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Macroeconomic Determinants of Bank Profitability in South Africa A Panel Analysis

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UNIVERSITY OF THE WITWATERSRAND

Macroeconomic Determinants of Bank Profitability in South Africa

A Panel Analysis

*A research report submitted to the Faculty of Commerce, Law, and Management, University of the Witwatersrand,
partially fulfils the requirements for the degree of Master of Management in Finance & Investments.*

By

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A. ABSTRACT

Using data on South Africa's commercial banks in the period 1994-2023, this paper investigates the relationship between selected macroeconomic matrices, namely interest rates, exchange rates and gross domestic product (GDP) growth and the financial performance of commercial banks in South Africa. Additionally, the study seeks to determine the extent to which regulatory frameworks affect South African banks' performance, examining how regulations have contributed to stability, risk management and overall financial health within the sector. The study employs panel data regression techniques to quantitatively model the relationship between macroeconomic factors and bank profitability. We find macroeconomic variables (output growth and real interest rate) have a positive influence on bank profitability (real return of equity (ROE)) at a group level but not under returns on equity at a bank level. In the case of Net Interest Margin Ratio (NIM-Ratio), exchange rate and output growth influence it negatively. The exchange rate only influences NIM-Ratio negatively and none of the other measures of profitability. In terms of other control variables, Bank's total capital adequacy ratio is found to influence ROA, NIM-Ratio positively under both model specifications.

When considered as a group, the results show that output growth significantly influences the group profitability positively for real return on assets (ROA) and ROE but not with NIM-Ratio. Real interest rate influences group profitability (ROE and NIM-ratio) under the random effect model. For other control variables, Common Equity Tier 1 capital (CET1) -group and total capital adequacy influence group profitability, however, the total capital adequacy only influences NIM-Ratio positively, while CET1 only drives real returns on equity. adequacy only influences NIM-Ratio positively, while CET1 only drives real returns on equity. Overall, the study suggests that macroeconomic drives play a significant role in role in bank and group profitability in a South African context.

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C. ETHICAL CLEARANCE

D. ACRONYMS AND ABBREVIATIONS

GFC	Global Financial Crisis
GDP	Gross Domestic Products
ROE	Return on Equity
ROA	Return on Asset
NIM	Net interest Margin
SCP	Structure-Conduct-Performance
SBV	Silicon Valley Bank
SARB	South African Reserve Bank
RE	Random Effects
FE	Fixed Effects
BOPO	Operating Costs to Operating Income
NPL	Non-Performing Loans (NPL)
LDR	Loan to Deposit Ratio (LDR),
OLS	Ordinary Least Square
BCP	Bank Supervision

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1 CHAPTER 1: INTRODUCTION

1.1 Background

Globally, banks serve as the lifeblood of both developed and developing economies, as they facilitate crucial functions such as intermediation between savers and borrowers, provision of liquidity, and risk management, ensuring that economies run efficiently (Casu & Girardone, 2006). Banks play an even more pronounced role in financing development in emerging markets, given the relative lack of well-established capital markets (Demirgüç-Kunt & Huizinga, 1999; Donev, 2021). Moreover, banks' robustness and stability are essential indicators of a country's overall financial health, often acting as barometers for potential systemic risks and economic vulnerabilities.

In developed countries, banks contribute significantly to economic growth by providing loans and credit facilities to businesses and consumers. They support investment in infrastructure, innovation, and other productive activities, fostering a conducive environment for economic expansion (Cafisco, 2020). In emerging markets, the role of banks is even more critical. These economies often face challenges such as inadequate financial infrastructure, limited access to credit, and high levels of financial inclusion. Banks in these regions act as the primary source for funding for small and medium-sized enterprises (SMEs) and play a vital role in promoting financial inclusion by extending banking services to underserved populations (Mohapatra, 2020).

Understanding factors that drive the health and performance of banks is paramount to both bank executives and policymakers in every nation; it is about safeguarding the foundation of economic growth and stability. Regular assessments of bank performance can forewarn against potential systemic risks and ensure that they continue to support national economic objectives optimally (Barth, Caprio, & Levine, 2008). Moreover, the importance of bank stability has been highlighted by the aftermath of the global financial crisis (GFC), which underscored the need for robust risk management practices and effective regulatory Frameworks (Laven & Valencia, 2018)

In South Africa, the banking sector, like many other sectors, has historically been deeply intertwined with the country's socio-economic and political landscape. Post-apartheid, the sector has witnessed significant transformation as it adapted to democratic dispensation and a rapidly globalizing world economy (Fosu, 2013). As major players in this sector, commercial banks have shown resilience and adaptability in response to various economic challenges. These have ranged from global recessions to domestic economic shifts (Mlala & Ocran, 2017).

Three significant events tested South African banks severely. The first crisis occurred in the 1880s and it unfolded through a typical series of events: trade and fiscal deficits were addressed by printing money, leading to accelerated credit extension, a sharp decline in the exchange rate, and a spike in inflation. These domestic issues were exacerbated by worsening international conditions and political uncertainty. The final catalyst was the collapse of the Cape's equivalent to Lehman Brothers, an unregulated merchant house (Haveman & Fourie, 2015). The second one was the increased international isolation due to the apartheid government in the 1980s. The macroeconomic environment of South Africa was particularly volatile during this period. The country faced high current-account deficits and a growing debt burden from the 1970s (Lowenberg, 1997), leading to the closure of 17 banks in 1985/86. The third event occurred in 2001 when the rand/dollar exchange rate fell sharply from R7.79 per US dollar in January 2001 to R12.13 per dollar in December, a depreciation of 55.6%. This followed another significant depreciation in 1998 when the rand fell from R6 to R13.66 per dollar (Haveman, 2021). During this period, Saambou Bank failed, resulting in a total of 17 banks either deregistering or coming under curatorship (Haveman, 2021).

Another event was the GFC of 2008. While many global banks faced severe losses, the South African banking sector remained relatively insulated. This was due to its conservative banking practices and robust regulatory framework (Makina, 2019). While structural and industry drivers played a crucial role in ensuring the relatively unscathed survival of South African banks, these institutions also maintained a clear and stable corporate strategic direction throughout the financial crisis. The industry was well-balanced in terms of the strategic positioning of its banks. Four of the eight major banks were identified as defenders (Rensburg & Venter, 2012). Furthermore, the South African Reserve Bank (SARB) played a crucial role in maintaining financial stability. SARB's stringent regulatory oversight ensured that banks adhered to prudent lending practices and maintained adequate capital buffers. This proactive regulatory environment helped to prevent the excessive risk-taking that characterized banking sectors in other regions. The Basel II framework, which was in the process of being implemented in South Africa at the time, also contributed to the resilience of the banking sector by enhancing risk management and regulatory standards (Moloi, 2014). However, the subsequent economic downturn did affect the profitability and performance of banks, emphasizing the sector's sensitivity to macroeconomic shifts and shocks (Ntuli, 2018).

More recently, the COVID-19 pandemic further highlighted the resilience and challenges faced by South African banks, this resulted in a negative impact on the profitability and liquidity of JSE-listed banks but the excess returns on bank stocks generated by investors remained unaffected. The

reduction in economic activity, coupled with heightened risk aversion among consumers and businesses, led to a contraction in lending and an increase in non-performing loans. This situation strained banks' balance sheets profitability, necessitating interventions from the SARB to provide liquidity support and maintain financial stability. (Peerbhal & Kunjal, 2024).

Furthermore, the South African banking sector has had to navigate various socio-economic challenges posed by the impacts of high unemployment in the country, varying interest rates, and lackluster economic growth (Akinboade et al., 2015). These challenges are exacerbated by the underdeveloped nature of the banking sector in Sub-Saharan Africa, which hinders its potential contribution to growth (Mlachila, 2013). These macroeconomic factors have invariably influenced lending practices, risk appetites, and overall financial health of commercial banks in the country.

Studies have shown that interest rates, GDP growth and exchange rates are key determinants of bank profitability (Le & Ngo, 2020). For instance, economic growth generally supports bank profitability through increased lending opportunities (Moussa & Hdidar, 2019). Exchange rate fluctuations can impact foreign-denominated assets and liabilities, thus influencing banks' risk exposure (Longaric, 2022). The South African Reserve Bank's (SARB) interest rate policies also directly impact the cost of borrowing and lending, which in turn affects banks' net interest margins.

The main profitability indicators used to assess bank performance include Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) (Athanasoglou et al., 2008). These indicators provide insight into banks' operational efficiency, equity utilization, and income generation from core banking activities. Understanding these profitability indicators helps bank executives and policymakers gauge the financial stability and performance of banks, ensuring they can support economic growth while mitigating systemic risks (Barth, Caprio, & Levine, 2008).

1.2 Problem statement

South Africa has a unique economic landscape, characterized by its transition from apartheid-era restrictions to a globally integrated economy. However, the country's banking sector has served as a linchpin of financial stability and growth both during and after apartheid. While the nexus between macroeconomic factors and bank performance is well-established in global literature (Bourke, 1989; Athanasoglou et al., 2008), there remains a paucity of comprehensive studies addressing this dynamic within South Africa's distinct socio-economic backdrop. Much of the existing research

focuses on developed markets or broader emerging market contexts without fully considering the unique economic challenges faced by South Africa, such as persistent high unemployment, exchange rate volatility, and variable inflation rates, which significantly influence banking operations (Akinboade et al., 2015).

Particularly, the aftermath of the global financial crisis and its ripple effects on emerging economies underscored the need for such an exploration (Mlala & Ocran, 2017). From a practical standpoint, the constant flux in South Africa's macroeconomic conditions, coupled with external economic shocks, prompts an urgent need to understand their ramifications on the financial health of its banks. This study addresses the research gap by examining the macroeconomic determinants of bank profitability specifically within South Africa's distinct socio-economic framework. Using a panel data approach, this research aims to provide a nuanced understanding of how factors such as GDP growth, interest rates, and exchange rates impact bank performance in South Africa. The insights gained will assist policymakers and banking institutions in making informed decisions to bolster the sector's resilience against future economic challenges.

1.3 Objectives of the Study

The primary objective of this study is to investigate the relationship between selected macroeconomic matrices, namely interest rates, exchange rates and GDP growth and the financial performance of commercial banks in South Africa.

- i) To analyse how specific macroeconomic factors (interest rates, exchange rates, and GDP growth) impact the profitability of commercial banks in South Africa.
- ii) To assess the historical and ongoing impact of external economic factors on the financial performance of South African commercial banks.
- iii) To examine the historical and ongoing impact of external economic factors on the financial performance of South African commercial banks.

1.4 Research Questions

This study will provide answers to the following research questions:

What is the relationship between key macroeconomic factors and the financial performance of commercial banks in South Africa

- i. How have selected macroeconomic indicators, such as interest rates, exchange rate and GDP growth, historically influenced the financial performance of commercial banks in South Africa?
- ii. How do external economic shocks, like the global financial crisis, modify the relationship between these macroeconomic indicators and bank performance in the South African context (Mlala & Ocran, 2017)?
- iii. To what extent do regulatory frameworks in South Africa amplify or attenuate the effects of macroeconomic factors on bank performance?

1.5 Significance of the Study

As banks play a critical role in any economy, understanding the relationship between macroeconomic factors and bank profitability is imperative for various stakeholders, including policymakers, investors, and bank executives to ensure that the banking sector remains resilient against shocks and continues to support broader economic policy objectives. This study holds profound relevance for various stakeholders:

- i. By understanding the sensitivities of commercial banks to macroeconomic changes, policymakers can frame economic and financial policies that bolster the stability and growth of the banking sector.
- ii. Insights from this study can guide strategic planning and risk management, helping banks navigate future economic uncertainties more adeptly.
- iii. The findings can offer investors a clearer picture of the factors influencing bank profitability, aiding in informed decision-making for investments in the banking sector.

1.6 Organization of the Study

The Introduction section lays out the research context, the significance of the study, and the overarching research problem. Chapter Two will delve into existing literature studies about the relationship between macroeconomic factors and bank performance, highlighting gaps, especially in the South African context. Additionally, it will review the literature on bank regulation, examining how regulatory frameworks influence bank stability and performance. Chapter Three outlines the research design, data collection, and analytical techniques employed to achieve the objectives of the study. Chapter Four will present the research findings and analysis, where data is dissected, and inferences are drawn in line with the research questions. Finally, Chapter Five will discuss the implications of the findings, both from theoretical and practical perspectives, followed by the conclusion, which recaps the study's key takeaways and suggests areas for future research.

2 CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The nexus between macroeconomic factors and banking sector performance has been a focal point of academic inquiry for decades. Banks, as financial intermediaries, are inherently susceptible to broader economic conditions, making the exploration of this relationship pivotal for both policymakers and industry stakeholders. This chapter discusses key theoretical underpinnings and global empirical insights that shed light on the interplay between macroeconomic determinants and bank performance. Additionally, it will examine the role of regulatory policies in shaping banking sector outcomes, providing a comprehensive review of how regulations influence risk management, profitability, and overall financial health in the context of South Africa.

2.2 Theoretical Foundations

Historically, banks have been posited as intermediaries that channel funds from savers to borrowers, facilitating the optimal allocation of resources in the economy (Schumpeter, 1911; Jakab, 2018). However, this traditional view has been challenged by the financing model of banking, which posits that banks create deposits of new money through lending, rather than simply intermediating existing funds (Jakab, 2015). This shift in understanding underscores the transformative impact banks have on the money supply and economic dynamics, highlighting their active role in economic expansion and financial stability. This dual role of banks as both intermediaries and creators of money necessitates a nuanced approach to regulation and oversight to ensure that the benefits of banking activities are maximized while potential risks are mitigated.

Theories such as the Structure-Conduct-Performance (SCP) paradigm offer insights that highlight that the macroeconomic environment can shape the structure of banking industries, which in turn influences their conduct and performance (Mason, 1939; Loyd-Williams, 1994). This has been supported in the Spanish banking industry where changes in the macroeconomics, such as economic growth, interest rate fluctuations, and regulatory reforms, significantly influence the market structure, conduct, and performance of banks in Spain. For instance, research has shown that periods of economic expansion led to increased competition among banks, which in turn affects their pricing strategies and profitability. Additionally, regulatory changes aimed at increasing market transparency and reducing entry barriers have been found to enhance competitive dynamics, thereby impacting overall industry performance. This alignment with the SCP paradigm underscores the importance of considering macroeconomic factors when analysing the banking sector's structural and performance

outcomes, (Lloyd- Williams, 1994).

Another strand of theoretical literature emphasizes the risk-return trade-off in banking. The Modigliani and Miller theorem, albeit primarily focused on corporate finance, highlights the influence of external factors, such as interest rates, on financial institutions' capital structure decisions (Modigliani & Miller, 1958). This theorem suggests that under certain conditions, the value of a firm is unaffected by its capital structure. However, in the context of banking, the situation is more complex due to the unique risks banks face, such as liquidity risk and regulatory constraints as well as government guarantees (Aboura, 2015). By reviewing previous studies, this theoretical approach examines whether the trade-off theory holds in various contexts. Despite extensive research, economists have yet to reach a consensus on determining the optimal capital structure that would maximize firm value (Cerkezi, 2013). Overall, while the Modigliani and Miller theorem provides a foundational understanding of capital structure, its application to banks requires consideration of the sector's specific risks and regulatory environment. This nuanced understanding is critical for developing effective banking policies and practices that balance risk and return.

This section provides a brief overview of some key theoretical paradigms that tie banks' profitability to macroeconomic variables, providing theoretical foundations for this study.

a. Structure-Conduct-Performance Paradigm

The Structure-Conduct-Performance (SCP) paradigm, rooted in industrial organization theory, offers a structured approach to understanding how industry structure impacts firm behaviour, subsequently affecting overall performance (Mason, 1939). According to SCP research, a market's structure was defined by technical factors, which also had an impact on how enterprises behaved and how the market produced goods and prices. A primary objective of this work was to elucidate how prices are established in markets with imperfect competition. Bain (1959) focused on the industry or group of competing firms as the unit of analysis, instead of a single firm or the aggregate of firms across the entire economy. By doing so, he defined the scope of inquiry as the partial equilibrium analysis of a single "market," where a market is characterized by a collection of competing firms.

Two main elements of economic price theory influenced the SCP approach. The first was the theoretical analysis of atomistic, oligopolistic, and monopolistic markets. In an atomistic market, firms are price-takers, and prices should align with marginal costs. Monopolists, on the other hand, are price-setters who tend to restrict output and raise prices. The oligopolistic market was the most

complex to analyse, requiring additional assumptions to be theoretically determinate. Bain (1959) explored various potential outcomes in such markets, including explicit or tacit collusion, imperfect collusion, and open price rivalry. The second key element of price theory for the SCP program was product differentiation, which ranges from homogeneous to differentiated products. Recognizing product differentiation introduced new theoretical dimensions of pricing policies and market conduct. This theoretical groundwork aimed to bridge the gap between theory and data for SCP researchers (Panahans, 2023).

Calice et al. (2021) divide the Structure-Conduct-Performance paradigm into two perspectives: the concentration-stability view and the concentration-fragility view. The concentration-stability view posits that a less concentrated banking sector with many small banks is more susceptible to financial crises than a concentrated sector with a few large banks. Conversely, the concentration-fragility view suggests that a more concentrated banking sector increases bank fragility, as larger banks benefit from implicit "too big to fail" policies and receive subsidies.

This framework has been instrumental in shaping competition policies and regulatory perspectives in various sectors, including banking. Talpur et al. (2006) analysed the SCP model in the context of the Pakistani banking industry, specifically examining the relationship between market structure, behaviour, and the financial performance of the banking sector. The results indicate that the banking sector in Pakistan exhibits negative concentration ratios, which directly impact profitability, efficiency, and innovation.

In the context of banking, the SCP paradigm provides a conceptual lens to understand the dynamics at play between the macroeconomic environment and the structure of the industry (number of banks, market concentration, etc.), which then affects banks' behaviour (pricing, risk-taking) and eventually their profitability. Certain macroeconomic conditions, such as downturns, might lead to consolidations, altering market concentration and power dynamics within the industry. This altered structure can influence bank conduct (e.g., risk aversion during economic recessions), eventually manifesting in their performance metrics. Nitha (2015) identified the factors that determine the risk-taking behaviour of Indonesian banks, using the SCP paradigm. According to this paradigm, a bank's decision-making is influenced by the dynamics of its structure and the performance level it aims to achieve. These decisions also reflect the bank's risk preference or risk-taking behaviours.

In South Africa, for instance, the banking sector is characterized by a few dominant players (oligopolistic market), with a significant market share concentrated among the major banks (Simatele,

2015). Early in the new millennium, the South African Reserve Bank and the National Treasury jointly commissioned an investigation into the phenomena. The South African banking industry has an oligopolistic market structure with certain signs of anti-competitive activity, according to a 2004 report titled "Competition in South African Banking" by the commission (Falkena et al., 2004). The interplay between macroeconomic factors, industry structure, bank conduct, and performance form the crux of this study's exploration. Among the major factors defining industry structure include the number of banks, market concentration (measured using metrics like the Herfindahl-Hirschman Index), barriers to entry, and the presence of foreign banks.

b. Risk-Return Trade-off in Banking

Banks face the perennial challenge of balancing risks and returns. The Modigliani and Miller (MM) theorem, originally in the context of corporate finance, underscores the influence of external factors, such as interest rates, on financial institutions' capital structure decisions. These decisions subsequently shape the risk profile and profitability of banks (Modigliani & Miller, 1958). One of the MM's core propositions postulates that in an environment with no taxes, bankruptcy costs, or information asymmetry, a firm's value remains unaffected by its capital structure. Even though originally designed for general corporations, the theory's implications for the banking sector are profound.

Banks, being financial intermediaries, have unique capital structures, predominantly made up of deposits, equity, and other borrowed funds. The macroeconomic climate, especially the level of interest rates, can dictate a bank's pivot between borrowing and equity holding. For instance, during periods of low interest rates, banks might lean towards borrowing as a source of funding, given the reduced cost of debt. However, over-reliance on borrowing can escalate risks, especially if there's a swift shift in macroeconomic conditions like sudden interest rate surges or economic downturns (Berger et al., 1995). The failure of some US regional banks, such as Silicon Valley Bank (SVB), First Republic and Signature Bank in 2023, has been partly blamed on the sudden tightening of monetary policy, which has seen benchmark interest rates raised significantly in a short space of time to counter high inflation.

Furthermore, the MM theorem infers that in a perfect market, dividend policies do not impact a firm's value. In the banking context, it implies that the decisions around profit retention versus dividend distribution should not inherently alter their value. Nevertheless, external macroeconomic variables may disrupt this equilibrium. In turbulent economic times, banks anticipating potentially harsh economic conditions might opt for higher profit retention to bolster their capital reserves (safety first).

In essence, while the MM theorem offers foundational insights into capital structure decisions, the intricate relationship between these decisions and the prevailing macroeconomic conditions is pivotal. For banks, this dynamic is further complicated due to their integral role in the financial ecosystem and their vulnerability to economic shocks. As such, this study is also rooted in the MM theory, delving into how macroeconomic indicators influence banks, in terms of their capital choices and ensuing profitability.

2.3 Empirical Literature Review

a) Global Insights

On Macroeconomic Determinants

Empirically, numerous studies have underscored the significance of macroeconomic determinants on bank profitability. Bourke (1989) spearheaded a comprehensive study across 12 countries, pinpointing interest rates, inflation, and GDP growth as vital determinants of bank profitability. This observation was mirrored by Athanasoglou et al. (2008) in their examination of the Eurozone, highlighting a consistent relationship between bank performance and macroeconomic indicators like inflation and GDP growth.

In the context of developed markets, Demirgüç-Kunt & Huizinga (1999) explored internal and external determinants of bank performance in a variety of countries and found that larger banks, as well as those with more capital and fewer non-performing loans (NPL), tend to be more profitable. Their study further emphasized the negative impact of inflation on bank profitability unless this is accompanied by correspondingly high interest rates.

Akhter & Daly (2009) analysis the potential strengths and vulnerabilities of financial intermediaries in over 50 countries using panel data on selected Financial Soundness Indicators (FSIs). Their analysis demonstrates that capital adequacy, a crucial indicator of banks' financial health, is significantly influenced by the business cycle, inflation, real effective exchange rates, and industry size. Furthermore, the analysis provides evidence that banks' profitability is shaped by a combination of macroeconomic conditions, bank-specific factors, and industry characteristics, such as the business cycle, inflation, credit risk, capital adequacy, and the level of competition.

Bolt et al. (2012) added to the literature on the relationship between bank profitability and economic activity. By accounting for stronger co-movements between bank profits and economic activity during deep recessions, they found that output growth has a significantly larger impact on bank profitability

than typically reported in the literature. Loan losses are identified as the primary driver of this result among the various components of bank profit. Additionally, they found that long-term interest rates in preceding years are crucial determinants of bank profitability during periods of high economic growth.

de Mendonça & da Silva (2018) examined systemic risk in the Brazilian banking sector, focusing on the influence of accounting and macroeconomic variables on systemic risk. An analysis is performed in two steps using data from 2011 to 2015. First, systemic risk in Brazil is measured based on the ΔCoVaR framework. Second, empirical evidence from a panel data analysis is presented regarding the determinants of systemic risk, including banking and macroeconomic variables. The findings indicate that systemic risk measured using the ΔCoVaR methodology aligns with the main events reported in the Financial Stability Reports by the Central Bank of Brazil. Additionally, the empirical evidence underscores the significance of bank liquidity, profitability, leverage, and interest rates in determining systemic risk. One implication of this analysis is the necessity for prudential regulation policy to be coordinated with monetary policy to mitigate systemic risk.

Matins et al. (2019) examine how bank-specific, industry-specific, and macroeconomic factors affect the profitability of 108 real estate banks in the U.S., the U.K., and Germany from 2000 to 2014. The literature on profitability determinants of real estate banks is scarce, and few papers investigate the impact of the recent financial crisis on bank profitability. To account for the crisis effects, the years before and during the crisis are considered separately. The study concludes that bank-specific characteristics related to credit and liquidity risk, operational efficiency, total loan growth, opportunity cost, and implicit interest payments explain real estate bank profitability. Additionally, the Lerner index, interest rate volatility, and GDP significantly impact profitability. The results also indicate a significant impact of real estate price growth on the profitability of real estate banks.

Petria et al. (2015) assessed the main determinants of banks' profitability in the EU27 over the period 2004-2011. The factors influencing bank profitability are divided into two major groups: bank-specific (internal) factors and industry-specific and macroeconomic (external) factors. Bank profitability is proxied by return on average assets (ROAA) and return on equity (ROAE). The empirical findings align with the expected results. Credit and liquidity risk, management efficiency, business diversification, market concentration/competition, and economic growth all influence profitability, both on ROAA and ROAE. Notably, an interesting and valuable result is the positive influence of competition on profitability in the EU27

Sufian & Kamarudin (2012) discuss bank-specific characteristics and macroeconomic factors

affecting profitability in Bangladesh's banking sector from 2000 to 2010, using data from 31 commercial banks. Multiple regression analysis is employed to identify these determinants, utilizing the generalized least squares method with a fixed effect model, as confirmed by the Hausman test. The results highlight five key bank-specific determinants of profitability: capitalization, non-traditional activities, liquidity, management quality, and bank size. Additionally, three macroeconomic factors—GDP growth, inflation, and market concentration—significantly influence profitability.

O'Connell (2022) employed an empirically driven single equation framework incorporating the traditional Structure-Conduct-Performance (SCP) hypothesis. Utilizing the generalized method of moments technique, the analysis spans a panel of UK banks from 1998 to 2018 to account for profit persistence. The findings reveal that all bank-specific determinants, except credit risk, significantly influence bank profitability as anticipated. However, the study finds no evidence supporting the SCP hypothesis. Interest rates, particularly long-term rates, and the rate of inflation significantly impact bank profitability, while the business cycle shows an insignificant effect once other variables are considered. The results also indicate moderate profit persistence within the UK banking market, suggesting a deviation from a perfectly competitive market structure.

Emerging markets, with their unique challenges and opportunities, offer a different dimension. In their study focused on Asian banks, Dietrich & Wanzenried (2011) discovered that higher capital ratios, fewer non-performing loans, and increased GDP growth correlate with higher profitability.

On bank regulation

Ayadi et al. (2015) report that the GFC highlighted the necessity of strong regulation and supervision for a banking system that effectively channels financial resources into investments. The study contributes to the policy debate by evaluating whether adherence to international regulatory standards and protocols improves bank operating efficiency. Specifically, the study examines the impact of adopting international capital standards and the Basel Core Principles for Effective Bank Supervision (BCP). Using the Simar and Wilson (2007, J. Econ. 136(1), 31) double bootstrapping approach, the relationship between bank efficiency and regulatory compliance is analysed with data from an international sample of publicly listed banks. The findings suggest that compliance with BCP, whether overall or in its individual chapters, does not correlate with bank efficiency.

Veeramoothoo & Hammoudeh (2022) studied the influence of Basel III liquidity constraints, specifically the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR), on bank

profitability is examined using a simultaneous quantile regression framework with time-fixed effects. The analysis reveals a positive and significant relationship between LCR, NSFR, and profitability across most quantiles. However, the coefficients for LCR and NSFR are small across all profitability quantiles, indicating a minor quantitative impact on bank profitability. Further investigation shows that Basel III liquidity constraints affect banks with very low profits differently compared to those with high profitability, underscoring the importance of using a quantile approach. The coefficients are plotted to illustrate the impact of liquidity constraints across different levels of conditional profitability. Additionally, the findings indicate that small banks are more vulnerable to short-term liquidity risks (LCR), while large banks are more susceptible to medium- to long-term liquidity risks (NSFR). This suggests that liquidity regulations might need to be tailored according to bank size and profitability. Overall, the study suggests that Basel III has effectively set liquidity requirements that minimize the impact on bank profitability while reducing the likelihood of an industry-wide liquidity crisis.

Oino (2018) discusses the significance of maintaining sufficient regulatory capital since the 2008 financial crisis. It is generally believed that increased capital requirements negatively affect banks' financial performance. A study employing structural equation modelling analysed data from 4503 European banks from 2001 to 2005 to examine the interaction between tier 1 capital and financial performance. The findings indicate that banks have grown since the 2008 financial crisis, and while tier 1 capital has also increased, this rise has not kept pace with the banks' expansion. Consistent with expectations, a negative association was found between tier 1 capital and financial performance. Additionally, banks have diversified their revenue streams more than they did before 2008. In terms of efficiency, the cost-income ratio has been higher post-2008 compared to pre-crisis levels. These results suggest that regulators must consider both the expansion of banks and the increase in their capital levels when formulating policies.

a. The South African Context

South Africa has its own set of intricacies as an emerging market. Amidst its transition from apartheid to a democratic dispensation, the country's banking sector evolved rapidly, reflecting shifts in its macroeconomic landscape (Fosu, 2013). As such, given its unique economic trajectory, South Africa presents a compelling case for exploring the interplay between macroeconomic variables and banks' profitability.

Ntuli (2018) highlighted that inflation and interest rate fluctuations were critical determinants of bank profitability in South Africa. On the other hand, Van der Merwe & Botha (2015) explored the post-apartheid banking landscape and identified that banks with efficient cost management practices and

stable macroeconomic conditions demonstrated higher profitability. Their findings underscore the nuanced interplay between bank-specific strategies and the broader economic environment in South Africa.

Ozili (2021) explores the factors influencing banking sector profitability in South Africa, Nigeria, and the United States. The results indicate that cost efficiency, the size of non-performing loans, and the overhead cost ratio are crucial determinants of profitability across these regions. Specifically, in South Africa, significant determinants include the cost-efficiency ratio, overhead cost-to-total asset ratio, and non-performing loans.

Lawa et al. (2021) investigated the determinants of bank performance by examining bank-specific variables, industry-related factors, and macroeconomic influences. The analysis utilized a panel of selected banks, representing approximately 80% of total bank assets in South Africa, and employed random effects panel data analysis. Findings indicate that non-performing loans, capital adequacy, and GDP market price are primary predictors of bank performance in South Africa. Effective management of these variables is crucial for the progress of the South African banking system. The results suggest that the strength of the economy significantly impacts the profitability of banks, and that the ROA of South African banks influences economic growth as measured by the country's GDP.

Ifeacho (2014) further emphasized the influence of bank-specific variables and selected macroeconomic variables on the South African banking sector from 1994 to 2011, utilizing the capital adequacy, asset quality, management, earnings, and liquidity (CAMEL) model for bank performance evaluation. Annual data from South Africa's four largest banks—ABSA, First National Bank, Nedbank, and Standard Bank, which together hold over 70% of the country's banking assets—were analysed. Bank performance was measured using return on assets (ROA) and return on equity (ROE). The findings indicate that all bank-specific variables significantly determine bank performance. Specifically, asset quality, management quality, and liquidity positively affect both ROA and ROE, aligning with theoretical expectations. However, capital adequacy shows a significant negative relationship with ROA, while its relationship with ROE is significant and positive. Among the macroeconomic variables, interest rates (in the ROA model), unemployment rates (in the ROA model), and the inflation rate (in the ROE model) are significant. Bank performance is positively related to interest rates and negatively related to unemployment rates, while other macroeconomic variables are statistically insignificant.

While the relationship between macroeconomic factors and bank performance is well-established,

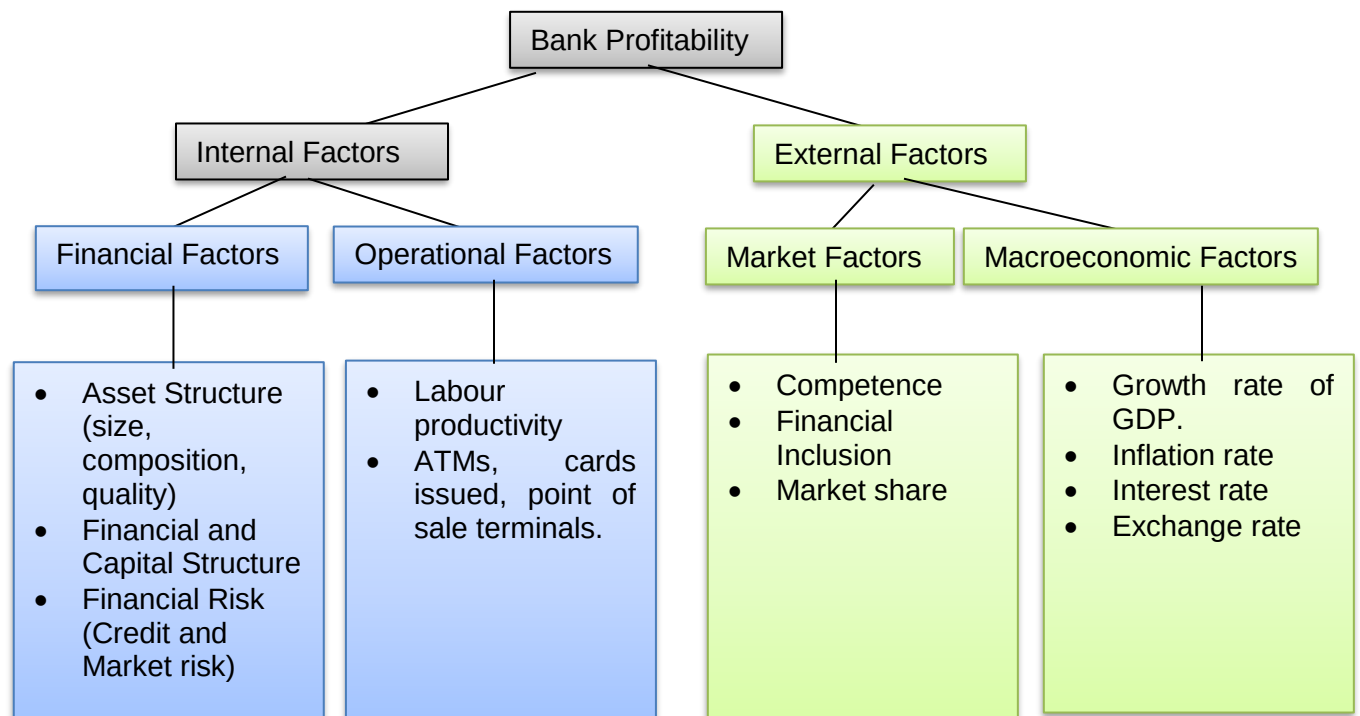
there is a discernible gap in context-specific studies, especially for countries like South Africa with distinctive and still evolving economic narratives. Moreover, the dynamic interplay between such factors in the wake of global economic shocks, such as the 2008 financial crisis and the COVID-19 pandemic, remains underexplored in the South African context.

Overall, these empirical insights, spanning different geographies and economic contexts, underscore the multifaceted relationship between macroeconomic factors and bank profitability. They collectively emphasize the need for a nuanced approach and varied methodologies in understanding this dynamic, considering both bank-specific and macroeconomic variables and different periods.

2.4 The Conceptual Framework

Bank profitability, is often measured using metrics like Return on Assets (ROA) and Return on Equity (ROE), which are influenced by a myriad of internal and external factors (Dietrich & Wanzenried, 2009). Recent research continues to emphasize these metrics, with studies showing their relevance in evaluating bank performance amid varying economic conditions (Pervan, Pelivan, & Arneric, 2015) The diagram below, a key roadmap for the study, provides a visual representation of the conceptual framework underpinning the interplay between banks' profitability and internal and external factors.

Figure 1: Tying Bank Profitability to Macroeconomic Variables



Source: Joaqui-Barandica et al (2022)

Such aspects as management quality, operational efficiency, and risk management practices are key internal determinants of banks' profitability while market factors and macroeconomic variables are crucial from an external perspective.

External Factors used in this study

- i. **Interest Rates:** Typically, higher interest rates can increase banks' net interest margins (NIM), leading to higher profitability (Demirgüç-Kunt & Huizinga, 1999). Research suggests that while an increase in interest rates can initially compress banks' NIM, in the long run, it can lead to higher profitability (Busch, 2017; Alessandri, 2012). This is due to the positive impact of the level and slope of the yield curve on profitability (Alessandri, 2012). It is important for banks to manage their exposure to interest rate risk, as changes in interest rates can have significant effects on NIM (English, 2002). However, extremely high rates might signal economic instability, potentially leading to credit defaults, and may precipitate a mismatch in Banks' assets and liabilities. Additionally, very high interest rates may disrupt the banks' traditional funding base as depositors may move their funds to alternative assets offering higher interest rates than savings accounts offered by banks.
- ii. **Inflation:** Expected inflation might be beneficial for banks if they can adjust their interest rates accordingly. Research on the impact of expected inflation on the banking sector presents conflicting views. Bordes (1991) and Sergeeva (2021) suggest that anticipated inflation can be beneficial, with Bordes finding strong support for this proposition in a test of bank data across OECD countries, and Sergeeva noting a positive trend in the banking sector's net profit in Ukraine following a decrease in inflation. However, Umar (2014) and Boyd (2001) present a more cautious view, with Umar highlighting the adverse effects of inflation on bank performance and Boyd finding a significant negative relationship between inflation and banking sector development. These studies suggest that while expected inflation may have some benefits for the banking sector, it can also pose significant challenges. However, unexpected inflation can erode the value of banks' fixed-rate assets, affecting profitability (Perry, 1992). Recent studies support this indicating that unanticipated inflation poses significant risks to banks' financial stability by impacting their asset valuations and interest margins (Abaidoo & Anyigba, 2020)
- iii. **Economic Growth:** An expanding economy usually denotes more business opportunities, leading to increased lending and other banking activities, thus positively influencing bank profitability (Athanasoglou et al., 2008). A profitable banking sector is crucial for economic growth, particularly in small banking sectors (Dahiya & Kumar, 2020). However, the impact of bank profitability on economic growth is short-lived, with past profitability levels exerting a negative influence (Klein, 2018). Factors such as credit risk, loan concentration, capitalization, income sources, and operational expenses also

play a role in bank profitability (Sufian, 2009).

- iv. **Exchange Rates:** For countries with significant foreign exchange exposures, fluctuations in exchange rates can impact banks' asset values, especially if they hold foreign-denominated assets or liabilities (Choi & Elyasiani, 1997). Reem (2004) and He (2014) both found that large U.S. commercial banks are exposed to foreign exchange risk, with the latter suggesting that this risk can be mitigated through portfolio adjustments. Wong (2009) further highlighted the positive relationship between bank size and foreign exchange exposure, particularly in the case of Chinese banks. Agarwal (2018) expanded on this by demonstrating that banks' net foreign currency exposure can act as a transmission channel for exchange rate shocks to the real economy, with a potential impact on credit supply and investment.

Internal Factors used in this study

- v. **Capital and financial structure:** The financial structure of a bank encompasses all the ways a bank finances its assets. This includes both liabilities and equity. The capital structure specifically refers to the mix of a bank's equity and long-term debt used to finance its operations and growth. It is a subset of the financial structure. The capital structure of a bank consists of various layers or tiers of capital that are designed to absorb losses in different scenarios. This structure is important for maintaining financial stability and meeting regulatory requirements. Under the Basel III framework, total Capital Adequacy refers to a bank's ability to absorb losses, covering the sum of various types of capital. The total capital ratio is calculated as the ratio of the bank's total regulatory capital to its risk-weighted assets (RWAS). The components of total capital include Tier 1 capital which consists of CET1 and Additional tier 1 (AT1) capital. CET1 includes common equity such as common shares and retained earnings. AT1 includes instruments that are subordinated, have no fixed maturity, and can absorb losses (like contingent convertible bonds). Tier 2 Capital. This includes subordinated debt and other instruments that are less secure than Tier 1 capital but can still absorb losses in the event of a bank's insolvency (Basel III framework, 2010).

A range of studies have explored the impact of bank regulation on bank profitability. Mahmud (2022) found that stringent capital requirements and strict information disclosure regulations have a positive effect, while regulations on problem institutions and exit have a negative impact. Naceur (2010) highlighted the positive influence of bank capitalization and credit risk on profitability, and the impact of regulatory and institutional variables. Agoraki (2017) identified higher capital requirements, market discipline, and restrictions on banking activities as factors contributing to better bank performance. Alam (2013) further emphasized the significant impact of capital regulations on bank efficiency, particularly in Islamic banks. These findings collectively suggest that certain types of bank regulation

can enhance bank profitability.

- vi. **Market Share:** The primary indicator is the total assets which size of the bank's balance sheet, including loans, deposits, and investments. The banking sector in South Africa is characterized by a high degree of concentration, with a few large banks holding most of the market share. Since the discovery of minerals in the 1860s, British imperial banks have played a dominant role in the industry. The profits these banks generated were often reinvested to expand their size through the acquisition of local banks, further consolidating their market position (Jones, 1998). Since 1994, the four largest banks in South Africa have faced growing competition from foreign banks and niche players. With the entry of foreign banks, the market share of these top four banks decreased from 84% in 1994 to 75% in 2001 (Hawkins, 2004). However, following a period of failures and acquisitions of many small and medium-sized banks after 2002, the market share of the four largest banks rose again to over 80%, where it has remained (Simatele, 2015). Despite this, foreign banks and niche players continue to compete. Industry concentration is often assessed using the Herfindahl-Hirschman Index (HHI), which considers both the number of banks and their size distribution based on total assets. The index is computed by squaring each bank's market share and then summing these squared values (SARB 2011a).

2.5 Conclusion of the Literature Review

The intricate relationship between macroeconomic determinants and the performance of banks has been a topic of sustained academic interest, with its implications resonating profoundly for various stakeholders ranging from policymakers to bank executives. The theoretical foundations, anchored by seminal works such as Schumpeter's perspective on banks as economic intermediaries and the Modigliani and Miller theorem on capital structure decisions, provide a conceptual lens to understand the dynamics at play.

Empirical studies, both global and specific to South Africa, further validate the influence of macroeconomic variables on bank profitability. While global insights offer a comprehensive understanding of the determinants, the South African context underscores the need for a nuanced exploration tailored to its specific challenges and opportunities, shaped by its unique historical, socio-political, and economic trajectory. However, gaps remain in the existing literature, particularly in understanding how macroeconomic factors affect bank performance in South Africa in a more contemporary setting. Specifically limited South Africa-specific studies and the impact of regulatory frameworks in emerging markets.

As the global financial landscape becomes more interconnected and interdependent, understanding the synergetic relationship between banks and broader economic conditions is paramount. In the South African context, the intricate interplay between macroeconomic factors, especially in the aftermath of significant global economic events, remains an area ripe for deeper exploration. This study aims to bridge some of these gaps, contributing to both the academic discourse and offering updated practical insights to navigate the ever-evolving banking and macroeconomic landscapes in South Africa.

3 CHAPTER 3: DATA AND RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used to explore the influence of selected macroeconomic variables on the profitability of South African commercial banks. It establishes the foundation for achieving the research aims, answering questions, and achieving objectives, paving the way for the ensuing data analysis and findings. A quantitative research approach is chosen due to its capability to discern quantitative relationships between variables. The data sourcing phase is then discussed, emphasizing the study's reliance on esteemed institutions like the SARB to ensure data integrity. The chapter then sheds light on the econometric techniques and analytical tools, such as panel regression models, that will be employed to quantitatively address the research questions. It also specifies the metrics for measuring variables like bank profitability about macroeconomic factors.

3.2 Data Sources

The study employs secondary data primarily sourced from the SARB, Bloomberg, or Refinitiv DataStream and individual annual reports of selected commercial banks operating in South Africa. Macroeconomic data, such as GDP growth, exchange rates and interest rates, are obtained from the World Bank database and SARB. In 2023 there were 14 locally controlled banks, 4 foreign-controlled banks, 3 mutual banks, 12 foreign branches with registered branches, and a further 30 with representative offices, among these 7 are listed on the JSE (South African Reserve Bank, 2023). All listed banks in South Africa between 1994 to 2023 will be considered for the study. However, due to data availability constraints, only 6 banks were analysed, as they had comprehensive data over the study period. The below table indicates the banks that were considered for the study and identifies the six banks that had the necessary data analysis.

Table 1: Locally controlled commercial banks

No.	Bank name	Listed on JSE	Analysed in Study
1.	Absa Bank Limited	Yes	Yes
2.	African Bank Limited	No	No
3.	Bidvest	No	No
4.	Capitec Bank Limited	Yes	Yes
5.	Discovery Bank Limited	Yes	No
6.	FirstRand Limited	Yes	Yes
7.	Grindrod Bank Limited	No	No
8.	Investec	Yes	Yes
9.	Ithala	No	No
10.	Nedbank	Yes	Yes
11.	Sasfin Bank Limited	No	No
12.	The Standard Bank of South Africa Limited	Yes	Yes
13.	Tyme Bank Limited	No	No
14.	Ubank	No	No

Source: South African Reserve Bank

3.3 Data Type and Period

The research utilizes panel data collected on an annual basis, covering a period from 1994 to 2022. This timeframe is chosen to capture the evolution of the South African banking sector post-apartheid and amidst global economic changes, such as the 2008 financial crisis and the COVID-19 pandemic.

3.4 Econometric Techniques

The study employs panel data regression techniques to quantitatively model the relationship between macroeconomic factors and bank profitability. Panel data captures both cross-sectional and time-series variations, which allows for controlling variables that change over time but not across entities or those that change across entities but not over time (unobserved heterogeneity). This is relevant to the current study to capture data across multiple entities (banks) over several periods. Additionally, using panel techniques can help mitigate potential biases in Ordinary least square (OLS) regression

due to omitted variables (Wooldridge, 2010). Pooled regression, Random Effects (RE), and Fixed Effects (FE) are among the most common panel data analysis models, but their general framework is the same:

$$y_{it} = \alpha + \beta' X_{it} + u_{it}$$

Where:

- y_{it} : Dependent variable (bank profitability measure) for entity i at time t
- X_{it} : Vector of independent macroeconomic variables for entity i at time t
- β' : Vector of coefficients indicating the impact of each independent variable on the dependent variable.
- u_{it} : Error term for entity i at time t capturing unobserved effects.

The study will estimate three panel regression models for each metric of profitability (ROA, ROE, and NIM). This will provide a framework for determining whether the impact of a given macroeconomic determinant is consistent across the different proxies for profitability. The general form of each model is as follows:

i. **Model for ROA:**

$$ROA_{it} = \alpha + \beta' X_{it} + u_{it}$$

ii. **Model for ROE:**

$$ROE_{it} = \alpha + \beta' X_{it} + u_{it}$$

iii. **Model for NIM:**

$$NIM_{it} = \alpha + \beta' X_{it} + u_{it}$$

In each of these models, X_{it} remains consistent, encompassing the selected macroeconomic variables which is interest rates, exchange rate and GDP growth. The differences in coefficients β_s across the three models will shed light on how these macroeconomic variables differently influence each profitability metric.

3.5 Metrics of Profitability Measurement

Assessing a bank's financial performance necessitates an in-depth examination of its profitability metrics. These metrics, grounded in empirical literature, provide nuanced insights into the financial health and efficiency of banks, making them essential for addressing the study's objectives. A range of profitability metrics have been identified as key indicators of a bank's financial performance. Charitou et al. (2019) found that ROA, NIM, and losses significantly impact a bank's financial soundness. Căruntu (2008) emphasized the importance of profitability in achieving the primary goal

of maximizing profit while minimizing risk. Brindadevi (2013) highlighted the role of profitability in assessing the efficiency and effectiveness of a bank's operations, with a focus on interest spread, net profit margin, return on long-term funds, return on net worth, and ROA. Bikker (2010) underscored the complexity of measuring bank performance and the need for high-quality indicators, suggesting that a combination of these indicators may provide a more robust assessment.

Ongore & Kusa (2013) studied the determinants that affect the performance of commercial banks in Kenya. They used ROE, ROA and NIM as the bank performance indicators whereas capital adequacy, management efficiency, asset quality and liquidity as the internal factors and GDP growth rate and inflation rate as external factors for the study.

Profitability will be measured using the following key metrics:

- a. **Return on Assets (ROA):** ROA offers insights into how efficiently a bank utilizes its assets to generate earnings (Olson & Zoubi, 2008). By gauging net income against average total assets, ROA is a pivotal metric, especially when exploring the impact of macroeconomic variables on asset utilization and profitability.

Equation 1:

$$ROA_{it} = \frac{Net\ Income_{it}}{Average\ Total\ Assets_{it}}$$

A review of studies by Fethi (2009) highlights the use of operational research and artificial intelligence techniques in assessing bank performance, with data envelopment analysis being the most widely applied technique. Hidayat et al. (2022) and Sukmadewi (2020) both emphasize the importance of ROA in evaluating bank performance, with Hidayat et al. (2022) specifically noting the impact of NIM, Operating Costs to Operating Income (BOPO), Loan to Deposit Ratio (LDR), and NPL on ROA. Sukmadewi (2020) further underscores the significance of Capital Adequacy Ratio (CAR), LDR, BOPO, NPL, and NIM in influencing ROA. These studies collectively support the use of ROA as a key metric in assessing bank performance

A range of studies have consistently identified ROA as a key indicator of bank performance across different banking environments. Hossain (2017) found ROA to be significant in determining bank profitability in Bangladesh, with factors such as earnings, asset quality, and management

efficiency also playing a role. Similarly, Bakar (2009) and Ifeacho (2014) both highlighted the importance of ROA in predicting bank performance, with Bakar (2009) using it as a dependent variable in a predictive model and Ifeacho (2014) identifying it as a significant determinant of bank performance in South Africa. Obeid (2023) further emphasized the relevance of ROA, particularly in the context of Arab countries, where it was found to be influenced by bank-specific variables and macroeconomic factors

- b. **Return on Equity (ROE):** ROE measures the returns generated on shareholders' equity (Dietrich & Wanzenried, 2011). Given the study's focus on macroeconomic impacts, understanding the efficiency with which shareholder funds are used under varying economic conditions becomes paramount.

Equation 2:

$$ROE_{it} = \frac{Net\ Income_{it}}{Average\ Shareholder's\ Equity_{it}}$$

ROE is a key performance measure in the banking industry, but its reliance can lead to excessive risk-taking (Moussu, 2014). While it provides a summary of performance, it does not offer a comprehensive understanding of how and why performance is achieved (Karr, 2005). The quality of assets and earnings ability are significant determinants of ROE in commercial banks (Sayani, 2017). However, using ROE alone to predict portfolio performance may not guarantee higher returns (Ahsan, 2013).

ROE is a widely used metric in the banking sector, but its effectiveness as a performance measure has been questioned. Moussu (2017) and Moussu (2014) both found that pre-crisis ROE is a strong predictor of bank risk during financial crises, suggesting that it may incentivize excessive risk-taking. However, Sukmadewi (2020) found that ROA, a measure of profitability, is a better indicator of financial performance in the banking industry. Karr (2005) also emphasized the need for a more comprehensive performance measurement system in banking, beyond just ROE.

- c. **Net Interest Margin (NIM):** NIM is especially relevant for a study centered on commercial banks, as it directly relates to the core lending and borrowing operations (Maudos & Fernández de Guevara, 2004). Assessing how interest incomes and expenses fluctuate with

changing macroeconomic variables can offer invaluable insights into banks' operational profitability.

Equation 3:

$$NIM_{it} = \frac{Interest\ Income_{it} - Interest\ Expense_{it}}{Average\ Earning\ Assets_{it}}$$

NIM is a crucial measure of a bank's profitability and efficiency, influenced by factors such as the proportion of current account and savings account deposits, operating costs, and the size of the loan book (Barik, 2019). A healthy NIM is essential for maximizing shareholder returns and profitability (Silva, 2020). However, the relationship between NIM and non-traditional banking activities is complex, with potential negative impacts on risk-adjusted profitability (Nguyen, 2012). NIM also plays a role in assessing a bank's ability to cover its depreciated assets, with implications for capital adequacy (Marpaung, 2018).

Research has consistently highlighted the significance of the NIM as a critical performance metric in European banks. Hanzlík (2019) and Căpraru (2015) both found that NIM is negatively influenced by factors such as market concentration and bank size, while Jílková (2022) identified a positive relationship between NIM and inflation and GDP growth. Saunders (2000) further emphasized the impact of regulatory components, market structure, and risk premium on NIM. These findings collectively underscore the broader applicability of NIM as a key determinant of bank profitability in the European banking sector

3.6 Conclusion of the Methodology

This chapter has laid out the research methodology that underpins the current research, striving to uncover the intricate dynamics between selected macroeconomic factors and the financial performance of commercial banks in South Africa using panel data analysis. The foundation of the study is cemented in a quantitative research approach, justified by its inherent capability to discern quantitative relationships, especially pivotal when exploring multifaceted relationships between many variables.

By estimating three distinct panel regression models for each profitability metric, the research aims to provide a robust and comprehensive analysis that addresses the existing gaps in the literature to provide a multi-dimensional perspective on bank profitability, especially within the South African context. This approach not only heightens the study's thoroughness but also aligns seamlessly with

its objectives, ensuring a holistic exploration of the chosen topic.

4 RESULTS

4.1 Introduction

This chapter details the results of the analyses from the methodology described in the previous chapter. Section 4.2 provides the summary statistics of the collected data from JSE listed Banks (Group) and the descriptive statistics. Section 4.3 discusses the findings of the research done to determine if there is a relationship between the Macroeconomic determinants and bank profitability. Section 4.4 completes the chapter by providing a conclusion.

4.2 Summary statistics of the collected data from JSE-listed banks

Table 2 provide the summary statistics of collected data from JSE-listed Banks (Group) from 1994 to 2022 for 6 Banks. Among these banks, 4 of them operate as a group of companies and two operate as sole banks. All estimations, including the pooled, random effects (RE), and fixed effects (FE) models, were conducted using **Stata**. Stata's robust econometric capabilities were utilized to ensure accurate estimation and analysis, particularly with respect to panel data methodologies. The software provided tools for handling variable transformations, conducting model diagnostics, and obtaining reliable standard errors.

The returns on assets (ROA) and equity (ROE) were adjusted for inflation to reflect real terms, ensuring that the profitability measures account for changes in purchasing power over time. This transformation excludes inflation as a separate macroeconomic determinant in the model. Variables such as the Net Interest Margin (NIM) ratio, which displayed high variability, were examined for potential outliers. Any extreme values identified were assessed to determine their influence on the overall results, with appropriate adjustments made where necessary.

Table 2 shows the summary of the descriptive statistic of each independent and dependent variable. The tables consist of the number of observations, means, standard deviation and minimum values for the observations. For Banks and Groups together, the average real return on Assets is -3.75 which indicates that on average, the return on asset is negative across the sampled banks, suggesting potential challenges in asset utilization or profitability. The real return on equity is 12.82 percent indicating overall profitability for the equity holders of these banks. The capital adequacy rate is 18.55 and 18.23 percent for the Group and the Bank respectively indicate a strong capital adequacy ratio

at group and bank level suggesting a stable capital base to risk-weighted assets. The NIM ratio has an average of 8.06 percent which suggests an average positive net interest margin, indicating banks are profitable in terms of lending activities. The NIM ratio has the largest standard deviation than the average, this variable could have potential outliers, which will be explored further before further estimations. CET1 for the Groups and the Banks has an average of 18.06 and 17.70 percent respectively. For macroeconomic variables, the average exchange rate is 9.60 percent, the growth rate of 2.40 percent, and the real interest rate average is 5.10 percent.

Table 2. Descriptive Statistics of sampled Banks and Group data

Variable	Obs	Mean	Std. Dev.	Min	Max
RROA	166	-3.752	3.222	-9.403	10.718
RROE	166	12.826	6.502	-12.745	27.52
Gcapital Adequacy	90	18.545	8.43	10.1	43.1
Bcapital Adequacy	76	18.234	9.339	7.2	42.5
NIM Ratio	167	8.547	23.378	1.001	156.728
CET1-Group	52	18.056	9.569	8.3	42.1
CET1-Bank	52	17.704	9.214	8.3	41.5
Exchange-rate	168	9.568	3.968	3.552	18.441
Growth-rate	166	2.398	2.379	-6.342	5.604
Real-Interest-rate	164	5.104	2.73	.508	12.691

Source: Author's self-computations:

4.3 Findings of the research done to determine if there is a relationship between the Macroeconomic determinants and bank profitability

Table 3 presents the correlation between dependent variables and independent variables. The results show a positive association between real returns on assets and all other variables apart from real interest rate. Real returns on assets correlation is not significant for real exchange rate and GDP growth. While real returns on equity is positively correlated with all variables with exception of the NIM Ratio and real interest rates. In the case of the third dependent variable NIM Ratio is highly correlated with CET1 for both group and banks, however, it is not expected to cause the problem, since none of them is included on the right-hand side of the estimation in this study. CET1 for both groups and banks is highly correlated with the capital adequacy ratio for banks and groups, which could potentially damage the estimates therefore caution will be taken during estimation to control such possibilities. The results will be estimated with these variables independently.

Table 3. Pairwise correlations of dependents and other covariates

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) RROA	1.000									
(2) RROE	0.411*	1.000								
(3) Gcapital-Adequacy	0.670*	0.422*	1.000							
(4) Bcapital-Adequacy	0.666*	0.484*	0.973*	1.000						
(5) NIM-Ratio	0.614*	-0.019	0.909*	0.916*	1.000					
(6) CET1Group	0.799*	0.643*	0.980*	0.969*	0.902*	1.000				
(7) CET1Bank	0.784*	0.667*	0.970*	0.972*	0.895*	0.993*	1.000			
(8) Exchange-rate	0.070	-0.158*	0.106	0.080	-0.081	0.046	-0.042	1.000		
(9) Growth-rate	0.088	0.280*	-0.095	-0.135	0.145	-0.052	0.016	-0.458*	1.000	
(10) Real-Interest-rate	-0.226*	0.037	-0.210*	-0.098	-0.012	0.024	0.014	-0.559*	0.086	1.000

Source: Author's self-computations: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4 depicts the panel data estimate for the three dependent variables (real returns on assets, equity and NIM-Ratio) all estimated using the random Effect (RE) and fixed effect (FE) specifications. Columns 1 and 2 provide real returns on Assets estimated using Random effect and Fixed effect specifications. Look at the variables of interest (macroeconomics), none of the variables is statistically significant in explaining real returns on assets for these 6 banks. However under RE specification. The capital adequacy ratio and CETI are positive and statistically significant at 5 and 1 percent levels in explaining real returns on assets for the banks. For every one percent increase in the capital adequacy ratio, real excess returns increase by 0.1 percent, holding all else constant.

Similarly, a one percent increase in CET1 results in real returns on assets increasing by 0.14 percent, implying that a stronger equity (Common Equity Tier 1) base enhances asset returns, potentially due to reduced risk perception among investors and creditors. However, the effect on ROE is negative and significant in the fixed effects model (-0.335), which might indicate that higher CET1 could limit leverage, reducing equity returns. This dual effect highlights the complex trade-off between financial stability and profitability.

Considering the real returns on Equity (Columns 3 and 4), economic growth and real interest rate have a positive and statistically significant influence on excess returns at a 1 percent level. In terms of size, a one percent increase in output growth will result in a 0.55 percent increase in returns on equity under the RE specification and a 0.63 percent increase under the FE specification, implying that banks benefit from economic expansion through increased lending opportunities, reduced loan defaults and overall growth in financial activities. In terms of real interest rate under RE specification, a one percent increase in increases excess real returns on equity by 0.74 percent, which is statistically significant at a 1 percent level, suggesting that higher real rate benefit equity returns, potentially through enhanced interest income. While under FE specification, a one percent increase in real interest rates increases excess returns of banks by 0.73 percent which is statistically significant

at the 10 percent level . CET1 under the FE model has a negative effect on real returns on equity. A one percent increase in CET1 decreases returns on equity by 0.34 percent which is statistically significant at 5 percent.

Lastly, the NIM-Ratio (Columns 5 and 6) is positively influenced by capital adequacy ratio, CET1 and negatively influenced by exchange rate and output growth in terms of macroeconomic drivers under both RE and FE specification. Under RE, a currency appreciation will result in a 0.39 percent decrease in NIM-Ratio which is significant at a 10 percent level. Whereas a one percent increase in output growth results in a 0.18 percent increase in NIM-Ratio, which also is statistically significant at a one percent level. In the case of other covariates, the capital adequacy rate and CET1 positively and significantly influences NIM-Ratio. A one percent increase in capital adequacy increases NIM-Ratio by 0.53 percent. While a one percent increase in CET1 increases NIM-Ratio by 0.16 percent. Under FE specification, capital adequacy ratio, CET1, and output growth are statistically significant in explaining NIM-Ratio. A one percent increase in output growth results in a 0.18 percent increase in NIM-Ratio, which is statistically significant at a 5 percent level. In the case of other covariates, capital adequacy rate and CET1 positively and significantly influences NIM-Ratio. A one percent increase in capital adequacy increases NIM-Ratio by 0.51 percent. While a one percent increase in CET1 increases NIM-Ratio by 0.20 percent. In the case of model fit, the results fit the data well, with the exception of returns on equity under fixed effect specification (column 4) where the covariates only explain a 25 percent variation in equity real returns.

Table 4. Estimated results for Real returns on Assets, Equity and NIM Ratio at a Bank level

VARIABLES	(1) ROA-RE	(2) ROA-FE	(3) ROE-RE	(4) ROE-FE	(5) NIM-Ratio-RE	(6) NIM-Ratio-FE
Bcapital Adequacy	0.066** (0.027)	-0.092 (0.110)	0.057 (0.482)	-0.213 (0.191)	0.532*** (0.038)	0.512*** (0.057)
CET1Bank	0.142*** (0.028)	-0.004 (0.030)	0.344 (0.503)	-0.335** (0.100)	0.156*** (0.026)	0.198* (0.063)
Exchange rate	0.023 (0.051)	0.047 (0.031)	-0.121 (0.158)	-0.016 (0.120)	-0.388* (0.209)	-0.407 (0.254)
Growth rate	-0.104 (0.066)	-0.069 (0.049)	0.550*** (0.043)	0.629*** (0.048)	-0.183*** (0.041)	-0.181** (0.036)
Real Interest rate	-0.105 (0.132)	-0.116 (0.111)	0.743*** (0.214)	0.731* (0.307)	0.440 (0.424)	0.443 (0.447)
Constant	-6.547*** (0.949)	-0.723 (2.443)	4.824 (3.515)	21.654* (7.770)	-3.563** (1.541)	-3.655** (0.882)
Observations	47	47	47	47	47	47
Number of id	4	4	4	4	4	4
Overall-R2	0.664	0.505	0.525	0.251	0.906	0.905

Source: Author's computation: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10

Table 5 shows the panel data results for the three dependent variables (real returns on assets, equity and NIM-Ratio) at a group level, using the random Effect (RE) and fixed effect (FE) specifications. Columns 1 and 2 provide real returns on Assets estimated using Random effect and Fixed effect specifications. In the case of macroeconomic variables, only economic growth is positive and statistically significant in explaining real returns on assets for these groups. However under RE and FE specification (columns 1 and 2), a one percent increase in output growth, real returns on assets increase by 0.12 and 0.11 percent, holding all else constant. CETI is positive and statistically significant at a 10 percent level in explaining real returns on assets for groups. For every one percent increase in CET1, real excess returns increase by 0.13 and 0.14 percent respectively, holding all else constant under RE and FE respectively.

Considering the real returns on Equity (columns 3 and 4), economic growth and real interest rate have a positive and statistically significant influence on excess returns at 1 and 5 percent levels. In terms of magnitude, a one percent increase in output growth will result in a 0.73 percent increase in returns on equity under the RE specification and a 0.66 percent increase under the FE specification. In terms of real interest rate, it is only significant under the RE specification, where a one percent increase increases excess real returns on equity by 0.92 percent, which is statistically significant at the 5 percent level. All other covariates (capital Adequacy and CET1 and exchange rate are not statistically significant in explaining real returns on equity at a group level).

For NIM-Ratio variable (Columns 5 and 6) is positively influenced by the capital adequacy ratio, and positively influenced by real interest rate in terms of macroeconomic drivers under RE specification.

Under RE, a one percent increase in real interest rate will result in a 0.95 percent increase in NIM-Ratio which is significant at a 5 percent level. In the case of other covariates, the capital adequacy rate positively and significantly influences NIM-Ratio. A one percent increase in capital adequacy increases NIM-Ratio by 0.55 percent.

Under FE specification, the capital adequacy ratio is positive and statistically significant in explaining NIM-Ratio. A one percent increase in capital adequacy increases the NIM ratio by 0.73 percent. None of all other macroeconomic variables coupled with financial drivers are significant. In the case of model fit, the results fit the data well, with the exception of returns on equity under fixed effect specification (column 4) where the covariates only explain 47 percent variation in NIM-Ratio.

Comparison with previous literature

Our results are consistent with those of Bourke (1989) & Athanasoglou et al. (2008) who showed that macroeconomic factors play a crucial role in explaining bank profitability. For bank capital adequacy and profitability, the results in this research support a positive relationship between capital adequacy and profitability, as capital buffers reduce risk and allow for greater investment in profitable assets, this is consistent Akhter & Daly (2009) findings. However, some studies in highly leveraged or competitive markets report weaker relationships, suggesting the context (e.g., regulatory environment, risk appetite) may influence the strength of this effect . Bolt et al. (2012) support the positive and significant influence of output growth effect on bank profitability observed here, as growth generally expands lending and investment opportunities for banks , enhancing profitability. Moreover, Sufian & Kamarudin (2012) corroborate our finding in terms of the impact of economic growth.

Studies often report a positive impact of real interest rates on bank profitability due to increased interest income from loans. The positive relationship between the real interest rate and ROE is consistent with this, as higher rates increase returns on equity. However, variations in impact across profitability metrics suggest that real interest rates may not uniformly affect all aspects of bank performance

Table 5. Estimated results for Real returns on Assets, Equity and NIM Ratio at a Group level

VARIABLES	(1) ROA-RE	(2) ROA-FE	(3) ROE-RE	(4) ROE-FE	(5) NIM-Ratio-RE	(6) NIM-Ratio-FE
Capital Adequacy	0.067 (0.058)	0.062 (0.057)	0.331 (0.298)	-0.009 (0.259)	0.552** (0.216)	0.727*** (0.206)
CET1Group	0.133* (0.068)	0.140* (0.068)	0.052 (0.345)	0.455 (0.306)	0.113 (0.270)	-0.096 (0.253)
Exchange rate	0.056 (0.119)		0.235 (0.187)		-0.224 (0.138)	
Growth rate	0.116* (0.060)	0.114* (0.059)	0.729*** (0.226)	0.660** (0.269)	-0.005 (0.257)	0.187 (0.331)
Real Interest rate	0.117 (0.244)		0.919** (0.449)		0.949** (0.450)	
Constant	-7.856*** (1.518)	-6.772*** (0.185)	-1.025 (2.719)	5.197*** (1.131)	-7.291*** (2.230)	-6.828*** (0.836)
Observations	50	50	50	50	50	50
id	17	17	17	17	17	17
Overall-R2	0.681	0.656	0.527	0.472	0.907	0.866

Source: Author's computation: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10

4.4 Conclusion

The results show that macroeconomic variables (output growth and real interest rate) have a positive influence on bank profitability (real return of equity) at a group level but not under returns on equity at a bank level. In the case of NIM-Ratio, exchange rate and output growth influence it negatively. The exchange rate only influences NIM-Ratio negatively and none of the other measures of profitability. In terms of other control variables, Total bank capital adequacy and CET1 are found to influence ROA, NIM-Ratio positively under both model specifications. Thus, it is important to consider these variables when thinking about shareholders' returns and firm profitability.

When considered as a group, the results show that output growth significantly influences the group profitability positively for real ROA and ROE but not with NIM-Ratio. Real interest rate influences group profitability (ROE and NIM-ratio) under the random effect model. For other control variables, CET1-group and total capital adequacy influence group profitability, however, the total capital adequacy only influences NIM-Ratio positively, while CET1 only drives real returns on equity. This result suggests that macroeconomic drives play a significant role in role in bank and group profitability in a South African context. Therefore, policymakers should pay special attention when designing sector strategies and being cognisant of the influence of macroeconomic factors on the profitability of these institutions.

5 CONCLUSION

This study examined how selected macroeconomic indicators, namely interest rates, exchange rates, and GDP growth, have historically influenced the performance of commercial banks in South Africa. Additionally, it investigated the extent to which regulatory frameworks in South Africa amplify or attenuate the effects of these macroeconomic factors on bank performance.

The analysis revealed several key findings. First, macroeconomic variables (output growth and real interest rate) have a positive influence on bank profitability (real return of equity) at a group level but not under returns on equity at a bank level. In the case of NIM-Ratio, exchange rate and output growth influence it negatively. The exchange rate only influences NIM-Ratio negatively and none of the other measures of profitability. Second, when considered as a group, the results show that output growth significantly influences the group profitability positively for real ROA and ROE but not with NIM-Ratio. Real interest rate influences group profitability (ROE and NIM-ratio) under the random effect model.

Furthermore, the study found that regulatory frameworks like the Basel III framework play a crucial role in modulating the effects of these macroeconomic factors. Stricter capital requirements and enhanced supervisory practices were observed to buffer banks against adverse macroeconomic conditions, thereby stabilizing performance.

Implications for Investors: the results suggest that well-capitalized banks with strong CET1 ratios are more resilient to economic fluctuations, which could be beneficial for long-term investments. Investors might prioritize banks with higher capital adequacy, as these banks are better positioned to sustain profitability during economic downturns. Additionally, the positive link between economic growth and ROE highlights the potential for higher returns in periods of economic expansion, which can guide investors' timing and asset allocation strategies.

For banking institutions, the findings emphasize the importance of maintaining strong capital buffers, especially under regulatory frameworks like Basel III. Higher capital adequacy and CET1 ratios not only help banks meet regulatory requirements but also enhance profitability, particularly in challenging economic environments. Banks may benefit from strategic capital planning to align with macroeconomic conditions and improve profitability metrics such as ROA and NIM. Furthermore, the negative impact of exchange rate fluctuations on NIM suggests that banks with significant foreign exposure should adopt effective hedging strategies to manage currency risk.

Policymakers and Regulators: The study's findings reinforce the need for adaptive regulatory

frameworks that balance financial stability with flexibility. Policymakers should consider the dynamic interplay between macroeconomic conditions and regulatory measures, such as capital requirements, to foster a robust and resilient banking sector. The evidence that capital adequacy positively influences profitability highlights the role of regulatory capital standards in supporting bank performance. However, policymakers should also be cautious about imposing overly stringent requirements that may constrain lending capacity, especially during economic downturns.

This study contributes to the literature on the relationship between macroeconomic factors, regulatory frameworks, and bank performance in emerging markets like South Africa. Researchers could expand on these findings by exploring how evolving macroeconomic trends, such as digital transformation and climate-related financial risks, interact with bank performance. Future studies might also consider additional control variables, given that data limitations restricted their inclusion in this analysis. Comparative studies across different geographical contexts and regulatory environments could further deepen the understanding of these complex relationships.

One limitation of this study is its historical focus, which may not fully capture future macroeconomic and regulatory shifts. Future research could explore the evolving impacts of emerging macroeconomic trends and regulatory innovations on bank performance. Additionally, due to data limitations other control variables could not be used.

In conclusion, this study contributes to the understanding of how macroeconomic indicators and regulatory frameworks interact to shape the performance of commercial banks in South Africa. By highlighting the complex and multifaceted nature of these relationships, it underscores the importance of adaptive and balanced regulatory approaches to ensure the stability and profitability of the banking sector amidst macroeconomic fluctuations.

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