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A DISSERTATION SUBMITTED TO THE FACULTY OF COMMERCE, LAW, AND MANAGEMENT, UNIVERSITY OF THE WITWATERSRAND, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF MANAGEMENT IN FINANCE AND INVESTMENTS

Title: The impact of risk factors on the commercial banking sector's financial performance in South Africa.

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DEDICATION

I want to dedicate this study project to my late mother, Ms. C. Mberikwazvo, who encouraged me to further my studies, the entire family their support and patience, and my beloved husband, who is my pill of strength.

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There used to be an old saying that states, "a job well began is a job half-done," and I thank the almighty God for granting me the strength to face all educating activities with an optimistic mind ability to complete the dissertation successfully. I appreciatively acknowledge the cooperative comments, professional guidance, and propositions from my supervisor Dr. Blessing Mudavanhu. I am not forgetting the Chiyengerere and Chikede family for offering me the support that I could not even visualize in the history of my life. I wish to express gratitude to dear colleagues for their valuable ideas.

ABSTRACT

Banks face numerous financial and non-financial risks in their operations, and the banking sector plays a positive role in the country's economy. This study aims to find the impact of risk factors on the South African banking sector's financial performance. Fixed effects model was selected estimated together with Panel EGLS (cross-section SUR) to account for cross-sectional heteroscedasticity and correlation. Using annual frequency data from South Africa's systematic important financial institutions (SIFI's) banks, namely, ABSA, FirstRand Bank, Nedbank, Capitec, Investec, and Standard Bank. Return on capital employed (ROCE) and net interest margin (NIM) were bank performance measures. The study results showed that capital adequacy ratio, loan to deposit ratio, liquidity ratio, and unemployment are statistically significant determinants of bank performance measured by ROCE. Whereas GDP, nonperforming loans ratio and capital adequacy ratio are statistically significant to bank performance measured by net interest margin. The study concludes that credit risk, liquidity risk, solvency risk, and market risk factors are fundamental factors in determining South African commercial banks' profitability and financial performance. Therefore, banks have to present an appropriate sense of equilibrium when managing risk or to perform their risk management practices with financial performance. Because poor risk management policies can distress banks' performance badly as they influence asset quality and class, leading to increased advance losses.

Keywords: return on capital employed, net interest margin, financial performance, South Africa.

LIST OF ACRONYMS

CAR	**Capital Adequacy Ratio**
COVID-19	**Coronavirus Disease 2019**
CET1	**Common Equity Tier 1 capital**
CD	**Cross-sectional Dependency**
NPL	**Non Performing Loans ratio**
LDR	**Loan To Deposit Ratio**
LR	**Liquidity Ratio**
EGLS	**Estimated Generalized Least Squares**
GDP	**Gross Domestic Product**
NIM	**Net Interest Margin**
OLS	**Ordinary Least Squares**
PCSE	**Panel-Corrected Standard-Errors**
ROE	**Return On Equity**
ROA	**Return On Assets**
ROCE	**Return On Capital Employed**
RWA	**Risk-Weighted Assets**
SIFI'S	**Systematic Important Financial Institutions**
SARB	**South African Reserve Bank**
SUR	**Seemingly Unrelated Regression**
VIF	**Variance Inflation Factor**

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CHAPTER ONE: INTRODUCTION

1.1. Background of the study

This section is structured to give an overview of the research problem, thereby giving the research's general background information. It is under this section that the researcher intends to look at the practical benefits of the research. The research shall explore the impact of risk factors on commercial banks' financial performance in South Africa.

1.2. Motivation for study

A healthy financial system improves economic development, and for that, banks should employ have adequate risk management. South Africa's banking sector accounts for almost 30% of national financial assets. Previous studies revealed that risk management in the banking sector is considered a keystone to reasonable and satisfactory banking practices. To this degree, all present-day banks are unsteady and insubstantial money-related atmosphere; they are exposed to several risks to be precise: credit risk, liquidity risks, market risk, insurance risk, operation risk, showcase risks, solvency risk, financing cost risks, and reputational risks.

These stated risks, in particular, may, in some way, lead to financial distress or bankruptcy of commercial banks under the circumstances that they are incapable of facing their financial commitments. Therefore, we ought to note that banking is a risky business; henceforth, professional management of risk is essential to commercial banks' survival. In light of this, risk management is prevalent even critical in monetary environments than in other economic sectors. The undisputable enthusiasm behind money-related firms increases revenue in terms of earnings and offers additional value to shareholders' investments by suggesting outstanding financial services, principally by inspecting risks adequately.

While researchers continue to be optimistic that South Africa's economy would recover, the negative impact of COVID-19 on economic prospects has been severe. Disruptions in global supply chains, fall in commodity prices, and financial markets have experienced unprecedented price movements. Even though significant uncertainty remains on how the global pandemic will distress countries, various economic analysts

already predict that the COVID-19 recession may be the worst since the Great Depression in the 1930s. Governments and central banks worldwide have taken extraordinary action to react to the health crisis, including through the closure of major economic sectors, alongside economic measures to moderate the economic effects. In March 2020, South Africa exited the World Government Bond Index after losing its investment-grade rating. This resulted in a significant increase in bond yields over what other emerging markets have experienced due to COVID-19. Besides, Moody downgraded the long-term domestic and foreign currency deposit ratings of the five large South African banks from a Baa3 to Ba1 investment grade. When conducting this report, the magnitude and period of the economic recession from the COVID-19 crisis remain uncertain. This plague, together with a slowdown in economic activity, is projected to dwindle banks' risk profiles or risk-weighted assets and decrease bank profitability, which would adversely affect the capability of banks to meet their minimum capital requirements

1.3. Research problem

Banks are exposed to various risks that need to be managed carefully, primarily since they use a large leverage amount. Lacking effective risk management, they might quickly become insolvent. Suppose a bank is perceived to be in a financially weak position. In that case, depositors will withdraw their funds, and other banks will not provide advances. The bank will not sell debt securities, such as bonds or commercial paper, in the financial markets, which will worsen the bank's financial condition. According to Tasseu and Hailu (2019), risk management is crucial for the banking sector to sustain their better financial performance since banking sectors significantly contribute to allocating the nation's limited savings among the most productive and enhancing the efficient allocation of risks of those investments.

Although banks share numerous similar risks with other businesses, the significant risks affecting banks are liquidity risk, operational risk, insurance risk, solvency risks, interest rate risks, credit default risks, and trading risks. Management of these variables efficiently and effectively is vital for improving the banking sector in South Africa. This study, therefore, analysed the impact of risk factors on bank performance by applying profitability ratios, namely return on capital employed (ROCE) and net interest margin (NIM), as the proxies for bank performance. Other ratios included and serve as

independent variables are liquidity ratio and loan to deposit ratio; these will focus on liquidity risk, nonperforming loans are the measure for credit risk, and capitaladequacy ratio, which will measure capital risk. Macroeconomic factors such as GDP and unemployment rate are included, and they focus on market risk. The research covered a period of 10 years from 2010 to 2019.

1.4. Research objectives

Main objective

This study aims to evaluate the impact of risk factors on bank performance. For this purpose, the study focuses on the following objectives:

Specific Objectives

Specifically, the study aims at accomplishing the following objective:

- To examine the effects of risk on the performance SIFIs in South Africa

1.5. Research Question

- What is the impact of risk on the performance SIFIs in South Africa?

1.6. Research hypothesis

$H0_1$: There is a significant impact of nonperforming loans and commercial banks' performance in South Africa.

$H0_2$: There is a significant impact of capital adequacy ratio on commercial banks' performance in South Africa.

$H0_3$: There is a significant impact of loan to deposit ratio on commercial banks' performance in South Africa.

$H0_4$: There is a significant impact of liquidity ratio on commercial banks' performance in South Africa.

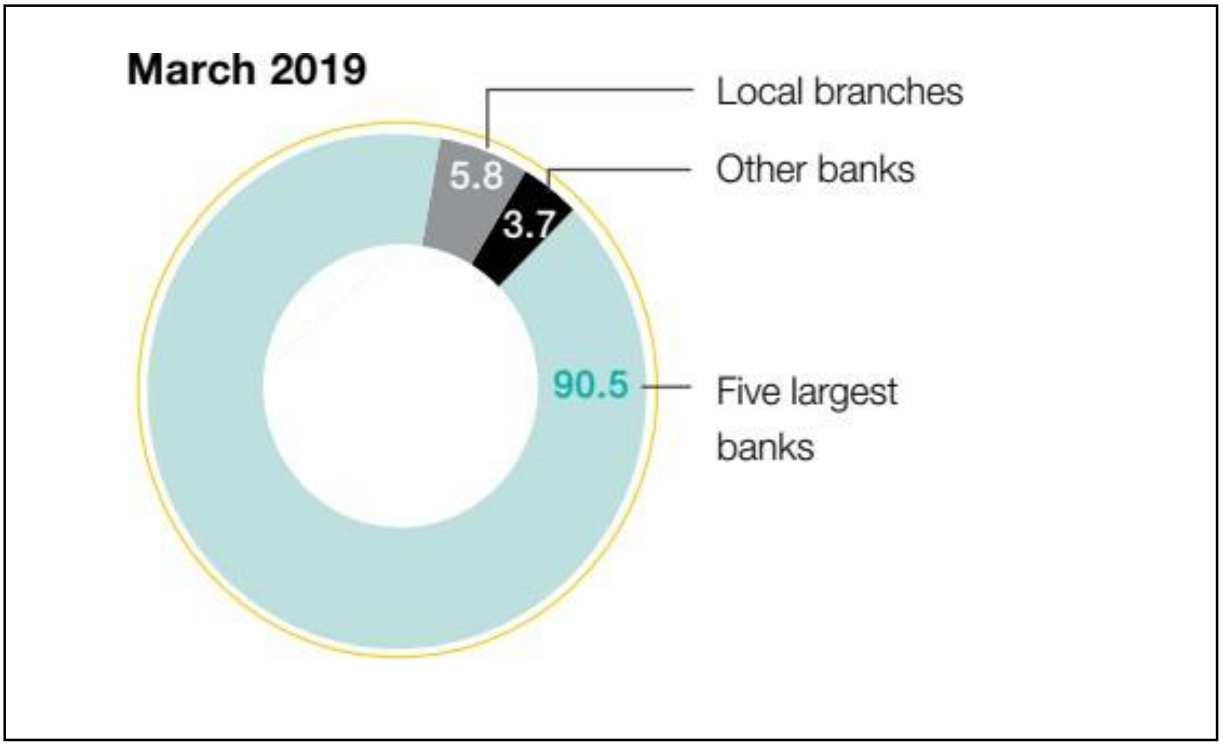
$H0_5$: There is a significant impact of the gross domestic product on commercial banks' performance in South Africa.

$H0_6$: There is a significant effect of unemployment on the performance of commercial banks in South Africa.

1.7. Overview of banking system in South Africa.

South Africa's banking sector accounts for almost 30% of national financial assets. SARB Financial Stability Peer Review mentions that the banking sector is concentrated, with the six largest banks designated as systematic important financial institutions (SIFIs). They accounted for over 92% of sector assets. These banks are the Standard Bank of South Africa, ABSA, Nedbank, FirstRand, Capitec, and Investec bank. Five of these banks, excluding Capitec bank, are considered the largest banks in South Africa by the SARB prudential annual report of 2019/2020. They accounted for 90.5% of total banking sector assets as of March 2019.

Figure 1*: Assets of five largest banks excluding Capitec bank.*

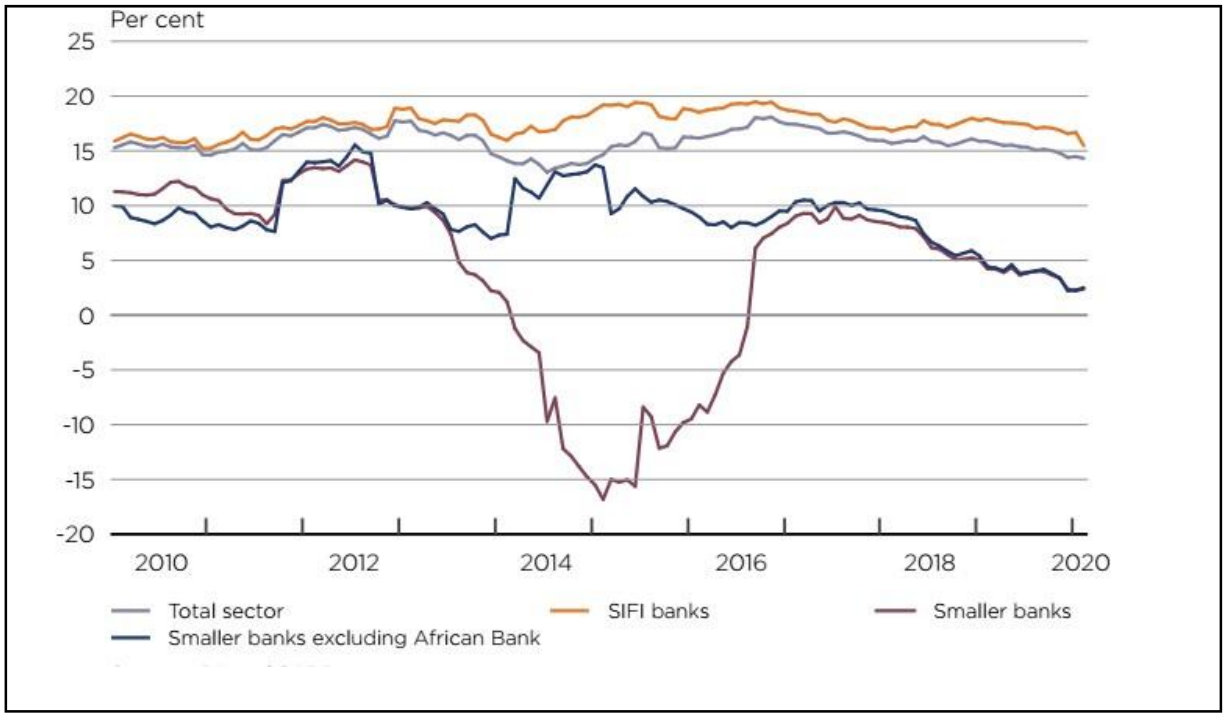


Source: SARB Prudential Annual Report 2019/2020

Profitability is an essential supplier to the sector's ability to generate capital to have

sufficient buffers available in a shock to the financial system. Over the past five years, the South African banking sector's equity return (ROE) and assets return (ROA) shows a steady and continuous downward trend against the context of a low economic growth environment. SIF's banks measured by ROE are closely correlated to that of the entire banking sector and reflect a similar, gradual, continuous downward trend. As mentioned earlier, domestic assets of South Africa's six systemically important financial institutions (SIFI) banks accounted for 90% of total banking sector assets, which means that these banks are highly exposed to issues affecting the local economy. Consequently, the ongoing downturn in national economic growth is a crucial driver of the lower return on equity.

Figure 2: The banking sector's performance measured by return on equity

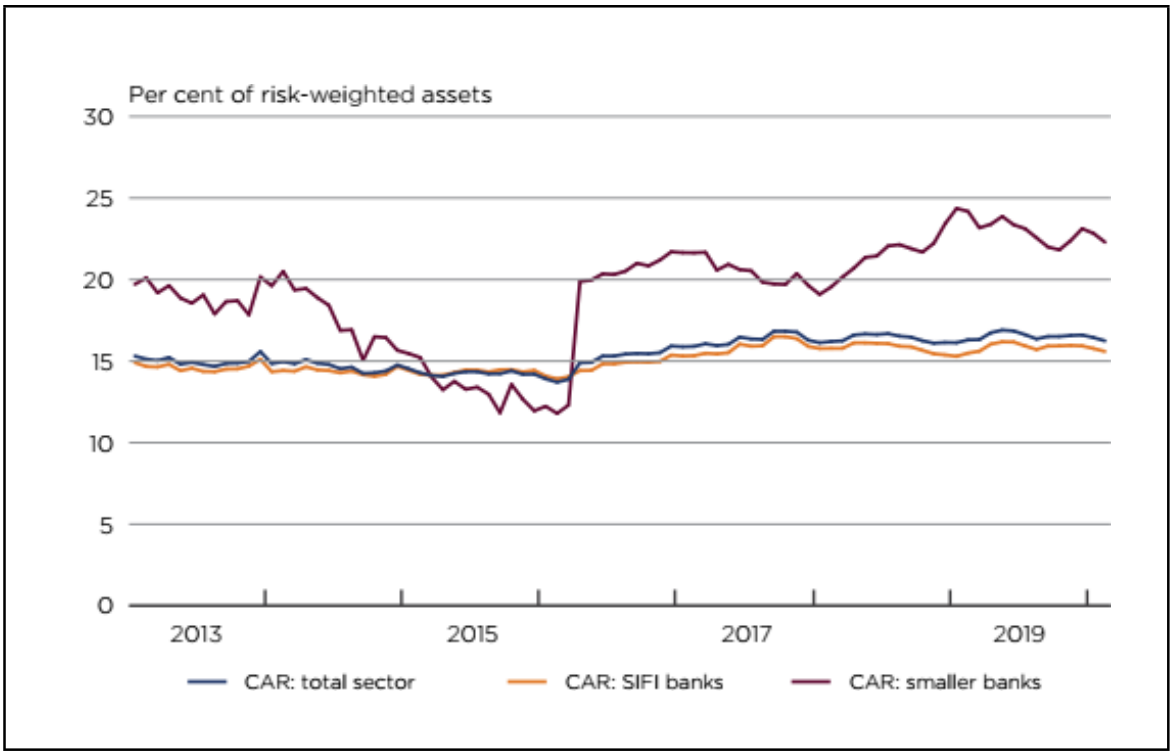


Source: SARB 2019 report

South Africa has been compliant with the most vital capital, leverage, and liquidity rules. The South African Reserve Bank (SARB) installed a comprehensive regulatory framework in place, which has guaranteed financial organizations significant capital and liquidity buffers to ingest tremors. For instance, the total capital adequacy ratio (CAR) for the banking sector, since 2008 it has improved by more than a third. (SARB financial stability report 2019). Capital buffers are vital because they help banks absorb losses in times of stress, such as COVID-19, which shrinks the probability of tightening credit provision.

Basel III's key focus area is to strengthen the banking sector's capital base to facilitate the extent to which banks can absorb losses. This was done by increasing the capital adequacy requirements of banks and boosting the quality of capital. The quality of capital increased by raising the share of common equity tier one (CET1) capital. Implementation of Basel III has unquestionably improved the South African banking sector's capital position. The banking sector's total capital adequacy ratio at the beginning of 2008 was below 12%, and end of 2019, it boosted to 16%. The capital quality was enhanced, with CET1 capital accounting for 82% of total required capital (SARB). As shown in figure 3, the capital adequacy ratio for SIFIs has been correlated to that of the entire banking sector.

Figure 3 : Capital adequacy ratios for SIFI's banks and smaller banks.



With Basel III's implementation, the domestic banking sector's capital quality has been enhanced, and sizeable capital and liquidity buffers were constructed. Liabilities of the domestic banking sector gradually become longer in the period and tilted into more stable funding sources. Collectively with the other reforms' implementation, these developments have significantly shaped the banking sector's resilience for the past decade. At the end of the year 2019, South Africa fell into a recession following a prolonged period of creeping economic growth linked to electricity limitations, mistrust

in business, and policy uncertainties.

The domestic financial system is presently under pressure but remains resilient. Both financial and non-financial institutions were affected by declines in financial asset prices. Depositors (investors, creditors, account holders, savers, lender) strongly preferred short-term deposits, which reduced the availability of term fundings to banks. An increase in nonperforming loans, withdrawals from investment funds, and insurance policy lapse rates are anticipated over the coming years. Cumulatively, there is a possibility of a decrease in profitability of financial firms due to COVID-19 effects.

There is a lack of confidence around the long-term effects of COVID-19 on the banking sector. While the financial system is currently stable, a prolonged economic and financial disorder caused by the pandemic might directly or indirectly threaten financial stability and performance. Banks are expected to have appropriate risk management systems, capital and liquidity buffers, risk management systems, and governance arrangements to ensure that they operate as viable businesses in standard times and can withstand stress in difficult times. Hence, it is of paramount importance to investigate the impact of bank-specific risk factors and macroeconomic factors on commercial banks' performance in South Africa.

1.8. Contribution of the study

The study will seal the theoretical gap in the board of knowledge on the impact of risk factors and the management of risks in commercial banks' financial performance. Cumulatively, the study can provide extensive information to those interested in the banking or financial sector. Another significant addition from the study is to provide the foundation for other scholars who desire to study the area further.

Commercial banks’ employees and their managers and investors will get in-depth guidelines from the study results, conclusions, and recommendations from a functional area. Commercial bank managers can also use the study results to focus on modeling risk management procedures and improving banks' performance.

This study contributes to several ever-growing financial policies, measures, and regulations implemented by policy regulators. Financial institutions will reference this study’s results to implement tight and control measures or policies in line with risks and risk management to improve financial performance.

1.9. Overview of research report

The introduction of this study will be followed by the literature review on financial risks, and theories and empirical studies risk management and bank performance. Thereafter, the methodology, data and models employed in the study will be discussed. The statistical results of the techniques used in the study will be provided, along with a discussion of the results of the model. Lastly, the concluding remarks of the study are presented and the list of sources (relevant literature) used in the study, are then provided.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction.

This chapter discusses the theoretical review as the leading theories on risk, risk management, financial performance, empirical review, and further conclusions. This chapter's conclusion will be on how this research intends to cover the knowledge gap and how it intends to fill the knowledge gap.

2.2. Definition of terms and concepts.

2.2.1. Financial Performance

Financial performance is how many monetary goals of an organisation are accomplished within a specific period. Similarly, be explained as a way of assessing the achievements of the firm's plans, procedures, and broadly in its processes as it makes every effort to accomplish its financial commitments. Organizations can use financial performance to evaluate the organization's overall financial health over a specified timeframe. Financial performance can also determine how best firms in related industries perform or compare industries or sectors and conglomeration segments. There is a relationship between financial performance and an organization's activities vis-à-vis its past activities, forthcoming performance, and other estimated costs, firm productivity, supervision, and responsibility. Successively, firms can also use financial performance to show how an organisation has presented its results and in what manner the entity's results have been accomplished. Performance can be used to exhibit an organization's strength, success, and power in an industry or operation sector.

Various interested groups of a firm, such as creditors, managers, creditors, tax authorities, shareholders, and others, try to find information on an organization's financial position at a given point of time and its financial performance over some time by performing financial analysis of an organization. Financial analysis encompasses the action of scrutinizing the financial statements of a firm. A financial statement is a designed assembling of data according to rational and reliable bookkeeping or accounting techniques. Its objective is to provide an appreciation of the fiscal characteristics of an organization. It can illustrate an organization’s current position in

the form of a statement of financial position (balance sheet) or can disclose a chain of undertakings over a given period, in the form of a profit and loss account, also known as a statement of comprehensive income. As a result, the term' financial statements' generally refers to two critical statements: the balance sheet and the income statement.

Nevertheless, financial statements do not disclose all related material to financial procedures, but they deliver valuable information, highlighting two essential factors: profitability and financial soundness. As a result, financial statement analysis is an effective practice for financial performance analysis, which scrutinizes and interprets financial statements to diagnose a firm's profitability and financial soundness fully.

Many profitability ratios were proven to measure financial performance. Various organization exercises, like revenues from the organization's operations, proceeds from the business undertakings, or cash flows from operations could be applied to determine its financial performance. Other techniques that can measure financial performance may include scrutinizing financial statements and figuring out growth margin rates in distinctive areas. The calculation of the commercial banks' financial performances in this study will be in the form of ratio analysis. The return on equity (ROE), net interest margin (NIM), the return on assets (ROA), and return on capital employed (ROCE) are the standard and appropriate measures of Financial Performance (Trivedi, 2010). In this study, return on capital employed (ROCE), and net interest margin (NIM) shall measure South African commercial banks' financial performance.

2.2.2. Risk and risk management

Risk refers to the future effect of hazardous activities that organizations cannot eliminate or avoid. It can also be perceived as impending uncertainties as caused by uncontrolled perils. Losses are measured in numerous ways, such as direct financial loss to the business, adversities concerning the organization, and loss of assets.

Risk management comprises a sequence of elaborated stages with key intentions to recognize the risks, address, and eradicate risks identified earlier to avoid disastrous effects to a successful firm. Effective risk management means trying to act proactively than reactively to control future results. Consequently, firms can benefit from effective risk management because it reduces both the likelihood of a riskoccurring and its possible impact. Risk management is an essential activity in financialfirms because it empowers a business with the necessary tools to identify and deal with potential risks

adequately. Besides, risk management offers an organization with a foundation upon which it can carry out a good decision-making process, and any identified risk can be easily mitigated.

Assessment and management of risks are the core approaches to preparing for future development and growth consequences. When an organization assesses its plan for managing possible threats and designing structures to mitigate them, it increases its chances of being a successful firm. Besides, progressive risk management techniques guarantee risks of high importance and are solved aggressively as possible. Likewise, the management should have the required information to create informed decisions and guarantee that the organization will always be profitable.

2.2.2. Risk and Financial Performance

The primary objective of bank management is to increase shareholder's wealth. Further, this primary objective derives from the cost, for instance, increasing risks. Business banks are exposed to several risks, such as insurance risks, market risks, credit risks, reeling risks, operational risks, outside trade risks, country risks, liquidity hazards, and bankruptcy risks. Various types of risks generally arise from several banking processes. Literature indicates that academics used different forms of risk in their studies subject to their study aims. Risk factors and financial performance shall be linked by the use of other financial ratios and macroeconomic factors. This study's risk factors are explained by nonperforming loans that will measure credit risk, loan to deposit ratio, and liquidity ratio to measure liquidity risk and capital adequacy ratio to measure capital risk. Macroeconomic factors, gross domestic product unemployment rate to focus on market risk.

2.3. Type of bank risks

Credit Risk

Lending is a primary source of bank profitability; nevertheless, when borrowers fail to reimburse their borrowed funds because of their financial problems, the credit risk rises. Pompong and Ratna (2019) suggest that nonperforming loans are inferred as loans that experience problematic repayment due to deliberate factors or because external factors are beyond the debtor's ability, affecting the bank's credit collectability. Many studies

used nonperforming loans to measure credit risk; however, those studies came up with different results; for instance (Serwadda (2018) and (Ekinci and Poyraz, 2019) found a negative impact of nonperforming loans on bank performance. Mushtaq, Ismail, and Hanif (2015) state that nonperforming loans are the central element of credit risk that negatively affects the banking performance; hence this study uses nonperforming loans to measure credit risk.

Liquidity risk

Liquidity risk is considered as one of the common causes of financial crises in the banking sector. Banks undertake liquidity makeover by is obtaining moderately short-term funding to provide longer-duration loans. If access to funding (liabilities) declines sharply, risks can emerge. In contrast, the amount of outstanding loans (assets) remains. In severe cases, funding risks might lead to solvency challenges if banks have no option but to sell assets at a loss to provide liquidity for their customers seeking withdrawal funding from the bank. Several studies found a negative relationship between liquidity risk and bank performance, and they argue that holding the most liquid assets can lead to lower returns. Ali and Dhiman (2019) found out that the relationship between liquidity and profitability is insignificant and positively related.

Capital risk

Capital and solvency buffers provide an environment for financial organizations to continue their operations even though business conditions deteriorate. However, if the economy's overall activities remain weak, an immediate health emergency is no longer applicable, and it will be problematic for the financial sector to rebuild buffers. In Serwadda's (2018) study, the capital adequacy ratio positively and insignificantly affected bank profitability. In contrast to the results of Ali and Dhiman (2019), the relationship between capital adequacy ratio and ROA was positive. Also, Menicucci and Paolucci (2016) conducted a study on the impact of internal determinants on European banks' profitability. Their findings indicated that the capital adequacy ratio had a significant positive impact on bank profitability measured by return on equity

Market Risk

Market risk is also known as systemic risk, and it cannot be diversified or avoided. In this study, the proxies for market risk are gross domestic product and unemployment. Ruzheng (2019) points out that unemployment will influence the labor market and

consumption level; it usually impacts the banking and insurance industry. SARB usually conduct market risk reviews focusing on banks that use the internal model-based approach (IMA). Key challenges they discover include market liquidity and volatility, making it challenging for banks to find direction. This trend is likely to continue and be worsened by the COVID-19 pandemic. Banks also continue to highpoint theregulatory burden connected to capital imposition.

2.4. Bank risk and information asymmetry

In a credit relationship, the bank has an information asymmetry problem that results from the difficulty of credit risk assessment. If the bank has the ability to collect and treat information when loan applications are accepted, credit risk is minimized. The bank needs relevant information about the borrower both at the time of accepting a loan application and after the credit has been granted. Through relevant information, the bank can control the actions taken by the borrower. So, the bank, in search of information, is confronted with the issue of information asymmetry. information asymmetry generates two main problems: adverse selection and moral hazard. Due to the existing information asymmetry between the bank and the borrower, the phenomenon of adverse selection or anti-selection is manifested before signing the loan agreement. After signing the loan agreement and granting the credit, information asymmetry becomes a source of moral hazard.

- **Adverse selection**

Adverse selection implies an immoral effect of market functioning, the effect that generates informational problems. These problems occur when there is a lack of observation of the characteristics of a product or service. There are situations where a loan applicant holds more information than a bank, more precisely the loan applicant may conceal some information about his/her characteristics: market position, competition, dependence on a partner, possible unpaid claims that may become nonperforming, prospects of continuity of the activity for certain sectors of the economic activity, etc. The attitude of the loan applicant, not to provide the bank with this information, is immoral and the bank is not able to correctly observe the quality of the loan applicant. The example illustrates a situation of ex-ante information asymmetry where the bank is subject to an adverse selection problem. On this issue, Akerlof (1970) considers that ″the adverse selection, which occurs before the signing of the loan agreement, results from the fact that information about the characteristics of the borrower is dissimulated. ″

❖ **Moral hazard**

After signing a contract between the parties, information asymmetry, this time ex-post, generates a moral hazard issue. The moral hazard is due to the agent's inability to observe the actions of other agents. Moral hazard occurs under certain conditions and gives rise to diverse situations. Berger et al. (2011) distinguish between two situations. The first situation corresponds to the case when the uninformed agent is unaware of the actions of his/her partners. The partners have an opportunistic behaviour, taking advantage of the fact that the agent is uninformed and acts in their own interest. Against an agent, his/her partners claim that poor results are independent of their will. In the second situation, the uninformed agent knows the actions of the partners but cannot verify the validity of the actions because he/she is not able to observe the circumstances in which the actions take place. The moral hazard issue, as Berger et al. (2011,) appreciate, ″can be studied by going through the agent's theory with a principal-agent model″. The principal sees a moral hazard when he/she notices the imperfection of the action or fails to know the action the agent performs in his or her interest. Therefore, the principal's problem is to find the way to challenge the agent to act in his or her interest.

Reduction in the effects of information asymmetry and their effective management should be major concerns for any bank. It is essential that a bank identifies the appropriate means for knowing and managing the causes of information asymmetry, mainly adverse selection and moral hazard. Stiglitz and Weiss (1981) believe that borrowers should also be interested in reducing the adverse consequences of information asymmetry. Borrowers and banks have different perceptions about information asymmetry. For example, quality borrowers see the adverse selection as a problem that may cause their loan applications to be denied. For banks, increasing their exposure to credit risk is due to the behaviour of borrowers and information hidden by them.

2.5. A critical review of theories

2.5.1. Financial distress theory

Organizations with a greater risk of facing financial distress will borrow not as much as firms with a lesser risk of financial distress. For instance, all other things being equal, the greater the volatility in earnings before interest and tax (EBIT), the lower a firm should borrow. Besides, financial distress is considered to be costlier for some organizations than others. The organization's assets primarily influence the costs of

financial distress. In particular, financial distress costs might be determined by how easily ownership of those assets can be transferred. For instance, a firm might have an incentive to borrow more if its most tangible assets can be sold without significant loss in value. For organizations that depend heavily on intangibles, such as employee aptitude or growth prospects, debt will be unattractive that these assets cannot be sold efficiently. The financial distress theory, therefore, is relevant to the study on the relationship between financial risk and financial performance as it identifies liquidity and credit risks as forecasters of financial distress.

2.5.2. Shift-ability theory

The shift-ability theory of bank liquidity was proposed by H.G. Moulton (1918). According to the shift-ability approach, a bank's ability to meet liquidity demands is connected to the volume of its assets that can be easily shifted to another bank. As explained by professor Milton," the way to attain the minimum in the matter of reserves is not by relying on maturities but by maintaining a considerable quantity of assets that can be shifted to other banks before maturity as necessity may require. Liquidity is tantamount to shift-ability". Matz (2011) stresses that shift-ability theory provides banks with much more broadly relevant liquidity concepts.

On the other hand, it depends upon the highly adjustable quality of marketability, and as a result, it is more beneficial for bank-specific liquidity requirements than for systematic requirements. This theory has some aspects of truth. Banks now accept sound assets that they can shift on to other banks. Large companies' shares and debentures are acknowledged as liquid assets alongside treasury bills and bills of exchange and have stimulated term lending through banks. The theory is relevant to a study that focuses on the effect of financial risk on financial performance as it provides a clear explanation as to how liquidity risk affects financial performance using liquidity coverage and net stable funding ratios as stated by new Basel III framework.

2.5.3. The anticipated income theory

H.V. Prochanow developed the anticipated income theory in 1944. According to this theory, irrespective of nature and the borrower's character, the bank management can plan its liquidity using the debtor's anticipated income and enables a bank to have medium and long-term loans if the borrowers receive their anticipated income regularly. This theory is more beneficial for bank-specific liquidity requirements than systematic (Clifford 2011). Anticipated income theory is also applicable to the banking

industry because it fulfills the three objectives of liquidity, safety, and profitability. It fulfills the principle of security and for the reason that the bank issues loans based on sound security and the borrowers' ability to repay them (Visemih and Ngarka 2019).

2.4.4. The liability management theory

This theory was developed in the 1960s (Matz 2011). According to this theory, banks do not need to grant self-liquidating loans and possession of liquid assets because they can borrow funds reserved in the money market in case of a need. A bank, by using different sources it can secure reserves by generating additional liabilities against itself. These sources consist of issuing time certificates of deposit, borrowing from other commercial banks and the central banks, issuing shares to raising capital funds, and reinvesting profits. Liability or funds management approaches present the notion that liabilities can, at least to some extent, be sources of liquidity. The liability management theory became increasingly popular as banks gained the ability to pay market interest rates on large liabilities. The fundamental contribution of the theory was consideration of both sides of a bank's balance sheet as sources of liquidity. Today, banks use both assets and liabilities to meet liquidity needs**.** (Koch & Scott, 2008). The theory is relevant to this study because liability management requires consideration of the extra risk as well as the difference between the cost of obtaining funds and the return that can be earned when the funds are invested in loans or securities. Thus, the relationship between asset management and liability management is a critical determinant of a bank's profitability.

These theories indicate that an effective risk management strategy can enhance bank profitability and performance. The practical and efficient management of bank risks decreases the level of bank customer defaults. The bank that dearth liquid assets and has many customers who do not fund their accounts can lead to bank defaulting in honoring financial obligations that fall due. Thus shift-ability of assets, steady cash flow in customer's financial records, and meeting customer withdrawals are crucial for effective risk management. Hence these theories have a link with the issue in the study: risk factors and bank performance.

2.6. Empirical Literature review

The effect of risk and risk management on profitability or financial performance in the banking sector developed concerns in developed, emerging, and developing countries, some of the recent studies are as reviewed below:

Ali, Muazu, and Joseph (2020) examined differential effects of credit risk and capital adequacy ratio on Ghana's domestic banking sector's profitability. In their study, they employed the fixed effects estimation approach. The study shows a positive and significant effect of credit risk on profitability with a colossal effect for local relative to foreign banks. However, the capital adequacy ratio negatively affects foreign banks' profitability with no apparent impact on local banks. This suggests that, as the creditworthiness of a bank increases, its profitability tends to decline. This opposes the theoretical impression of Basel III's benefits of high capital adequacy, as they encourage banks to boost their capital strength to achieve higher profitability and promote soundness and stability of the international banking system.

Mapharing, Mphoeng, and Dzimiri (2019) examined the impact of financial risk management practices on commercial banks' financial performance in Botswana. The study covered eight years from 2011 to 2018 and used ROA and ROE to measure financial performance. Proxies for risk management were inflation, total equity to total assets, interest rates, total debt to total assets, loan to deposit ratio, and total debt to total equity were independent variables. Their regression results revealed that interest rates and loan to deposit ratio negatively and significantly impact ROA and ROE. In contrast, total debt to total assets negatively and insignificantly affect the return on assets. Conversely, total debt to total assets revealed an insignificant positive impact on return on equity. The estimation results showed that there is a negative relationship between credit risk and ROA as well as between credit risk and ROE. Their results are consistent with Ekinci and Poyraz (2019) and Lelgo and Obwogi (2018).

A study conducted by Wood and McConney (2018) to determine the impact of risk factors on the commercial banking sector's financial performance in Barbados showed that the internal risk factors' effect is more substantial than that of the external variables. Nonperforming loans had a significant adverse impact on financial performance, while capital adequacy depicts a positive effect on bank performance. As a result, they concluded that risk managers should develop their risk management practices by monitoring the external environment to increase profitability. As for macroeconomic factors, a statistically insignificant effect on financial performance was shown by gross domestic product.

Ali and Dhiman (2019) explored the impact of credit risk management and banks'

financial performance. The panel regression was applied for data analysis of data. In their model equation, credit risk was measured by nonperforming loans ratio, loan loss provision ratio, capital adequacy ratio, management, earnings, and liquidity. Banks' profitability measured was by return on assets (ROA). The capital adequacy ratio was positive and insignificant to explain the financial performance (ROA). Liquidity was insignificant and positively related to financial performance. This means higher liquidity in the banks can lead to higher profitability. Nonperforming had a significant negative relationship with financial performance.

Pompong and Ratna (2019) also studied credit and credit risk's effect on Central Asia Bank's profitability. In their, study profitability was measured using the indicator Return on Total Assets (ROA), and credit risk was measured using the loan to deposit ratio and nonperforming loans. Their regression results revealed that loan to deposit ratio and Nonperforming loans have a significant positive influence on ROA at Central Asia Bank.

Chukwunulu et al. (2019) studied the effect of risk management on bank performance in Nigeria. The study showed that there is a negative and significant relationship between non-performing loans and bank performance. The result for liquidity risk revealed a negative and insignificant relationship with bank performance in Nigeria. The capital adequacy ratio, which was the proxy for capital risk, revealed a significant positive relationship with bank return on equity and an insignificant negative relation with return on asset. They also concluded that officials and managers should implement risk identification, assessment, measurement, and control mechanisms that align with global best practices to avoid a financial crisis and improve commercial banks' performance.

Serwadda (2018) examined a significant effect of bank‑specific factors on commercial banks' performance in Hungary. Return on average assets (ROAA) was the performance indicator with bank-specific variables that included capital adequacy ratio,bank size, overhead costs, nonperforming loans, net interest margin, and liquidity risk.A fixed-effect model was employed, and the empirical findings of his study revealed that bank-specific variables have a highly significant on commercial bank’s profitability. Nonperforming loans and liquidity negatively affected commercial banks' financial performance; hence, increasing nonperforming loans reduces bank profitability. However, net interest margin and capital adequacy ratio had an insignificant positive

effect on bank performance. He concluded monitoring of credit and liquidity indicators in commercial banks is essential and pursue diversification policies of income sources although maintaining operational costs.

Research by Serwadda (2018) on the impact of credit risk management systems on commercial banks' financial performance in Uganda employed panel data regression. It used return on assets as a dependent variable. Independent variables for credit measures used are growth in interest earnings, nonperforming loans, and loan loss provisions to total loans. This study's regression results revealed a significant negativeinfluence of non-performing loans on bank performance measured by return on assets.Lawa (2017) examined the determinants of the South African banks' performance usingbank-specific factors, industry-related factors, and macroeconomic influences, using apanel of the "Big Four" South African banks. The study applied random-effects panel data analysis. Results revealed that market prices, capital adequacy, nonperforming loans are the key factors affecting South Africa's bank performance.

A study conducted by Yong Tan et al. (2017) examined the effect of competition and risk on Chinese banks and the importance of efficiency on bank profitability measured by return on assets, return on equity, and net interest margin. The study results showed that credit risk was negatively insignificant affecting bank profitability. Liquidity risk, however, had a significant favorable influence on profitability. The capital risk negatively affected profitability and bank size and profitability had a positive and significant relationship. Cost efficiency had a negative and significant effect on banks' return on assets but positively affected return on equity and net interest margin. They conclude that banks with lower competition levels experience lower profitability than those with high competition levels.

A study by Anarfi et al. (2016**)** on the determinants of bank profitability in Ghana and return on assets (ROA) was used as a profitability measure. The bank-specific variables used for analysis were capital, bank deposits, asset size, and overhead cost, where the macroeconomic factors comprised of GDP, exchange rate, and interest rate. Bank-specific factors had a highly significant negative impact on the profitability of banks. Bank size and deposit on banks show no effect' on profitability in Ghana. As for macroeconomic factors, only the exchange rate had a negative impact on profitability.

John Bosco et al. (2016) studied the co-integration, and causal relationship of commercial banks’ profitability measured by return on assets, return on equity, and net

profit margin in Rwanda and the credit risk indicators, macroeconomic variables. Credit risk indicators used were nonperforming loans, loan loss provision, and capital,where interest rate, inflation, and gross domestic product were the macroeconomic variables. Their analysis revealed that the nonperforming loan ratio negatively affected bank performance on assets' returns and return on equity. This indicates that high nonperforming loans decrease commercial bank profitability. There is a need for a rigorous credit risk management system for safeguarding the assets and equity of the banking sector. Capital adequacy ratio and all the external factors employed, thus interest rate, inflation, and GDP were related positively to return on assets and return o equity.

Mushtaq, Ismail, and Hanif (2015) conducted a study on how credit risk and capital adequacy affect commercial banks' performance in Pakistan. Simple pool regression was applied. The nonperforming loans ratio was highly significant and negatively associated with ROA, and the capital adequacy ratio is highly significant, positively affecting banks' performance in Pakistan. In their detailed analysis, conclusions were made that nonperforming loans, cost per loan assets, and loans and advances negatively associate with return on assets. Results indicated the effects of high credit risk, leading to a decrease in commercial and financial performance. The capital adequacy ratio, however, had a significant positive impact on bank performance.

Abu et al. (2015) studied the effect of credit risk on Bangladesh's banking sectors' profitability. The study used net interest margin, return on average assets, and average equity as proxies for bank profitability. Using OLS random effect model, Generalise Least Squares, and system GMM, the study finds a negative and significant effect of non-performing loans on bank profitability. The analysis also finds a negative and significant effect of capital adequacy on return on average equity (ROAE). They also noted that the capital adequacy ratio had a significantly positive net interest margin but significantly negative ROAE. Their study revealed some significant policy implications for increasing profitability and protecting banks from a crisis.

Rahman et al. (2015) performed a study on determinants of bank profitability in Bangladesh. They employed profitability ratio measures, namely return on assets, return on equity, and net interest margin. The bank-specific factors used were; bank size, ownership, capital, cost efficiency, credit risk, liquidity, non-interest income, and off-balance-sheet activities. Macroeconomic factors were inflation and gross domestic

product. They found out that capital strength, i.e. regulatory and equity capital, and loan concentration, significantly impacted bank profitability positively. Simultaneously, cost efficiency and off-balance sheet activities showed a significant negative influence on bank profitability. Non-interest income, credit risk, and gross domestic product were essential determinants of net interest margin. The size of the bank, on the other hand, had a positive and significant impact on return on assets. At the same time, inflation negatively and significantly affected return on assets and return on equity.

Ifeacho and Ngalawa (2014) investigated the impact of bank-specific variables and selected macroeconomic variables on the South African banking sector for the period of1994-201. They used the CAMEL model for bank performance evaluation: capital adequacy, asset quality, management, earnings, and liquidity (CAMEL. The study data used was annual frequency from South Africa's four largest banks: ABSA, First National Bank, Nedbank, and Standard Bank. Using return on assets (ROA) and return on equity (ROE) as bank performance measures, their results stated that all bank-specific variables are statistically significant determinants of bank performance. On the other hand, capital adequacy shows an unexpected significant negative relationship with return on assets, while its relationship with return on equity was significant and positive as expected. Their results were inconsistent with the work of Ali and Dhiman (2019) as well as Menicucci and Paolucci (2016). They find out that the capital adequacy ratio had significant positive impacts on bank performance**.**

2.7. Conclusion

From this study's literature review, many vital conclusions are drawn. First, while existing theories show a connection between risk factors and commercial bank performance, they do not state the number and category of bank-specific risk and external risk factors to include when conducting researches. Thus, reviewed existing empirical studies in this chapter show the use of an infinite range of risk factors to examine their impact on bank performance. Consequently, while previous scholars have significantly upgraded the understanding of interactions between the banking sector and actual economic activities, the literature's outcomes are mixed. They were sensitive to the selection of countries, variables, and the study period. It is challenging to oversimplify the results as each country's banking sector is unique regarding its own rules, regulations, and type of investors. Most of the studies discussed above agreed that there are significant associations among risk factors and commercial banks'

financial performance. However, risk factors are common, difficult to simplify the results because the same factors impact economies differently. Bhunia (2012) and Kumar and Puja (2012) added that different periods also yield diverse outcomes.

From the above findings, this research is based on recognizing essential common types of risks included in the risk factors category and measuring their impact on commercial banks' financial performance in South Africa. Literature reveals that minimal studies have been conducted in South Africa on this topic. This study covers the research gap in South Africa. It offers propositions to the banking industry and risk management professionals and policymakers to manage financial risk components to come up with more profits. Most of the studies done before took either return on assets (ROA) and return on equity (ROE) for the financial indicator as a dependent variable. This study will use return on capital employed (ROCE) and net interest margin (NIM) as a financial indicator for dependent variables.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

The chapter presents and explains appropriate research methods to achieve the study's stated expectations and meeting objectives. The first subsection covers the research design: data collection methods and sampling—lastly, model specification and how data will be analyzed.

3.2. Research Design

The study adopted a quantitative research design. Quantitative research is conducted when there is an understated hypothesis on why something might become apparent. Also, quantitative research is well-suited with performing tests to accept or reject predicted hypotheses and proving their correctness. The quantitative study goes further than the qualitative study in that it presents results about the reasons behind a phenomenon.

3.3. Data source and sampling

A convenience-sampling technique is applied based availability of data for all the variables under study. The study covers six (6) largest banks also designated as systematic important financial institutions (SIFIs) and account for over 92% of sector assets. These are the Standard Bank of South Africa, ABSA, Nedbank, FirstRand, Investec, and Capitec bank. The data sources used in this study were secondary data. The variables data sets were collected from the selected banks' annual financial statements, EquityRT, and World Bank for macroeconomic variables. The study covers a period of 10 years from 2010 to 2019 which is after the global financial crisis and also when the Basel accords have been updated and being gradually implemented.

3.4. Model Specification

The study adopts panel data analysis for its estimations by following the works of (Ekinci, R. and Poyraz, G. (2019), Serwadda (2018), Mokatsanyane et al. (2017). Panel data is used to define the degree of independent variables on return on capital employed and net interest margin. Henceforth the study will choose either fixed-effects or random-

effects model for estimation by using the Hausman specification test to identify the appropriate technique for analysis.

$$\mathbf{Y}it = \alpha + \beta_1 \mathbf{X}_{1it} + \beta_2 \mathbf{X}_{2it} + \beta_3 \mathbf{X}_{3it} + \beta_4 \mathbf{X}_{4it} + \beta_5 \mathbf{X}_{5it} + \beta_6 \mathbf{X}_{6it} + \varepsilon_{it} \quad (1)$$

Where $_i$ denote the cross-sectional dimension and *t* denotes the time-series dimension. β indicates the coefficient of independent variables, α is the constant, and ε is the bank's error term.

Y = Return on capital employed (ROCE) / Net interest margin (NIM)

X_1 = Capital adequacy ratio (CAR)

X_2 = Nonperforming loans ratio (NPL)

X_3 = loan to deposit ratio (LDR)

X_4 = liquidity ratio (LR)

X_5 = gross domestic product (GDP)

X_6 = unemployment (UE)

Model 1

$$\mathbf{ROCE} = \alpha + \beta_1 \mathbf{CAR}_{it} + \beta_2 \mathbf{NPL}_{it} + \beta_3 \mathbf{LDR}_{it} + \beta_4 \mathbf{LR}_{it} + \beta_5 \mathbf{GDP}_{it} + \beta_6 \mathbf{UE}_{it} + \varepsilon_{it} \quad (2)$$

Model 2

$$\mathbf{NIM} = \alpha + \beta_1 \mathbf{CAR}_{it} + \beta_2 \mathbf{NPL}_{it} + \beta_3 \mathbf{LDR}_{it} + \beta_4 \mathbf{LR}_{it} + \beta_5 \mathbf{GDP}_{it} + \beta_6 \mathbf{UE}_{it} + \varepsilon_{it} \quad (3)$$

The financial performance models are shown above, i.e., models 1 and 2 measured by return on capital employed (ROCE) and net interest margin (NIM), respectively. These models are expressed as a function of; capital adequacy ratio, nonperforming, loan to deposit ratio, liquidity ratio, gross domestic product, and unemployment rate.

3.5. Variables and their measurement

3.5.1. Dependent variables

i. Return on capital employed (ROCE)

Return on capital employed is a profitability ratio that measures how efficiently a bank

uses its capital to create profits. The return on the capital employed ratio is considered one of the best profitability ratios. ROCE is investors generally use it to decide whether a company is appropriate for investment or not. A higher return on capital employed is always advantageous, as it shows that per dollar capital employed, more profits are generated.

$$\text{ROCE} = \frac{EBIT}{\underset{[capital\ employed]}{\text{total assets} - \text{current liabilities}}} X\ 100$$

Earnings before interest and tax (EBIT) is the bank's profit, including all expenses apartfrom interest and tax expenses.

Capital employed is equal to total funds of equity invested by the bank. Capital employed is generally calculated as either total assets minus current liabilities or the addition of fixed assets and working capital.

ii. Net Interest Margin (NIM)

The net interest margin (NIM) measures how large the spread between interest revenues and interest costs that banks have achieved by close control of its management over earning assets and searching for the cheapest funding sources (Rose et al., 2006). Net interest margin has been considered an essential measure of bank profitability, and its minimum value, which is considered for a healthy bank, is 4%. A slight adjustment in the interest margin can have a considerable impact on profitability. A higher net interest margin is linked to profitability in banks by preserving good quality of assets. A positive NIM shows that the bank invests efficiently, where a negative NIM indicates inefficient investing. The net interest margin of banks is directly correlated to interest rates in the economy. Interest rates move accordingly with the economy's business cycle. A major determinant of net interest margin is whether there is a high demand for borrowing or saving.

$$\text{NIM} = \frac{interest\ income - interest\ paid}{average\ invested\ assets} X\ 100$$

Interest income comes from interest payments received by the bank from outstanding.

It consists of lines of credit and loans on the bank's statement of financial position.

Interest paid is the amount charged by the lender to the borrower in financial transactions. It can also be called the cost of borrowing funds. Interest paid accumulates on unsettled liabilities. Common examples include customer deposits and wholesale financing.

Average invested assets are a bank's earning assets invested in producing revenue without substantial work. Some common earning assets are stocks, bonds, certificates of deposits, and notes.

3.5.2. Independent variables

iii. Capital Adequacy Ratio (CAR)

The capital adequacy of South African banks is measured in terms of the requirements of the SARB. The capital Adequacy ratio shows the percentage of risk-weighted credit exposures of banks. The base minimum South African total capital adequacy ratio for banks is 10% of risk-weighted assets. This ratio was applied by the Basel accord to safeguard depositors and stimulate the banking sector's steadiness and efficiency worldwide.

$$\text{CAR} = \frac{tier\ 1\ capital + tier\ 2\ capital}{\text{total risk weighted assets}} X\ 100$$

Tier 1 capital is the core capital known as common equity tier 1 (CET1), which is the ratio of CTE1 and reserve funds to risk-weighted exposure. It is required at all times to be a minimum of 6.5 percent and additional tier 1 capital. Therefore, the tier 1 capital is the ratio of common equity tier 1 capital and reserve funds plus additional tier 1 capital and reserve funds to risk-weighted exposure. This is required to be always at a minimum of 8 percent.

Tier 2 capital is an additional component of the bank's core capital base under Basel accord, including undisclosed reserve, hybrid instruments, general loss reserves, and subordinated debt instruments to provide total capital requirements. Therefore, the total capital adequacy ratio (CAR) is the ratio of common equity tier 1(CET1) capital and

reserve funds + additional tier 1 capital and reserve funds and tier 2 capital and reserve funds to risk-weighted exposure.

iv. Nonperforming loan ratio (NPL)

Nonperforming loans are total borrowed funds in which the borrower has not made repayments of principal and interest as scheduled for at least 90 days. Bank's total nonperforming loans to total gross loans ratio are equal to nonperforming loans divided by the loan portfolio's sum (including nonperforming loans before deducting specific loan-loss provisions). The loan volume documented as nonperforming is the same as the gross loan value recorded on financial position statements, not only overdue amounts (World Bank).

$$\text{NPL} = \frac{total\ nonperforming\ loans}{\text{total gross loans}} X\ 100$$

A nonperforming loan can either be at a point of default or in default. The word default refers to the borrower's inability to pay back principal or interest on a loan outstanding. Nonperforming loans indicate a loss to the bank, which needs profit provision, decreasing the profit margin. An NPL ratio below 25% implies that the bank manages its credit risk control (Abera, 2018). Too many nonperforming loans on a bank's balance sheet mean a bank is experiencing cash flow problems. It is no longer earning income from its credit activities; hence the negative effect is expected.

v. Liquidity Ratio (LR)

The liquidity ratio expresses a company's capability to settle short-term creditors out of its total liquidity assets. The liquidity ratio is calculated by dividing the liquid assets by total assets. It can also show the number of times short-term liabilities are covered by cash. If the ratio is greater than 1.00, it means the bank's short-term obligations are fully covered. The level of bank liquidity shows the capability of the bank to endure shocks in its balance sheet.

$$\text{LR} = \frac{liquid\ assets}{total\ assets} X\ 100$$

Liquid assets include cash on hand and other assets that can be easily converted into cash at a less high cost. Examples include cash, marketable securities, and money market instruments, and they are recorded on the asset side of the bank's balance sheet.

vi. Loan to deposit ratio (LDR)

The loan to deposit ratio determines a bank's liquidity by comparing its total loans, advances, and total deposits. A high LDR means that the bank is not borrowing from outside but using its deposits in circulation to make availability of loans to its customers. A bank with a high loan to deposit ratio means it has good liquidity, and it might also indicate that the bank is not exploiting its capital efficiently. An exceptionally low LDR means the bank is borrowing funds to generate profits through loans.

$$\text{LDR} = \frac{total\ commercial\ bank\ loans\ and\ advances}{total\ deposits} X\ 100$$

Figures for calculations of total bank loans and advances and total deposits are listed on a bank's balance sheet. Loans are listed as assets, while deposits are listed as liabilities. The ideal loan-to-deposit ratio ranges from 80% to 90%. A loan-to-deposit ratio of 100% means a bank will not have reserves for expected and unexpected, unforeseen events because a bank loaned all the deposit funds received to its customers.

vii. Gross domestic product (GDP)

The most common approach for measuring and quantifying gross domestic product is the expenditure method which is the sum of private consumption, investment, government spending, and exports-imports, thus

Gross Domestic Product (GDP) = C + I + G + (X - M) where;

Consumption *(C)* is the spending of households on consumable goods and services. Private consumption consists of both durable goods, which last for three or more years, and nondurable goods.

Investment *(I)* is acquiring new capital goods, for example, machines, buildings, and other durables. Investment does not consist of buying stocks and bonds, as they are not produced goods and services.

Government spending *(G)* is the expenses by the government on goods and services. Government spending includes only funds used by the government to purchase goods and services. Transfer payments are such as social security expenses are not included in government spending on goods and services.

Net Exports measures the entire country's trade position, and it is calculated by the difference between exports and imports *(X-M)*. Exports of goods and services are locally produced items that are sold to the rest of the world. Imports of goods and services are products bought by households, firms, and governments in a given county from the rest of the world. A country's net exports, also known as balance of trade, can either be negative or positive. Negative net exports show a trade deficit, and a positive net exports value shows a trade surplus.

An increase in economic growth can imply that people have more money to spend and deposit to the bank and consume. This can increase the market flow, and increase deposits, increase in loans to be issued, and liquidity ratio will also be increased. The study, therefore, expects a positive effect.

viii. Unemployment (UE)

Unemployment refers to employable individuals and actively seeking a job but are unable to find a job. The unemployment rate is calculated by dividing the number of total unemployed persons by the total workforce. Unemployment can also be used as an indicator of a country's economic status. High unemployment rates influence the labor market, and consumption level is also affected, thereby negatively affecting the financial industry. Unemployment is a severe social and economic problem and has a high intense impact on the whole economy but is often disregarded. A stronger system of evaluating unemployment must be in place to limit its causes and address them better.

3.6. Estimation approach

Hausman test is a statistical test to select whether the most appropriate model to use its Fixed Effect

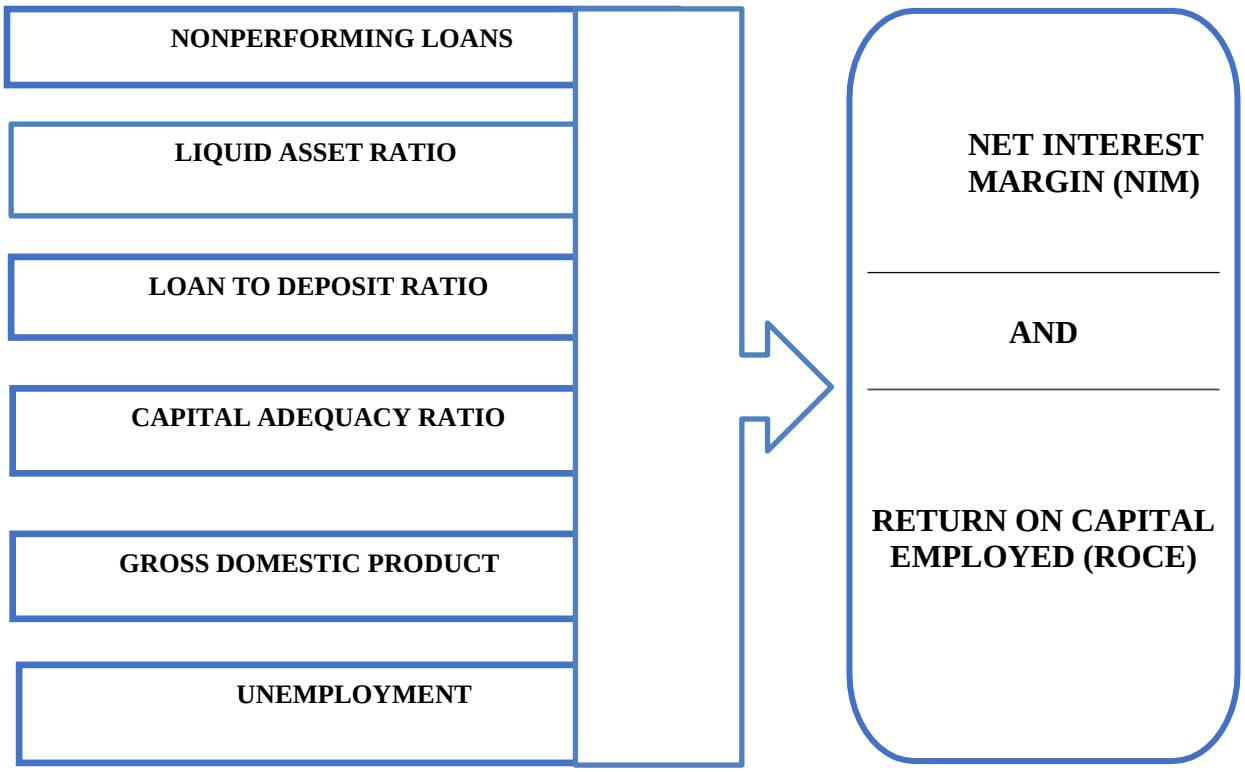
(FE) or Random Effect (RE) model is used. The conclusion that we must make when finished doing Hausman test with EViews is, if Hausman Test p value> 0,05 we accept H0, then method to be used s random effect. If Hausman Test receives p value <0,05 we reject H0 and accept H1 then is fixed effect method will be used.

H0: Select RE (p> 0.05)

H1: Select FE (p <0.05)

3.7. Conceptual frame work.

Figure 4: Conceptual framework: independent and dependent variables



CHAPTER FOUR: DATA ANALYSIS, RESULTS, AND INTERPRETATIONS

4.1. Introduction

This chapter focuses on presenting and analyzing the data results calculated using the models mentioned in Chapter 3 using the Eviews 11 student version. This chapter produces an in-depth analysis of data using quantitative analysis techniques. Data presentation is in tables, charts, and graphs to give a deep impression and simplify readers' understanding.

4.1.1. Pre-Estimation Tests

Before performing the regression analysis, pre-estimation tests were conducted. In this case, the pre-estimation tests were descriptive statistics to have a picture of the unprocessed data, correlation analysis, cross-sectional dependency test, and unit root tests. These are usually performed to avoid spurious regression.

4.1.2. Descriptive statistics

Descriptive statistics analysis is performed for a pure understanding of risk factors and profitability indicators for the study. Results are presented in tabular form to show the mean, standard deviation, minimum and maximum, skewness, and kurtosis for the variables of a sample of six systematically important financial institutions (SIF'S) from 2010 – 2019.

Table 1: descriptive statistics analysis

	ROCE	NIM	NPL	CAR	LDR	LR	GDP	UE
Mean	33.170	6.090	4.646	19.724	90.004	16.581	1.682	25.760
Median	26.006	3.536	4.630	16.000	90.949	15.177	1.631	25.020
Maximum	116.157	19.138	7.600	41.000	127.457	54.534	3.284	28.468
Minimum	4.045	2.131	2.270	12.000	58.233	5.415	0.1523	24.561
Std. Dev.	24.131	5.720	1.473	8.968	11.300	9.306	1.033	1.314
Skewness	1.107	1.547	0.165	1.500	0.498	1.901	0.071	0.797
Kurtosis	4.140	3.525	2.018	3.459	6.962	7.764	1.770	2.282
Observations	50	50	50	50	50	50	50	50

The net interest margin variable of the SIFI's has an average value of 6.09%. The NIM variable's maximum value is 19.13%, and a minimum value of 2.13, which is lower than 4%, is considered the minimum for a healthy bank. A higher net interest margin is linked to profitability in banks by preserving good quality of assets. The mean value of NIM is 6.09% which means banks are striving to increase their net interest margin.

The average capital adequacy ratio of 19.72 is shown in table 1 above means that most banks adhere to the minimum capital requirement of 10%. NPL ratio shows a minimum of 2.270 and a maximum of 7.600 with an average of 4.65, which is considered good according to Pompong and Ratna (2019), they point out that good NPL must be below 1. It implies that, on average, 4.7% of SIF's South Africa loans become nonperforming. The findings align with the South African Reserve Bank (SARB) analysis for 2009 – 2019. During that period, the average NPL ratio for South Africa was 3.97 percent, with a minimum of 2.84 percent in 2017 and a maximum of 5.94.

The ROCE of SIF's ranged from 4.04 to 116.16 with a mean of 33.17 (33%). Although some institutions have over 100% ROCE, some banks do not realise much capital-employed returns. Loan to deposit ratio also has a minimum value of 58.23 and a maximum of 127.46; any default will raise liquidity problems that can create panic and subsequently lead to a bank run. However, the overall average loan to deposit ratio for the selected banks is 90% which is in line with the ideal industry ratio of 80% and 90%.

The unemployment rate has a minimum, average, and maximum of 24%, 25%, and 28%, respectively. This shows that there is high unemployment in South Africa and for the period studied, it seems unemployment has been increasing. In a healthy economy, gross domestic product is considered ideal between 2% and 3%. South Africa's average GDP for the study period is 1.69, which shows that the economy is under stress and slow growth.

4.1.3. Cross-sectional dependency tests

A growing body of the panel data literature concludes that panel data sets are likely to exhibit substantial cross-sectional dependence, which may arise due to the presence of common shocks and unobserved components that become part of the error term ultimately, spatial dependence, as well as due to idiosyncratic pair-wise dependence in the disturbances with no particular pattern of common components or spatial

dependence. The impact of cross-sectional dependence in estimation naturally depends on a variety of factors, such as the magnitude of the correlations across cross-sections and the nature of cross-sectional dependence itself. Assuming that cross-sectional dependence is caused by the presence of common factors, which are unobserved and as a result, the effect of these components is felt through the disturbance term.

Table 2: cross-sectional dependency tests

Test	Return on Capital Employed (model 1)		Net interest margin (model 2)	
	Statistic	Prob.	Statistic	Prob.
Pesaran CD	0.273	0.785	-1.255	0.209

In their paper, Hoyos and Sarafidis (2006) point out that, Persaran CD test is expected to have good properties when *N* and *T* are small, and he provides Monte Carlo evidence to support this claim. Therefore, in this study, T is small Pesaran (, 2004) CD is therefore used for the analysis. Cross-section dependency in panel data is critical because banks are interdependent; if anything happens in one bank can affect or spillover to another bank. Table 2 above shows that the variables do not suffer from cross-sectional dependence since the p-value is greater than 5%. We can see the Pesaran CD test strongly rejects the null hypothesis of cross-sectional dependence at the 5% level of significance since Pesaran CD's probability is greater than 5%.

4.1.4. Unit root testing

The study tested for unit root presence using the Levin, Lin, and Chu test method to avoid spurious regression. The null hypothesis and the alternative hypothesis are unit root in the data set and no unit root in the data set. The decision criterion is that the null hypothesis is rejected when the probability is less than 5% otherwise accepted.

Table 3: Levin, Lin, and Chu unit root test results

Variables	Probability	Order of integration	Comment
Return on capital employed	0.0001	I(1)	Becomes stationary at first Difference
Net interest margin	0.0000	I(1)	Becomes stationary at first Difference
Nonperforming loans	0.0000	I(1)	Becomes stationary at first Difference
Capital adequacy ratio	0.0000	I(0)	Stationary at level
Loan to deposit ratio	0.0104	I(1)	Becomes stationary at first Difference
Liquidity ratio	0.0001	I(1)	Becomes stationary at first Difference
GDP	0.0000	I(1)	Becomes stationary at first Difference
Unemployment	0.0401	I(1)	Becomes stationary at first difference

From table 3 results, probabilities for net interest margin, return on capital employed, loan to deposit ratio, GDP, unemployment, nonperforming loans ratio, and liquidity ratio at level are greater than 5%; hence the study accepts the null hypothesis of the presence of unit root at level and individual intercept. In the first difference, the probabilities for all mentioned earlier are less than 5%; hence, we reject the null hypothesis of unit root presence, meaning that there is no unit root in variables hence stationary at first difference or integrated at order 1. Capital adequacy ratio is the only variable stationary at level and intercepts or integrated at order 0.

4.2. Selection of panel data model

To identify the model to use between the OLS-fixed effect and the OLS-random effect, we run the Hausmantest. The null hypothesis states that independent variables and error terms are uncorrelated. After running the Hausman test statistics at a 5% level of significance, a chi-statistic of 20.19 and a p-value is 0.0002. Therefore, the study rejected the null hypothesis at a 5% level of significance, and the fixed effects model was considered appropriate for the final analysis of data. The study also includes Panel generalized leastsquares (PGLS) (cross-section SUR) with cross-section SUR (PCSE) method to handlethe problem of autocorrelation and heteroscedasticity, which is mainly common in panel data. This method produces better results and high significance most

of the time.Wooldridge (2002)

4.3. Multicollinearity test using variance inflation factor (VIF).

It is essential to note that if independent variables are highly correlated, then multicollinearity effects will exist (Zainodin et al., 2011). Multicollinearity, therefore, decreases the estimation's accuracy; this diminishes the statistical power of the regression model**.**

Table 4: Variance inflation factors

Variable	Centered VIF (ROCE) (model 1)	Centered VIF (NIM) (model 2)
NPL	1.281	2.138
CAR	1.388	2.318
LDR	1.404	1.113
LAR	1.426	1.2117
GDP	1.449	1.153
UE	1.342	3.193
C	NA	NA

Multicollinearity was assessed in this study using the variance inflation factors (VIF). VIF values above 10 are an indication of the presence of multicollinearity. The results in table 4 present centered variance inflation factors results and they range from 1.113 to 3.193. According to Field (2009), there is no multicollinearity in both regression models used.

4.4. Normality Test

The data has to follow a normal distribution with parameters mean and variance. The null hypothesis is residuals are normally distributed, and the rejection criterion is we reject H_0 at 5% level of significance if the p-value of the Jaque-Bera is less than 5%. The charts below indicate the results of the Jarque-Bera test, kurtosis, and skewness of the data. The skewness kurtosis must be close to zero and three, respectively. Jarque-Bera probabilities are 0.73 and 0.63 for models one and two, respectively. We,therefore, fail to reject the null hypothesis and conclude that the residuals are normallydistributed.

On the charts below, skewness is -0.17 and -0.09, close to zero, and kurtosisis 3.6 and 3.4, close to 3.

Figure 5: Normality test: Model 1

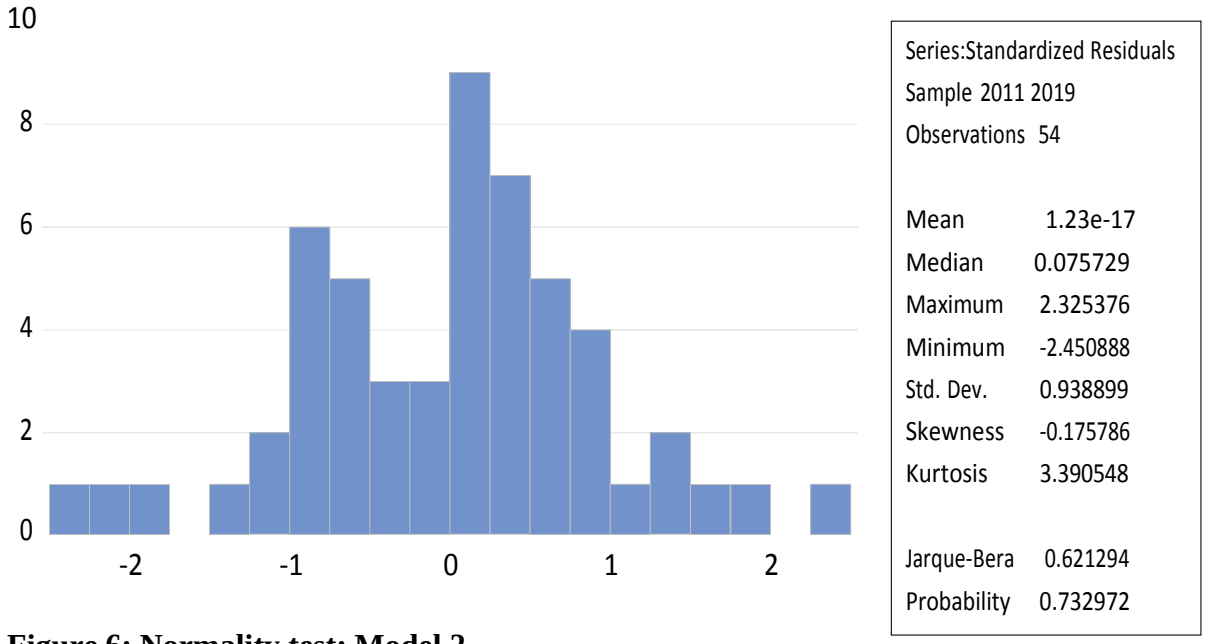
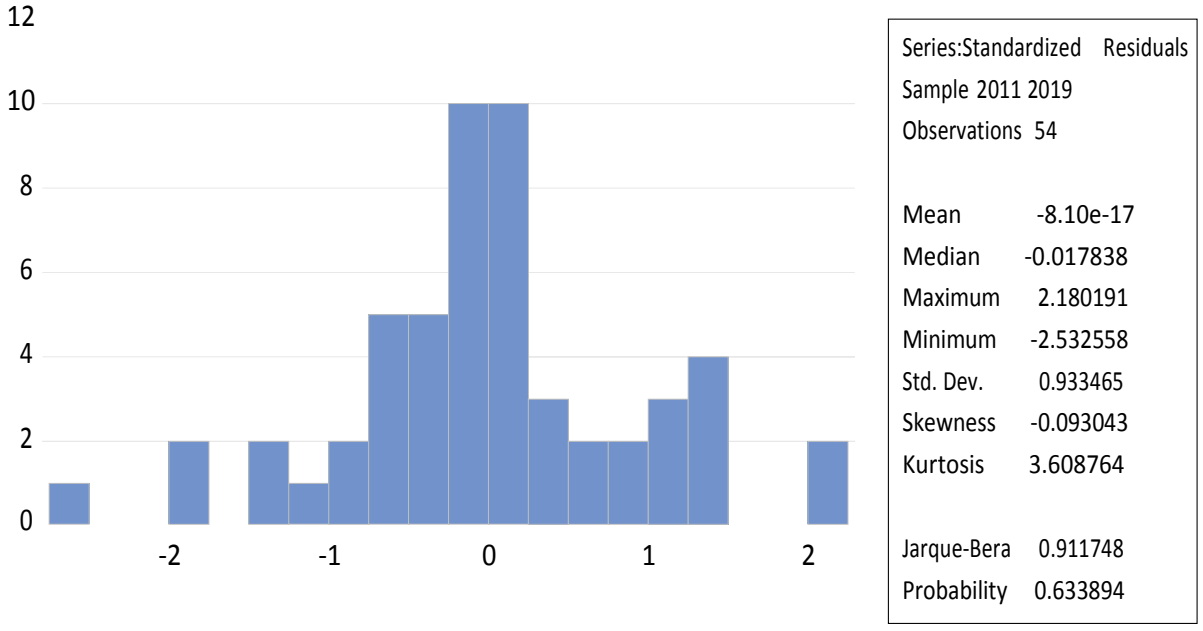


Figure 6: Normality test: Model 2



4.5. Fixed effects Regression Analysis output: Panel EGLS (Cross-sectionSUR)

Table 5: Regression output summary

Model	R^2	Adjusted R^2	p-(F-statistics)	Durbin-watson	P (t-statistic)
1	76.18%	69.94%	0.000	2.02	0.0186
2	65.76%	56.79%	0.000	1.98	0.0004

Source: research findings. *Note: model 1 is when return on capital employed as a dependent variable and model 2 net interest margin as a dependent variable.*

4.5.1. Significance test of the whole model

The F-test shows the significance of the whole model. The probability of the F-test should be significant, especially at a 1% level of significance. This means that the F-statistic probability should be equal to zero, and as shown in Table 5 above, both models' probabilities are equal to 0.0000. This means that the independent variables collectively have a significant effect on financial performance. These results confirm that a linear relationship exists between the dependent variable and the independent variables.

4.5.2. Coefficient of determination (R^2)

R-squared measured the variation in the dependent variables (net interest margin and return on capital employed), explained by variations in the independent variables (CAR, NPL, LDR, LAR, UE, and GDP). The results, as shown in table 5, both models indicate that independent variables can explain or affect the dependant variables of models one and two by 76% and 66% leaving 24% and 34% respectively unexplained, and this means that other variables or other factors can explain it.

4.5.3. Durbin Watson Statistic

The Durbin Watson statistic can detect autocorrelation in the residuals from a regression analysis. The Durbin Watson statistic will always assume a value between 0 and 4. If Durbin Watson Statistic is equal to 2, it means that there is no autocorrelation. A value below 2 shows a positive autocorrelation, and a value higher than 2 indicates a negative serial correlation. Table 5 Durban Watson's statistics from both models are 2.02 and 1.98; this means that both models are not affected by autocorrelation.

4.5.4. T- Statistic

For the whole model to be statistically significant, the probability value of t-statistics must be less than or equal to 5%. Looking at the probability value in table 5 show that both models' probability of t-statistic is less than 5% (0.0186> 0.05 and 0.0004>0.05), thus making dependant variables significant in explaining bank's financial performance measured by return on capital employed and net interest margin.

4.5.5. Constant Parameter

The intercept, which is often considered the constant, is the dependent variable's estimated mean value when all independent variables are equal to zero. For instance, holding other things constant, if the explanatory variables are equal to zero, it means model 1 and model 2 will be represented by the constant values, which are 9.806445 and -1.253714, respectively.

4.5.6. Fixed effects model: Panel EGLS (cross-section SUR)

This panel data regressions equation explains the effect of Capital Adequacy Ratio (CAR), Non-performing Loans (NPL), Liquid asset ratio (LAR), gross domestic product (GDP), Unemployment (UE), and Loan to Deposit Ratio (LDR) on return on capital employed and net interest margin of designated SIFI'S banks in the 2010– 2019 period as follows:

4.5.7. Analysis of model one results: Return on capital employed

Table 6: Summary of model 1 results

Variable	Coefficient	t-Statistic	Prob.
CAR	-0.553545	-2.570528	0.0138
NPL	0.159589	0.909901	0.3681
LDR	-0.113967	-3.224427	0.0024

LR	0.573147	8.687595	0.0000
GDP	-0.326654	-0.945061	0.3500
UE	1.078691	3.306561	0.0019
C	9.806445	2.448343	0.0186

Note: CAR=capital adequacy ratio, NPL=nonperforming loans, LDR=loan to deposit ratio, LR= liquidity ratio, GDP=gross domestic product, UE=unemployment and C=constant

Model 1

$$ROCE_{it} = 9.806445 - 0.553545CAR_{it} + 0.159589NPL_{it} - 0.113967LDR_{it} + 0.573147LR_{it} - 0.326654GDP_{it} + 1.078691UE_{it} + \varepsilon_{it}$$

The coefficients of independent variables indicate that explanatory variables impacted the deviation in the dependent variable at a fluctuating degree, as shown in model one. The model shows that ROCE is affected negatively by capital adequacy ratio, loan to deposit ratio, and liquidity ratio. However, this showed that as CAR, LDR, and LR increase, there would be a corresponding decrease in bank performance where nonperforming loans and unemployment positively impact return on capital employed.

The impact of capital adequacy ratio on the bank performance (ROCE).

Based on the regression result in table 6, the capital adequacy ratio coefficient is -0.5535; this indicates that any increase in CAR will cause a decrease in ROCE. If CAR increase by 1% ceteris paribus, return on capital employed will decrease by -0.5535; this means CAR has a negative effect on ROCE. The probability value (t-statistic) of the capital adequacy ratio is 0.0139, which is lower than the significance value of 5% (0.00 <0.05); therefore, H0 is rejected. It can be concluded that the capital adequacy ratio variable had a significant and negative effect on the bank's bank performance in the 2010-2019 period. This study's findings are in line with the previous research conducted by Ifeacho and Ngalawa (2014), Chukwunulu et al. (2019), Ali, Muazu, and Joseph (2020). However, it contradicts Wood and McConney's (2018) and Stevani and Sudirgo's (2019) results. The reason for an adverse effect might be that total risk-weighted assets cover assets with the utmost risk from loans. If loans increase, this will lead to an increase in total risk-weighted assets and can cause a decrease in the capital adequacy significance in the bank. The volume of cash funds available to banks is very

vital in determining a bank's productivity. Suppose more capital funds are available to a bank. In that case, it can issue more loans and receive additional interest revenue than banks with low capital funds because they issue less volume of loans to their customers.

The impact of non-performing loans on the bank performance (ROCE)

Table 6 above, where ROCE was the proxy for bank performance, NPL recorded a positive coefficient of 0.159589 and a p-value of 0.3681. Since the p-value is greater than 0.05 (0.2885 > 0.05), nonperforming loans have a positive and insignificant effect on bank performance measured by return on capital employed. This study, therefore, rejects the null hypothesis. The results are consistent with the study of Suvita and Xiaofeng (2012) but in contradiction with studies conducted by Ali and Dhiman (2019), Ekinci and Poyraz (2019), and Wood and McConney (2018). They find a significant negative relationship between non-performing loans and bank performance as theoretically expected. The surprising positive effect of nonperforming loans on banks' performance points out that, although loan default, nonperforming loans are growing in line with bank profitability. This suggests that commercial banks lack effective institutional procedures in the management of credit risk.

The impact of loan to deposit ratio on the bank performance (ROCE)

The loan to deposit ratio variable has a coefficient of -0.113969. This means that the loan to deposit ratio affected the return on capital employed negatively. LDR had a probability value (t-statistic) of 0.0024, which is lower than the significance value of 0.05 (0.0024<0.05). Therefore, the LDR variable has a negative and significant effect on bank performance measured by ROCE. The loan to deposit ratio is a measure of liquidity. The negative coefficient of -0.113969 suggests that a 1% increase in loan to deposit ratio will reduce bank performance by 0.113969. This result highlights the trade-off between liquidity and bank performance. Ceteris paribus, if the bank holds up more significant amounts of capital funds to meet liquidity demands, its performance decreases. However, Bank managers should be competent and very tactical to hold up adequate liquidity without affecting profitability. The negative relationship between loan to deposit ratio and bank performance confirms Mapharing, Mphoeng, and Dzimiri's (2019) findings.

The impact of the liquidity ratio on the bank performance (ROCE)

Based on table 6 results above, where ROCE was the proxy for bank performance, LR

recorded a positive coefficient of 0.573147 and a p-value of 0.0000. Since the p-value is less than 0.05 (0.0000 < 0.05), the liquidity ratio had a positive and significant impact on the bank performance (return on capital employed). This study, therefore, accepts the null hypothesis. An increase of 1% in liquidity ratio will increase bank performance by 0.5731.

The impact of the gross domestic product on the bank performance (ROCE).

Table 6 results above, where ROCE was the proxy for bank performance, GDP recorded a negative coefficient of 0.326654 and an insignificant p-value of 0.3500. Since the p-value is greater than 0.05, i.e. (0.3500> 0.05), this study, therefore, rejects the null hypothesis and concludes that gross domestic product has a negative and insignificant impact on the bank performance (return on capital employed). The results are in line with the study of Wood and McConney (2018). This proves that even though the South African economy is under stress, banks are profitable.

The impact of unemployment rate on the bank performance (ROCE).

Table 6 results above, where ROCE was the proxy for bank performance, unemployment recorded a positive coefficient of 1.078691 and a significant p-value of 0.0019. Since the significance value is less than 0.05, i.e. (0.0063 < 0.05), the impact of unemployment on bank performance is positive and significant. This study, therefore, accepts the null hypothesis. This means that an increase in unemployment by 1% will lead to a marginal increase of 1.078691 on bank performance. These positive results are against the expectations that high levels of unemployment lead to a decrease in production. This can effectively hinder banks' financial intermediation role of borrowing from surplus units and lending to deficit units, thereby affecting bank performance.

4.5.8. Analysis of model two results: Net Interest Margin

Table 7: Summary of model 2 results

Variable	Coefficient	t-Statistic	Probability
CAR	0.053745	3.104646	0.0034

NPL	-0.091598	-4.126616	0.0002
LDR	0.003881	0.857789	0.3959
LR	-0.013609	-1.704178	0.0957
GDP	-0.130697	-2.331998	0.0246
UE	0.057435	1.013627	0.3166
C	-1.253714	-3.853416	0.0004

Note: CAR=capital adequacy ratio, NPL=nonperforming loans, LDR=loan to deposit ratio, LR= liquidity ratio, GDP=gross domestic product, UE=unemployment and C=constant

Model 2

$$NIM_{it} = 1.253714 - 0.053745CAR_{it} - 0.0981598NPL_{it} + 0.003881LDR_{it} - 0.130697LR_{it} - 0.130697GDP_{it} + 0.057425UE_{it} + \varepsilon_{it}$$

The coefficients of independent variables indicate that explanatory variables impacted the deviation in the dependent variable at a fluctuating degree, as shown in model 2. The model shows that the net interest margin is negatively affected by capital adequacy ratio, non-performing loans, gross domestic product, and liquidity ratio. This indicates that as CAR, GDP, NPL, and LR increase, there will be a corresponding decrease in bank performance measured by net interest margin. The loan to deposit ratio and unemployment positively affect the net interest margin.

The impact of capital adequacy ratio on profitability (NIM)

From the results in table 7 above, the coefficient value for CAR where NIM was the dependent variable 0.05374 and a significant p-value of 0.0034. This study, therefore, fails to reject the null hypothesis since the p-value is lower than 0.05 (0.0034 < 0.05) and concludes that the capital adequacy ratio had a positive and significant impact on bank performance. This means that holding other things constant, an increase of 1% in capital adequacy ratio will lead to an increase of 0.0034 bank performance (net interest margin). This implies that, as the bank can fulfill its long-term financial obligations by being highly solvent, profitability is likely to increase. Results of this study are consistent with the study of Wood and McConney (2018), Chukwunulu et al. (2019), and Abu et al. (2015). They also find positive and significant results aligned with the theoretical concepts of capital adequacy embraced by recent Basel III, which encourage banks to boost their capital and also promoting soundness and stability in the banking system

The impact of non-performing loans on the bank performance (NIM)

Nonperforming loans had a negative coefficient value of -0.091598 and a significant p-value of 0.0002, and its p-value is less than 0.05 (0.0002< 0.05). The study, therefore, fails to reject the null hypothesis and conclude that non-performing loans have a significant and negative impact on bank performance. This means that an increase of 1% in non-performing loans ceteris paribus will decrease -0.091598 in net interest margin, thereby negatively affecting bank performance. This result is also supported by the findings of Ali and Dhiman (2019), Serwadda (2018), and Ekinci and Poyraz (2019). Suppose there is an increased supply of credit by banks and inadequate monitoring by management on screening borrowers will increase nonperforming loans and negatively affect bank performance. This effect of non-performing loans can be

triggered by an increase in unsecured assets as they do not create revenue. The growth of unsecured assets raises the volume of funds to be saved by banks to cover estimated credit losses. Therefore, unsecured asset growth harms bank profitability. These findings support the statement that credit risk is a significant determinant of the bank's financial performance.

The impact of loan to deposit ratio on bank performance. (NIM)

The coefficient value for the loan to deposit ratio in table 7 is 0.003881 and an insignificant p-value of 0.3959. Since the p-value is greater than 0.05 (0.0031<0.05), the study rejects the null hypothesis. It concludes that the loan to deposit ratio positively and insignificantly affects the bank performance (net interest margin) during the study period. An increase in loans leads to an increase in bank's interest income; this means loans provide contributions to bank performance. Ali and Dhiman also support this result; they also find a positive and insignificant effect of loan to deposit ratio on bank performance.

The impact of liquidity ratio on bank performance. (NIM)

The regression results in table 7 show that the liquidity ratio had a coefficient value of -0.013609 and an insignificant p-value of 0.0957. Since the p-value is greater than 0.05 (0.0957> 0.05), the study rejects the null hypothesis and concludes that there is an insignificant negative relationship between net interest margin and liquidity ratio. This means that holding other things constant, a 1% increase in liquidity ratio leads to a decrease in bank performance (net interest margin) by 0.013609. These results contradict Yong Tan et al. (2017) and Pompong and Ratna (2019), who find a positive and significant effect between liquidity and bank performance. However, Chukwunulu et al. (2019) also find a negative and insignificant effect.

The impact of the gross domestic product on the bank performance (NIM)

When NIM was used as the proxy for bank performance, GDP's coefficient value was -0.130697. A significant p-value of 0.0246 since the p-value is less than 0.05, i.e. (0.0246 < 0.05), we, therefore, accept the null hypothesis and conclude that GDP has a significant negative impact on the bank performance (net interest margin). This means holding other things constant; an increase of 1% in economic growth leads to decreased bank performance.

The impact of unemployment rate on the bank performance (NIM).

Unemployment shows a coefficient value of 0.057435 and a p-value of 0.3166. Since the t-statistic p-value is greater than 0.05, the study fails to accept the null hypothesis and conclude that unemployment positively and insignificantly impacted the bank performance (net interest margin). This positive and insignificant impact of the unemployment rate on bank performance is consistent with reports that have been hailed the South African banking sector as remaining stable and resilient than other sectors.

4.6. Hypothesis testing

Table 8: summary of hypothesis testing

Hypothesis	Statement	Variables	ROCE	NIM
H_1	Market Risk have a significant impact on the financial performance of commercial banks in South Africa	**GDP**	rejected	**Accepted**
		UE	rejected	**rejected**
H_2	Credit Risk have a significant impact on the financial performance of commercial banks in South Africa	**NPL**	Rejected	**accepted**
H_3	Liquidity Risk have a significant impact on the financial performance of commercial banks in South Africa	**LR**	Accepted	**Rejected**
		LDR	Accepted	**rejected**
H_4	Capital Risk have a significant impact on the financial performance of commercial banks in South Africa	CAR	Accepted	**accepted**

The regression analysis outputs in Tables 6 and 7, the column labeled probability., are the probability values that indicate the significance values to show if independent variables have a statistically significant influence on the dependent variables. If the significant value is less than 0.05, then the variable in question shows a statistical significance in predicting the dependent variable hence accepting the null hypothesis. If, on the other hand, the probability value is more than 0.05, then it means that the variable does not have any significant influence on the prediction of the dependent

variable, and we reject the null hypothesis. Based on the above enlightenment, the stated hypotheses are shown in Table 8, and they are interpreted below;

The market risk was measured by gross domestic product (GDP) and unemployment (UE). Unemployment had a positive and significant effect on ROCE and an insignificant positive impact on net interest margin (NIM). In contrast, the gross domestic product had an insignificant negative relationship with bank performance measured by ROCE and a negative and significant effect with financial performance measured by NIM.

The non-performing loans ratio measured credit risk. It had an insignificant positive impact on financial performance measured by return on capital employed, whereas it had a negative and significant impact on net interest margin.

Liquidity risk was measured by loan to deposit ratio (LDR) and liquidity ratio (LR). The loan to deposit ratio positively and significantly affected bank financial performance measured by return on capital employed and a statistically insignificant impact on net interest margin (NIM). However, the liquidity ratio positively and significantly impacted return on capital employed and a negative and insignificant effect on financial performance (NIM).

The capital adequacy ratio measured the capital risk. It had a statistically significant negative effect on bank financial performance (ROCE) and a statistically significant positive effect on net interest margin.

4.7. Conclusion

The chapter put down all the study findings, including the analysis of the results. Of importance was the connection of independent variables to commercial bank performance. The study yields mixed negative and significant positive impacts, and insignificant effects were presented depending on the measure of financial performance, thereby distorting the study's results. The results were analyzed using the Eviews11 student version. The chapter gives a clear outcome to the introductions in chapter one, works of literature in chapter two using the methodology developed in chapter three. The next chapter marks the end of this study by stating the study's conclusions and recommendations.

CHAPTER FIVE: SUMMARY, RECOMMENDATIONS, AND CONCLUSIONS

5.1. Introduction

This chapter summarizes the study findings and makes recommendations built from the study's results presented in chapter 4 and the related theories discussed in chapter 2. Its emphasis is on simplifying the study problem's understanding by carefully involving the recommendations in the outcomes.

5.2. Summary of findings

This study's key drivers were to analyze the impact of risk factors on commercial banks' financial performance in South Africa. Risk factors evaluated are credit risk, capital risk, liquidity risk, and market risk in line with Mapharing, Mphoeng, and Dzimiri (2019) and Matayo and Muturi (2018). Profitability ratios, namely, return on capital employed (ROCE) and net interest margin (NIM), were measures for bank performance. Positive and negative significant effects were predicted among the selected four (credit risk, liquidity risk, capital risk, and market risk) types of risks with financial performance. The conclusions are as follows:

The study established a mixture of positive and negative significant relationships in financial performance in terms of liquidity risk measured by loan to deposit ratio (LDR) and liquidity ratio (LR). Negative findings are in line with Mapharing, Mphoeng, and Dzimiri (2019), Yousfi (2015). Positive significant outcomes of the study are in line with Oladunjoye (2014). Therefore, the adverse effects indicate that increase in liquidity risk, the bank's financial performance decreases. This is caused by more weight and oversight employed on the management of risks at banks, which decreases performance; therefore, there is an indication of a trade-off amid safety and financial performance.

Likewise, a mixture of negative and positive significant impact was obtained between capital risk measured by capital adequacy ratio (CAR) and banks' financial performance. These results indicate that the increase of capital adequacy ratio has resulted in either reducing or increasing commercial banks' financial performance

depending on the profitability ratio used. This study yields a negative relationship with return on capital employed while net interest margin yields positive results as expected.

Moreover, the nonperforming loans ratio, which was the measure for credit risk, produced mixed results by having a positive and insignificant relationship with bank performance (return on capital employed) this relationship. A negative and significant association with bank financial performance (net interest margin) as expected is in line with the studies that concluded that credit risk has a negative effect on financial performance. Therefore, the effect of credit risk on bank financial performance in this study remains inconclusive.

Similarly, the market risk measured by gross domestic product and unemployment rate yields mixed results. GDP had a positive and insignificant relationship with bank financial performance measured by return on capital employed, while with net interest margin, a negative and significant relationship is obtained. On the other hand, unemployment yields a positive and significant relationship with bank performance measured by return on capital employed. With a net interest margin, a positive and insignificant result is obtained. This relationship of unemployment and bank performance is in line with the current South African banking sector, which is despite the current high unemployment rate, the sector remains resilient.

5.3. Study conclusions

From the above empirical findings, the study concludes that credit risk, liquidity risk, solvency risk, and market risk factors are fundamental factors in determining South African commercial banks' profitability and financial performance. This study indicates that banks' performance and nonperforming loans are inversely related, exposing banks to illiquidity and financial crisis. Therefore, banks should pay more attention to credit risk and liquidity risk. On a lighter note, the study recommends banks should construct effective policies to curb problems associated with solvency, liquidity, and credit risk issues accordingly. Poor risk management policies influence asset quality, leading to increased loan losses plus non-performing loans, exposing banks to financial distress.

5.4. Recommendations

There should be a sense of balance between economic growth and standards for financial stability. If policy regulators apply too few rules, the financial sector risks will become unstable. However, implementing too hostile rules might lead to a lack of an opportunity for a vibrant financial sector to back growth. Measures used to assess financial risks in this study solvency (capital adequacy ratio), credit risk (nonperforming loans ratios), profitability (return on capital employed and net interest margin), liquidity (loan to deposit ratio, liquidity ratio). These need to be observed over the coming months and years.

Higher capital adequacy ratios have added to a pulling out of cross-border loaning from developing countries in previous crises. The same might be happening now due to the COVID 19 crisis. Furthermore, borrowers are receiving lower incomes and might not reimburse their commitments, which will increase nonperforming loans that were already 5% in South Africa as of November 2020.

South African government should address such predicaments by taking on bad-debt by acquiring or securing banking assets at the lowest prices, capitalizing banks, taking equity stakes in corporations, and encouraging lending through government-backed securities other institutions, like development banks.

South Africa's current and potential investors should also note the information enclosed in the research and cautiously select the company they want to invest their funds in. Investors should also consider the level of risk for a bank, capital adequacy and liquidity, and the firm's capability to control the level of operating cost efficiency in advance of investing.

To sum up, the recommendations from this study's outcomes are that banks should have an appropriate sense of balance when managing risk or performing their risk management practices. By avoiding and minimizing bank exposures, banks should produce more earnings. Centered on the conclusions of this study, we recommend that South African banks should implicate applicable market risk, solvency risk, default risk, and liquidity risk administration rules that will produce proceeds for the banks

5.5. Limitations and areas of further research

A future study might consider other independent variables to sufficiently capture financial risk management's effect on commercial banks' performance in South Africa. Further, a stretched-out period in data sets that includes the pre-crisis period of 2008 and the post-crisis, including more bank-specific variables and macroeconomic variables that were not included in this study, may be of interest note any essential differences in the variables and period. The study only focused on the systematic important banks in South Africa; therefore, further studies can include all registered commercial banks in South Africa.

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APPENDICES

Appendix 1: Regression Model 1

Dependent Variable: DROCE

Method: Panel EGLS (Cross-section SUR)

Date: 02/25/21 Time: 14:20

Sample (adjusted): 2011 2019

Periods included: 9

Cross-sections included: 6

Total panel (balanced) observations: 54

Linear estimation after one-step weighting matrix

Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	-0.553545	0.215343	-2.570528	0.0138
DNPL	0.159589	0.175391	0.909901	0.3681
DLDR	-0.113967	0.035345	-3.224427	0.0024
DLR	0.573147	0.065973	8.687595	0.0000
DGDP	-0.326654	0.345643	-0.945061	0.3500
DUE	1.078691	0.326227	3.306561	0.0019
C	9.806445	4.005340	2.448343	0.0186

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

Root MSE	0.930165	R-squared	0.761776
Mean dependent var	0.133880	Adjusted R-squared	0.699384
S.D. dependent var	2.224835	S.E. of regression	1.054708
Sum squared resid	46.72119	F-statistic	12.20951
Durbin-Watson stat	2.023272	Prob(F-statistic)	0.000000

Unweighted Statistics

R-squared	0.581109	Mean dependent var	-0.064637
Sum squared resid	846.2646	Durbin-Watson stat	1.701446

Appendix 2: Regression Model 2

Dependent Variable: DNIM

Method: Panel EGLS (Cross-section SUR)

Date: 02/25/21 Time: 14:23

Sample (adjusted): 2011 2019

Periods included: 9

Cross-sections included: 6

Total panel (balanced) observations: 54

Linear estimation after one-step weighting matrix

Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	0.053745	0.017311	3.104646	0.0034
DNPL	-0.091598	0.022197	-4.126616	0.0002
DLDR	0.003881	0.004525	0.857789	0.3959
DLR	-0.013609	0.007986	-1.704178	0.0957
DGDP	-0.130697	0.056045	-2.331998	0.0246
DUE	0.057435	0.056663	1.013627	0.3166
C	-1.253714	0.325351	-3.853416	0.0004

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

Root MSE	0.924782	R-squared	0.657590
Mean dependent var	-0.305114	Adjusted R-squared	0.567911
S.D. dependent var	1.593629	S.E. of regression	1.048604
Sum squared resid	46.18196	F-statistic	7.332724
Durbin-Watson stat	1.981863	Prob(F-statistic)	0.000001

Unweighted Statistics

R-squared	0.317898	Mean dependent var	-0.175797
Sum squared resid	14.97493	Durbin-Watson stat	1.299577

Appendix 3: Data used for analysis

year	bank name	ROCE	NIM	CAR	NPL	LR	LDR	GDP	UE
2010	ABSA	46.0468	3.3539	14.80	7.60	12.4594	93.0694	3.0397	24.6831
2011	ABSA	39.4840	3.2849	16.20	6.90	15.3363	92.7481	3.2842	24.6389
2012	ABSA	40.6926	3.5422	17.50	5.80	15.6373	97.1108	2.2134	24.7272
2013	ABSA	47.3207	3.5970	15.60	4.71	13.3161	94.1166	2.4852	24.5613
2014	ABSA	46.6504	3.7858	13.70	4.19	15.2578	94.5272	1.8470	24.8901
2015	ABSA	45.2366	3.7918	13.60	3.47	17.8940	95.0454	1.1937	25.1494
2016	ABSA	44.0760	3.9042	15.10	3.94	15.1146	95.7744	0.3991	26.5365
2017	ABSA	41.1050	3.9404	15.00	3.75	17.3104	96.3309	1.4145	27.0354
2018	ABSA	40.7579	3.7373	15.40	4.81	15.2389	94.3294	0.7871	26.9062
2019	ABSA	39.3261	3.6299	16.20	4.47	16.7442	93.4976	0.1526	28.4681
2010	FRB	8.2908	4.0300	13.80	4.66	13.1681	85.6698	3.0397	24.6831
2011	FRB	10.0702	4.1900	14.20	4.35	12.9225	84.0316	3.2842	24.6389
2012	FRB	11.5704	4.5800	14.60	3.58	15.0551	86.5122	2.2134	24.7272
2013	FRB	13.4494	3.7900	14.90	2.88	14.4673	86.2317	2.4852	24.5613
2014	FRB	16.0521	3.7300	16.40	2.36	12.9901	89.2861	1.8470	24.8901
2015	FRB	19.3916	3.8600	16.90	2.66	16.2086	126.2079	1.1937	25.1494
2016	FRB	20.0859	3.9100	17.10	2.43	15.6968	127.4568	0.3991	26.5365
2017	FRB	20.7726	3.5300	17.30	2.27	10.5683	90.8063	1.4145	27.0354
2018	FRB	30.4823	3.2500	16.80	2.47	10.9224	87.7905	0.7871	26.9062
2019	FRB	41.0404	3.1100	16.80	3.71	10.7402	86.5515	0.1526	28.4681
2010	Capitec	116.1573	19.1380	37.00	6.20	54.5340	70.9906	3.0397	24.6831
2011	Capitec	79.7737	18.4065	41.00	5.70	39.6967	96.3787	3.2842	24.6389
2012	Capitec	77.8958	18.4478	39.00	5.10	38.7783	95.3141	2.2134	24.7272
2013	Capitec	61.8424	17.9601	41.00	5.80	18.9596	96.3264	2.4852	24.5613
2014	Capitec	60.8328	17.7712	39.00	6.50	21.4007	84.7785	1.8470	24.8901
2015	Capitec	65.6428	17.2866	36.00	5.40	21.3607	78.8802	1.1937	25.1494
2016	Capitec	66.3520	18.5963	35.00	5.60	22.8484	74.5927	0.3991	26.5365
2017	Capitec	64.6296	17.4567	34.00	6.30	26.6488	70.5354	1.4145	27.0354
2018	Capitec	61.6346	14.8372	36.00	5.70	30.3836	65.3038	0.7871	26.9062
2019	Capitec	63.2820	12.5220	33.90	7.20	30.6568	58.2329	0.1526	28.4681

2010	Nedbank	4.0452	2.9335	15.00	3.20	5.5242	96.9075	3.0397	24.6831
2011	Nedbank	5.0946	3.0331	14.80	3.65	5.9015	95.1824	3.2842	24.6389
2012	Nedbank	6.9440	3.0882	13.60	3.62	5.9936	95.6956	2.2134	24.7272
2013	Nedbank	8.0839	3.0879	14.40	3.57	6.3318	96.0892	2.4852	24.5613
2014	Nedbank	8.4524	3.0713	14.70	3.65	5.4148	93.8130	1.8470	24.8901
2015	Nedbank	9.4964	2.8831	14.10	4.90	7.5141	93.9080	1.1937	25.1494
2016	Nedbank	10.9835	2.9338	16.00	2.80	6.4923	92.8481	0.3991	26.5365
2017	Nedbank	11.6652	2.9801	16.70	2.70	6.7146	92.0611	1.4145	27.0354
2018	Nedbank	12.6648	2.9888	15.70	2.90	14.7784	89.1622	0.7871	26.9062
2019	Nedbank	13.8015	2.8871	15.50	3.50	17.6139	88.1080	0.1526	28.4681
2010	Standard bank	18.8463	2.1307	12.90	5.60	14.8511	90.4686	3.0397	24.6831
2011	Standard bank	19.0508	2.1782	12.00	4.50	13.8312	91.3925	3.2842	24.6389
2012	Standard bank	19.2927	2.3429	14.30	5.50	13.9337	89.0729	2.2134	24.7272
2013	Standard bank	19.6118	2.5614	16.20	7.20	8.5127	91.0910	2.4852	24.5613
2014	Standard bank	22.3610	3.0143	15.50	5.90	10.3687	88.6393	1.8470	24.8901
2015	Standard bank	22.3238	2.8868	15.70	4.60	17.3287	90.7631	1.1937	25.1494
2016	Standard bank	25.7785	3.1183	16.60	5.80	17.9868	87.7873	0.3991	26.5365
2017	Standard bank	27.5134	3.2682	16.00	4.70	19.1452	83.4911	1.4145	27.0354
2018	Standard bank	26.3108	3.0906	16.00	6.30	18.9510	82.4690	0.7871	26.9062
2019	Standard bank	26.2335	3.0655	16.70	7.20	19.5459	82.8126	0.1526	28.4681
2010	Investec	13.0481	4.2147	15.50	1.30	10.7485	82.7316	3.0397	24.6831
2011	Investec	12.5971	2.0117	11.60	2.00	14.8256	73.0565	3.2842	24.6389
2012	Investec	11.8278	1.3106	11.60	2.89	12.7602	76.1876	2.2134	24.7272
2013	Investec	11.0582	0.8692	15.50	3.60	12.8780	79.7625	2.4852	24.5613
2014	Investec	13.0885	0.7219	14.90	2.90	11.4828	81.2142	1.8470	24.8901
2015	Investec	16.8566	0.6622	14.70	2.58	12.8627	84.1752	1.1937	25.1494
2016	Investec	18.4139	0.6863	14.00	3.59	16.9688	76.4675	0.3991	26.5365
2017	Investec	18.1803	0.8749	14.10	2.60	11.5006	78.4514	1.4145	27.0354
2018	Investec	18.2859	1.0205	14.60	3.51	11.7838	77.7896	0.7871	26.9062
2019	Investec	19.2607	1.0931	14.80	3.02	10.3584	77.9113	0.1526	28.4681