance banks' operational efficiency by fostering a favorable environment for investment and growth. Stable inflation and steady economic growth can lead to improved borrower confidence, facilitating loan growth and reducing default rates (Ropele et al., 2022). In the South African context, these relationships are particularly relevant, as banks must navigate complex economic challenges that can directly impact their financial performance.

3.3. Model specification

To account for the dynamic nature of bank margins, this study adopts a dynamic panel data model that incorporates lagged *NIM* as an explanatory variable. This approach captures the inertia or adjustment costs in the evolution of bank margins over time, reflecting the intertemporal management of banks that face stochastic fluctuations in deposit supply and loan demand (Le et al., 2023; Angori et al., 2019; Dietrich et al., 2014). The empirical specification is based on the models developed by Angori et al. (2019) and Dietrich et al. (2014), represented by the following equation:

$$y_{it} = \alpha + \lambda y_{i,t-1} + \vartheta_c CET1_{it} + \sum_{j=1}^J \beta_j X_{it} + \sum_{k=1}^K \phi_k Z_{it} + \sum_{f=1}^F \psi_f M_{it} + \eta_i + \mu_i + \xi_{it} \quad (1)$$

where the subscript *i* represents individual banks within the sample and *t* denotes the specific year of observation, α captures the constant effect not explained by the independent variables, y_{it} represents the dependent variable, which in our case is the *NIM* (bank profitability), λ is the speed of adjustment, which indicates how quickly a bank's profitability (*NIM*) adjusts to changes in independent variables. A value closer to 1 suggests a slower adjustment, whereas a value closer to 0 indicates a more rapid response. X_{it} is a vector that encompasses bank-specific characteristics that influence profitability. Z_{it} is a vector that represents macroeconomic factors affecting profitability. These include *INF*, *GDP growth*, *GDP per capita*, and *Repo*. M_{it} is a vector that captures the market structure characteristics that influence bank profitability, where β , ψ , and ϕ represent the coefficients to be estimated using this model, η_i represents bank-specific fixed effects. It captures the unobserved time-invariant characteristics of individual banks that may influence their profitability, μ_i captures any unobserved factor specific to each year, which may affect all banks in the sample to a similar degree, and ξ_{it} denotes the error term.

3.4. Estimation approach

While the GMM is a suitable choice for this research, alternative methodologies could also be considered. Ordinary least squares (OLS) regression is an option due to its simplicity and ease of interpretation, providing straightforward estimates of relationships between variables. However, OLS may not adequately address endogeneity, particularly when independent variables correlate with the error term, leading to biased and inconsistent estimates (Wooldridge, 2015). Fixed and random effects models are common in panel data analysis. Fixed effects eliminate biases from unobserved heterogeneity, while random effects assume no correlation between entity-specific effects and independent variables. In dynamic models, the inclusion of a lagged dependent variable as an explanatory factor presents econometric challenges. Static panel regression models such as OLS, fixed effects, and random effects produce biased and inconsistent estimates because of the correlation between the lagged dependent

variable and the error term (Baltagi, 2008). Arellano and Bond's (1991) GMM estimator, chosen for this study, is appropriate because it accounts for the dynamic nature of the model and potential endogeneity (Arellano & Bond, 1991). Thus, while GMM is the preferred method, considering alternative approaches allows for a comprehensive understanding of how different methodologies could affect the analysis of Basel III on bank profitability in South Africa.

3.5. Pre-estimation tests

3.5.1. Unit root test

In this study, the Fisher-type unit root test, suitable for unbalanced data, was used. It combines p-values from individual unit root tests to test the null hypothesis that all panels contain unit roots, against the alternative that at least one panel is stationary. This study's Fisher-type test was based on the augmented Dickey-Fuller (ADF) test.

3.5.2. Multi-collinearity test

A correlation matrix with a threshold of 0.8, as suggested by Brooks (2008), was used to detect multicollinearity.

3.6. Post-estimation tests

The Sargan test was used to assess the validity of instrumental variables by testing their exogeneity. A significant Sargan test statistic indicates a potential model misspecification and biased estimates. On the other hand, the AR(2) test was utilized to check for autocorrelation in the error terms. These diagnostic tests ensure a comprehensive evaluation of the model's validity and address issues such as endogeneity and autocorrelation, thus enhancing the robustness of the study's findings.

4. RESULTS

4.1. Descriptive statistics

Table 1 presents the descriptive statistics for the variables used in this study.

Table 1. Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Minimum	Maximum	Skewness	Kurtosis
NIM	127	0.05	0.03	0.01	0.16	2.08	7.00
CET	109	0.10	0.05	0.01	0.21	-0.67	2.63
CIR	127	0.57	0.10	0.32	0.96	0.44	4.43
Funding	127	0.77	0.18	0.34	0.996	-0.65	2.37
SIZE	127	13.55	2.79	9.71	20.3	0.93	3.02
LDR	127	0.78	0.20	0.27	1.2	-0.85	3.11
CLR	91	0.02	0.03	0.01	0.12	2.28	6.78
NII	64	0.08	0.04	0.01	0.19	0.54	2.76
GDP per capita	129	8.84	0.13	8.65	9.08	0.12	2.03
C3	120	77.61	0.99	75.99	79.45	0.45	2.35
Pvtcred	120	61.18	1.44	57.74	63.27	-0.83	3.37
Z-score	120	15.25	0.99	13.43	17.26	0.09	2.67
INF	100	5.16	0.83	4.06	6.59	0.22	1.77
Repo	129	0.06	0.01	0.04	0.07	-0.65	2.34

Note: LDR = loan to deposit rate; Funding = funding structure; Pvtcred = private credit; CET = core equity capital.

Source: Authors' compilation.

Data on the South African banking sector from 2010 to 2022 show the resilience and adaptability of the sector in the face of economic challenges. Banks have maintained consistent profitability, robust capitalization, and prudent risk-management practices despite varying economic conditions and regulatory changes. The sector shows strong reliance on core deposits, conservative lending practices, and effective credit risk management. However, there is significant variation in efficiency, bank size, and reliance on non-interest income, reflecting diverse business models and strategies. Some banks are much more efficient and conservative in lending than others are. This could be due to differences in size and business models. For instance, the high average CIR (0.57) suggests high operating expenses overall, but the wide range (0.32–0.96) indicates significant variation in efficiency across banks. Some banks clearly manage their expenses better than others do. Likewise, the average LDR (0.78) suggests some conservatism, but the substantial range (0.27–1.2) reveals a large difference in lending practices. A maximum LDR of 1.2 signifies aggressive lending by a particular bank, while others lend out a much smaller portion of their deposits. The negative skew (-0.85) also suggests the concentration of banks on more cautious lending practices. Some banks have a much higher percentage of NPLs compared to others, suggesting less conservative lending practices. The broader economic environment paints a gloomy picture. The average GDP per capita (8.84) suggests a lower standard of living compared to wealthier nations, while a small standard deviation (0.13) implies

a limited variation in GDP per capita across the observed period. This could be interpreted as stagnant economic growth, in which wealth does not increase significantly for most citizens. On the other hand, the positive skew shows signs of income inequality, consistent with the view that South Africa has high-income inequality (World Bank, 2022). On the other hand, the average Repo of 6% (minimum: 4%, maximum: 7%) suggests a relatively stable monetary policy environment, with the central bank's efforts to control inflation and support economic growth. Overall, the South African banking sector has demonstrated stability and strength, as implied by its high Z-scores, positioning itself to support economic growth and circumvent future uncertainties.

4.2. Unit root test results

This study used the Fisher-type unit root test, which is applicable to unbalanced panel data, to check for unit roots in the data. Table 2 presents the results.

The results in Table 2 show that all the variables have negative and statistically significant test statistics at the 1% level, which means that one can reject the null hypothesis of a unit root for all variables. Therefore, all the variables are stationary in level and have an order of integration of I(0). This implies that no further transformation is needed for these variables, and they can be used in their level form in econometric models.

Table 2. Unit root test results

Variable	Statistic	Order of integration I(0)	Decision
NIM	34.47***	Yes	Stationary
CET	51.40***	Yes	Stationary
CIR	43.29***	Yes	Stationary
Funding	34.31***	Yes	Stationary
SIZE	34.34***	Yes	Stationary
LDR	214.92***	Yes	Stationary
CLR	89.66***	Yes	Stationary
NII	23.57***	Yes	Stationary
GDP per capita	54.02***	Yes	Stationary
C3	97.26***	Yes	Stationary
Pvtcred	64.67***	Yes	Stationary
Z-score	69.19***	Yes	Stationary
INF	47.85***	Yes	Stationary
Repo	66.50***	Yes	Stationary

Note: ***, **, and * indicate statistical significance at 0.01, 0.05, and 0.10 levels, respectively.

Source: Authors' construction based on research data.

4.3. Correlation analysis

This study checked for multicollinearity among independent variables using the correlation matrix shown in Table 3. A common rule of thumb is that, if the correlation between any two independent

variables is greater than 0.80, there is a serious multicollinearity problem (Brooks, 2008). None of the independent variables has a correlation above 0.80 in Table 3, which indicates that the data are free from multicollinearity.

Table 3. Correlation matrix

Variable	NIM	CET1	CIR	Funding	SIZE	LDR	CLR	NII	GDP	C3	Pvtcred	Z-score	INF	Repo
NIM	1.00													
CET1	-0.34*	1.00												
CIR	-0.39*	0.47*	1.00											
Funding	0.31*	-0.43*	-0.55*	1.00										
SIZE	0.38*	-0.52	-0.25*	0.43*	1.00									
LDR	0.03	0.09	0.02	-0.16	-0.65*	1.00								
CLR	0.92*	-0.50*	-0.62*	0.44*	0.69*	-0.19	1.00							
NII	-0.43*	0.21	0.51*	-0.46*	-0.30*	-0.07	-0.45*	1.00						
GDP	-0.01	-0.13	0.01	-0.04	-0.08	0.05	-0.09	-0.08	1.00					
C3	-0.04	-0.12	0.08	-0.04	-0.02	-0.11	-0.05	0.03	0.34*	1.00				
Pvtcred	0.01	-0.10	-0.02	-0.04	-0.07	0.10	-0.05	-0.16	0.20*	-0.10	1.00			
Z-score	0.05	0.16	-0.10	0.01	0.04	0.02	0.07	0.02	-0.24*	-0.39	-0.51*	1.00		
INF	0.03	0.15	-0.06	0.06	0.005	0.11	0.04	-0.11	-0.20*	-0.76	-0.02	0.18	1.00	
Repo	0.06	0.07	-0.08	-0.01	0.01	0.03	0.02	-0.004	-0.22*	-0.38	0.03	0.61*	-0.09	1.00

Note: * Indicates statistical significance at 0.05.

Source: Authors' construction based on research data.

4.4. Main results

The results of examining the effect of Basel III's higher capital requirements on the profitability of banks in South Africa are displayed in Table 4.

Table 4. Results for the effect of Basel III capital requirements on bank profitability

Variable	Coefficient	Std. error
NIM(-1)	0.4841*	0.2628
CET1	-0.0331	0.0991
CIR	-0.0796	0.0780
Funding	-0.0750	0.0542
SIZE	-0.0154**	0.0073
LDR	0.0453	0.0421
CLR	0.5405***	0.1695
NII	0.0961*	0.0568
GDP per capita	-0.0291*	0.0164
C3	0.0088***	0.0034
Pvtcred	-0.0069***	0.0022
Z-score	0.0033*	0.0019
INF	0.0062**	0.0029
Repo	-0.6992*	0.3728
Diagnostics		
Wald test	48.24***	
Sargan test	0.5706	
Arellano-Bond AR(2) test	0.8306	

Note: Dependent variable: NIM. ***, **, and * indicate statistical significance at 0.01, 0.05, and 0.10 levels, respectively.

Source: Authors' construction based on research results.

The negative coefficient for the CET1 capital ratio (-0.03) suggests that the stricter capital requirements under Basel III do not significantly hinder bank profitability in South Africa. This finding aligns with the observations of the SARB (2021), which indicated that banks had not only met but exceeded the minimum CET1 requirements. The ability of South African banks to maintain healthy capital buffers implies effective risk management practices that mitigate potential negative impacts on profitability (Sibande & Milne, 2024). Studies indicate that banks with higher capital ratios can withstand economic shocks better, suggesting a relationship between capital adequacy and financial stability (Admati, 2019). The gradual implementation of Basel III allowed banks time to adjust, which is vital for maintaining operational efficiency (BCBS, 2017). Therefore, this study contributes to the growing literature that argues higher capital

ratios do not necessarily translate to reduced profitability but may instead bolster financial resilience (Basten, 2020). Overall, the results suggest a rethinking of capital requirements, emphasizing that sufficient capital can coexist with robust profitability.

The negative and significant relationship between SIZE and NIM (-0.02) contradicts the common view that larger banks benefit from economies of scale (Batten & Vo, 2019; Berger et al., 2009). This finding resonates with the work of Mlambo and Ncube (2011), who noted that larger banks in South Africa often face challenges that smaller banks do not, such as increased bureaucratic inefficiencies and higher operational costs. Moreover, the increased competition in the South African banking sector may dilute the market power of larger banks, leading to lower margins (Dayi et al., 2022). Additionally, the concept of diseconomies of scale becomes relevant, as larger institutions may struggle with complexity in operations and decision-making, hindering profitability (Blatter & Fuster, 2021). This analysis reinforces the importance of contextual factors in determining the relationship between size and profitability, suggesting that merely being larger does not guarantee enhanced financial performance. The results emphasize that strategies for maintaining profitability must adapt not only to size but also to market dynamics and operational efficiency (Olmo et al., 2021). Thus, the findings present a nuanced view of the size-profitability debate in the South African context.

The negative but statistically insignificant coefficient for the CIR (-0.08) suggests that operational efficiency does not necessarily lead to higher profitability. This finding aligns with Mlambo and Ncube (2011), who pointed out that improved efficiency might not suffice to boost profitability in a competitive market. The lack of significance in this relationship indicates that external factors, such as market concentration and competition, may overshadow internal efficiency metrics (Attia & Alber, 2022). Furthermore, as highlighted by Blatter and Fuster (2021) high market concentration can lead to a situation where banks face price rigidity and reduced margins, limiting the effectiveness of cost reductions. The findings support the idea that

banks in South Africa must navigate complex market dynamics to achieve profitability, as operational efficiency alone may not be a panacea (Msomi & Olarewaju, 2022). Moreover, the results suggest a need for banks to explore innovative strategies beyond mere cost-cutting to enhance profitability in a highly competitive environment.

The significant positive association between *CLR* provisions (0.54) and profitability challenges conventional expectations. Typically, higher provisioning is perceived as a sign of increased risk, suggesting lower profitability (Meyer & Morope, 2022). However, this finding supports the notion that prudent risk management can lead to better outcomes, reflecting a proactive approach to credit risk (Mlambo & Ncube, 2011). Effective credit risk management practices help maintain asset quality and enhance profitability by reducing default rates (Temba et al., 2024). This result aligns with the literature emphasizing the importance of maintaining appropriate provisioning levels, which signal a bank's health and stability (Goncharenko & Rauf, 2019). Furthermore, the findings suggest that banks with a strong focus on risk management can thrive even in challenging economic climates, as indicated by successful banks during financial downturns (Admati, 2019). Overall, the results underscore the importance of integrating risk management strategies into profitability assessments.

The negative and significant coefficient for *GDP per capita* (-0.03) indicates an unexpected relationship between economic growth and bank profitability in South Africa. This finding diverges from the literature, which often associates higher GDP with increased bank profitability (Saif-Alyousfi, 2022). One possible explanation for this phenomenon is that increased economic activity may intensify competition among banks, leading to lower NIMs (Dayi et al., 2022). This result may also reflect the unique characteristics of the South African banking landscape, where high levels of financial inclusion and diverse market players create competitive pressures (Ncube, 2009). The findings emphasize that as the economy grows, banks may need to adopt innovative strategies to maintain profitability, as traditional approaches may no longer suffice. Additionally, it points to the need for policymakers to consider the implications of economic growth on banking profitability, particularly in terms of regulatory measures (Meyer & Morope, 2022). Therefore, the results prompt a reevaluation of the assumed linear relationship between GDP and bank profitability, suggesting that contextual factors play a significant role.

The weak positive relationship between market concentration (*C3* metric) and *NIM* (0.009) indicates that banks operating in more concentrated markets tend to enjoy higher NIMs. This finding aligns with previous research that suggests higher market concentration can lead to increased pricing power for banks (Saif-Alyousfi, 2022). However, it contrasts with findings from other regions, suggesting that the relationship between *C3* and *NIM* may be contingent upon specific market dynamics and regulatory environments. The results imply that South African banks may benefit from concentrated markets due to reduced competition, allowing them to maintain higher margins (Berger et al., 2009). Nevertheless, excessive concentration can also lead to regulatory scrutiny, limiting banks' ability to capitalize on potential profitability (Blatter & Fuster, 2021). This underscores the importance of balancing

concentration with healthy competition to foster a resilient banking environment (Ncube, 2009). The findings highlight the need for further research to explore the impact of market dynamics in South Africa, as they may yield different outcomes compared to other banking markets.

The negative and significant relationship between *Pvtcred* and *NIM* (-0.0069) underscores the complexities of the financial landscape in South Africa. As *Pvtcred* increases, banks may face greater competition, compelling them to lower interest rates and, consequently, their profit margins (Shair et al., 2019). This aligns with findings that suggest higher levels of financial development can lead to reduced profitability due to intensified competition (Temba et al., 2024). Moreover, the evidence suggests that banks must adapt their strategies in response to a well-developed financial sector, which may include diversifying their offerings or enhancing customer service to maintain margins (Dayi et al., 2022). The findings also hint at potential challenges faced by banks from non-bank financial intermediaries, which can further squeeze profitability (Blatter & Fuster, 2021). As such, the results emphasize the need for banks to remain agile and innovative to sustain profitability in an increasingly competitive environment. Overall, this study contributes to the discourse on the impact of financial development on banking profitability, particularly in emerging markets like South Africa.

The positive coefficient for the *Z-score* (0.0033) indicates a strong relationship between bank stability and profitability. This finding is consistent with previous literature that suggests higher stability metrics lead to improved financial performance (Shair et al., 2019). Banks with higher *Z-scores* are often better positioned to weather economic fluctuations, which in turn enhances profitability (Goncharenko & Rauf, 2019). The results suggest that focusing on risk management and maintaining capital buffers not only ensures compliance with regulatory standards but also supports long-term profitability (Admati, 2019). Furthermore, this finding highlights the importance of financial stability in attracting investor confidence, which is crucial for funding and growth (Meyer & Morope, 2022). It also points to the need for banks to prioritize stability in their operational strategies to navigate uncertain economic environments effectively (Temba et al., 2024). Therefore, the results underscore that promoting financial stability can serve as a foundation for sustainable profitability.

The negative and significant association between the *Repo* and *NIM* (-0.70) indicates that rising interest rates adversely impact bank profitability. This finding aligns with existing literature that emphasizes the relationship between monetary policy and banking performance (Meyer & Morope, 2022). Higher repo rates typically increase banks' funding costs, which can squeeze NIMs, as banks struggle to pass these costs onto consumers (Berger et al., 2009). The findings suggest that banks must adopt robust interest rate risk management strategies to mitigate potential profitability declines during tightening monetary policies (Goncharenko & Rauf, 2019). Moreover, this negative correlation highlights the challenges banks face in maintaining profitability amid fluctuating interest rates, reinforcing the notion that macroeconomic factors significantly influence financial performance

(Admati, 2019). As such, the results call for a deeper understanding of how interest rate movements affect bank operations and profitability, particularly in emerging markets.

4.5. Robustness test

The robustness test results conducted to show the reliability of the results are presented in Table 5.

This study used different variables and specifications in the models to check the robustness of the results. In Model 1, *Pvtcred* to GDP was replaced with domestic credit to GDP as a proxy for financial development. In Model 2, *C5* is used instead of *C3* as an indicator of market structure. In Model 3, *CET1* is substituted by the Basel III Tier 1 ratio as a measure of capital adequacy.

Table 5. Robustness test results

Variable	Model 1		Model 2		Model 3	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
	(2)	(3)	(4)	(5)	(6)	(7)
<i>NIM(-1)</i>	0.5420**	0.2753	0.6780**	0.2886	0.4493*	0.2494
<i>CET1</i>	-0.0403	0.1028	-0.0944	0.1064	-	-
<i>Tier1</i>	-	-	-	-	-0.0200	0.1037
<i>CIR</i>	-0.1002	0.0811	-0.1851**	0.0860	-0.0652	0.0804
<i>Funding</i>	-0.0830	0.0561	-0.1287**	0.0622	-0.0727	0.0533
<i>SIZE</i>	-0.0149*	0.0075	-0.0245***	0.0082	-0.0147**	0.0073
<i>LDR</i>	0.0563	0.0437	0.0910**	0.0451	0.0337	0.0327
<i>CLR</i>	0.5200***	0.1748	0.5976***	0.1847	0.5288***	0.1643
<i>NII</i>	0.1082*	0.0583	0.1345**	0.0622	0.0916*	0.0545
<i>GDP per capita</i>	0.1645***	0.0619	-0.0836*	0.0469	-0.0292*	0.0168
<i>C3</i>	-0.0165**	0.0076	-	-	0.0090***	0.0033
<i>C5</i>	-	-	0.0579	0.0392	-	-
<i>Pvtcred</i>	-	-	-0.0083**	0.0036	-0.0068***	0.0021
<i>Domestic credit</i>	0.5964***	0.2101	-	-	-	-
<i>Z-score</i>	-0.0044	0.0032	0.0060	0.0040	0.0034*	0.0019
<i>INF</i>	-0.0167**	0.0074	0.0024	0.0025	0.0063**	0.0029
<i>Repo</i>	3.2625***	1.1776	-0.0079	0.3997	-0.7100*	0.3977
Diagnostics						
Wald test	43.88***		36.54***		48.68***	
Sargan test	0.5615		0.5933		0.5520	
Arellano-Bond AR(2) test	0.8256		0.7709		0.8817	

Note: ***, **, and * indicate statistical significance at 0.01, 0.05, and 0.10 levels, respectively.

Source: Authors' construction based on research results.

The robustness test results for the effect of higher capital requirements on bank profitability in South Africa confirm that this study's main finding is robust and credible across different model specifications. The results consistently show that the coefficient of *CET1* or *Tier1* capital ratio is negative but insignificant in all models, implying that there is no significant effect of Basel III capital regulations on bank profitability, as proxied by the *NIM*, for South African banks. The results also show that the robustness test results for most of the variables are in line with previous findings in terms of the coefficient sign and statistical significance. However, notable differences were observed in Models 1 and 2. In Model 1, where *domestic credit* is used as an alternative measure of financial development, the results indicate that *Repo* has a positive and significant association with bank margins. This finding suggests that lower interest rates stimulate bank lending and profitability (Khan et al., 2017). Moreover, *domestic credit* has a positive and significant influence on bank profitability, supporting the view that financial development enhances bank performance (Beck et al., 2000). In Model 2, where *C5* is used instead of *C3* as a proxy for market structure, the results demonstrate that the *LDR* ratio has a positive effect on bank profitability, implying that higher lending activity is linked to higher bank income (Athanasoglou et al., 2008).

5. CONCLUSION

This study examines the impact of Basel III capital requirements on the profitability of banks in South Africa from 2010 to 2022, employing the one-step

GMM estimator for analysis. The empirical results indicate a negative but statistically insignificant relationship between the Basel III Tier 1 capital ratio (*CET1*) and bank profitability, measured by the *NIM*. This finding suggests that the regulations may have had a marginal effect, potentially due to South African banks having already maintained higher capital ratios before Basel III implementation, attributed to stringent oversight from the SA Reserve Bank. Additionally, the data indicates that *NIM* is positively and significantly related to *CLR*, *NII*, *C3*, stability (*Z-score*), and *INF*, highlighting the banks' ability to navigate various risks and uncertainties, such as credit and operational risks. The positive correlation between these variables and *NIM* suggests that banks can transfer some of their costs and risks to customers through higher interest rates or fees, while also benefiting from market power and diversification strategies. Conversely, *NIM* is negatively and significantly associated with *SIZE*, *GDP per capita*, *Pvtcred*, and the *Repo*, reflecting the competitive pressures and macroeconomic factors that influence credit demand and supply. The negative relationship indicates that larger banks and those operating in competitive markets or facing higher policy rates experience lower margins. Other variables, such as the *CIR* and *LDR*, did not show significant effects on profitability, implying that their influence is either minimal or captured by other variables in the model.

For policymakers, these results suggest that Basel III capital regulations do not negatively impact bank profitability in South Africa, indicating a positive outcome for the banking system. The findings imply that bank profitability is shaped by various internal and external factors, including

those beyond banks' control, creating a complex landscape where profitability depends on both institutional decisions and the broader market dynamics. Consequently, bank managers should adopt proactive strategies to manage risks, efficiency, and costs while adapting to changing market conditions and regulatory frameworks. The need to optimize funding structures and business models under capital regulations also arises, requiring a careful balance between profitability and stability. Bank managers must weigh short- and long-term goals, considering the trade-offs between reliance on deposits versus market funding, traditional versus non-traditional activities, and varying risk-return profiles.

This study contributes valuable insights into the impact of Basel III regulations on bank profitability in South Africa but also acknowledges certain limitations. The relatively small sample size

of 10 banks may restrict the generalizability of findings to the broader banking sector, and while the choice of GMM addresses endogeneity concerns, it does not completely mitigate limitations associated with the dataset's size and structure. A robustness test was conducted to validate the empirical findings, enhancing the reliability of results despite the limitations. Future research should explore alternative measures of bank profitability, such as return on assets or equity, and consider other proxies for capital and liquidity regulations, like the leverage ratio or net stable funding ratio. Additional studies may test the model's robustness using various estimation methods or data sources that could extend the analysis to different countries or regions, comparing results across various banking systems or regulatory environments.

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APPENDIX

Table A.1. List of banks

No.	Bank name	Uniform resource locator
1	Absa Bank Ltd	https://www.absa.africa/investor-relations/financial-results/
2	Investec Bank Ltd	https://www.investec.com/en_za/welcome-to-investec/about-us/investor-relations/financial-information.html#yearend
3	Standard Bank Ltd	https://reporting.standardbank.com/results-reports/annual-reports/
4	First National Bank Ltd	https://www.firstrand.co.za/investors/financial-results/
5	Nedbank Ltd	https://www.nedbank.co.za/content/nedbank/desktop/gt/en/investor-relations/information-hub/financial-results/2018.html
6	Capitec Bank Ltd	https://www.capitecbank.co.za/financial-results/2023/
7	Bidvest Bank Ltd	https://www.bidvest.co.za/financial-results-archive.php
8	Sasfin Bank Ltd	https://sasfin.com/investor-relations/
9	HBZ Bank Ltd	https://www.hbzbank.co.za/content.php?section=3andid=5
10	Mercantile Bank Ltd	https://www.mercantile.co.za/governance#financial-results