Impact of credit risk management on commercial banks performance in South Africa

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DECLARATION

I, Samantha Naidoo, declare that this research report entitled 'Impact of credit risk management on commercial banks in South Africa.', is my own unaided work. I have acknowledged, attributed, and referenced all ideas sourced elsewhere. I am hereby submitting it in partial fulfilment of the requirements of the degree of Master of Business Administration at the University of the Witwatersrand, Johannesburg. I have not submitted this report before for any other degree or examination to any other institution.

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Signed on this 27th day of February 2023 in Johannesburg

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ABSTRACT

This study will attempt to analyse the impact of credit risk management on commercial banks in South Africa. The objective is to identify how credit risk is measured and establish a relationship with the performance of commercial banks in South Africa. Two measures of risk were contemplated being the percentage of non-performing loans and the capital adequacy ratio; and its subsequent impact on the performance of the commercial banks, measured by return on equity (ROE). The study looked at six commercial banks in South Africa and using regression analysis found a statistically significant correlation between non-performing loans and performance and that capital adequacy ratio has a greater impact on performance than non-performing loans. It was recommended that commercial banks in South Africa continue with a robust and rigorous credit lending policy; with continuous measurement of loan performance throughout the life of the loan to ensure non-performing loans are kept as low as possible. Furthermore, unremitting management and monitoring of Tier I and Tier II capital will positively impact the performance of the commercial banks in South Africa.

DEDICATION AND ACKNOWLEDGEMENT

Dedication

I dedicate this to my loving parents: my dearly departed Dad, Mr Manogaran Deenadayalan Reddy and my courageous, beautiful Mum, Mrs Pathmadevi Reddy. I am because you are.

Acknowledgement

I thank my husband, Vishendran Naidoo, for his unwavering love and support throughout this arduous journey; my extended family and friends for cheering me on. I thank my supervisor, Dr Bongani Munkuli, for seeing my potential and encouraging me to reach it. To my MBA colleagues, lecturers and administrators – thank you for this experience. I am better because of it.

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1. INTRODUCTION TO THE RESEARCH

More generally, this research evaluates the impact of credit risk management on commercial banks performance in South Africa. However, before we consider the research conceptualisation in Section 1.2, we briefly introduce the terms and concepts that we have used in conceptualising this research in Section 1.1 generally and broadly. Chapter 2 has a more specific and detailed discussion on the research context. The research conceptualisation section of the research identifies the research problem statement in Section 1.2 and reads into the reason for this research in Section 1.2.2. The delimitations and assumptions of the research study is contemplated in Section 1.3 and in Section 1.4 the significance of the research study is discussed. Section 1.5 provides an outline of how the report will be presented.

1.1. Context of and background to the study

Globalisation has allowed for commercial banks in South Africa to be more competitive in its offering to end users of financial instruments and products. Through the increased competition, it is encumbered on the commercial bank to increase its ability to discern the good credit from the bad through increased credit risk management protocols. It is undeniable that commercial banks, being critical components of a country's capital markets, are extremely important for trade, investment, finance and economic growth. While these are equally important for robust, strong and well-performing banking system, most practitioners and policymakers recognise that maintaining a high quality in bank assets, especially in loan advances, is indispensable for a vibrant banking system. Risk-taking and competition are some of the initiatives that are likely to threaten asset quality. This study will review credit risk management and the impact on performance of commercial banks in South Africa, measured through profitability.

Through the 2008-2009 world financial crisis financial institutions in many countries around the world faced closure through higher risk-taking behaviours which resulted in poor quality of assets. The financial crisis started as a result of brazen manoeuvres by lenders of debt into the mortgage loan market. These loans, which are assets to financial institutions, were given at low interest rates and to end-users who did not have a good credit profile or sustainable income to continue repaying the loans. These loans would be bundled into mortgage-backed securities and then sold off as lucrative financial instruments. As the number of loans grew with an unsustainable repayment profile, the number of non-performing loans grew resulting in increased liquidity and capital risk for those financial institutions. The effect was so great that governments stepped in to bail out these financial institutions and recapitalise the banks to

ensure the banks remain liquid. If this route was not taken, there would have been a greater recession in these countries which would have severely impact the greater economy. Following the 2008-2009 financial crisis, policymakers introduced stricter controls to lending.

South Africa is no stranger to poor credit risk management in commercial banks with the latest failure being African Bank which was placed under curatorship in 2014 for reckless lending in unsecured loan advances. Although commercial banks in South Africa and licenced financial institutions are governed by the *National Credit Act 34 of 2005* which aims to curb reckless lending and improve credit risk management; this does not completely eliminate the risk of poor credit management.

It would stand to reason that credit risk management policies were flouted by some financial institutions in the quest to outmanoeuvre its competition and increased profitability in the short term. Understanding the impact of poor credit risk management on firm performance [measured through return on equity] will reduce the recurrence of failures caused by poor credit risk management.

1.2. Research conceptualisation

1.2.1. Identifying the problem statement

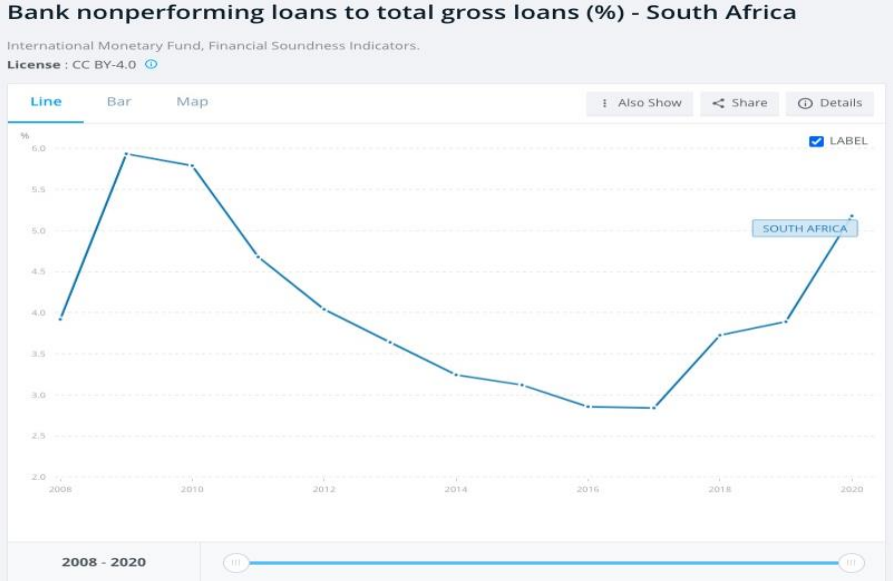
This research will investigate the impact between credit risk management and performance of commercial banks in South Africa. Through globalisation and increased competition, commercial banks are faced with the increasing profitability while managing a good credit risk framework. The effect of good credit risk management is seen either through or after a financial crisis [or other crisis that may infer financial crisis for example the Covid-19 pandemic] in the financial performance of the commercial bank and its exposure to non-performing loan advances.

Commercial banks increase profitability by providing debt in the form of loan advances to the end user. The mechanism in which commercial banks apply credit principles of whether to advance a loan or not can be set through international standards, regulatory environments, legal protocol of the country in which it is situated, internal credit policies and capital management policies (Kithinji, 2010). With the aim of increasing profitability and pressure applied from shareholders and stakeholders; internal managers may find it easier to be lenient on credit risk management and not apply the correct credit risk principles to advance the business. If the credit risk management protocol of a commercial bank is not followed through in its entirety, this could lead

to increased non-performing loans and consequently have a negative impact on the profitability and performance of the commercial bank.

Saba (2012) defines non-performing loan as "a sum of borrowed money upon which the debtor has not made his or her scheduled payments for at least 90 days. A nonperforming loan is either in default or close to being in default." Non-performing loan advances are loans in which credit was provided to a user of credit and the loan was not repaid in accordance with the legal agreement between the parties. Whilst it is known that an end user's financial circumstances may change, resulting in a non-performing loan; the credit risk criteria used to mitigate the credit risk would form part of the credit management protocol assumed by the commercial bank. This could result in commercial banks requesting additional security for the loan (Rajan & Dhal, 2003). However, risk of the unknown is exaggerated when there is poor credit risk management protocol (Munangi & Bongani, 2020). As non-performing loans increase, the banks' capital requirements need to be adjusted to raise provisions for any bad debt which in turn impacts profitability and subsequently return to the shareholders (Rahman & Hai, 2017).

The table below shows the percentage of non-performing bank loans to the total amount of gross loans in South African for the period between 2008 and 2020. It shows a sharp increase between 2008 and 2010 which may be attributed to the World Financial Crisis. There is a downward trend over the next ten years followed by another spike in 2020 which may be attributed to the Covid-19 pandemic. South Africa's lowest percentage of bank non-performing loans was 2.8% in 2017 and its peak was in 2009 at 5.9%. In comparison to other emerging markets over the same period, [India: lowest in 2011 at 2.7% and highest in 2017 at 10%; Kenya: lowest in 2011 at 4.4% and highest in 2020 at 14.1%; Russian Federation: lowest in 2008 at 3.8% and highest in 2018 at 9.7%] (Source: www.worldbank.org) South Africa can be considered to fare better than its peers. Of course, there may be other reasons that could be considered for the performance of peer countries but that is out of the scope of this research.



Source: https://data.worldbank.org/indicator/FB.AST.NPER.ZS?locations=ZA

1.2.2. The research purpose statement

The objective of this research is to ascertain the impact of credit risk management on commercial banks performance in South Africa. This will be done by analysing financial performance of commercial banks in South Africa by using return on equity as a measure of financial performance and determining the effect of non-performing loans on performance. Further analysis will be conducted on the capital adequacy ratio of commercial banks in South Africa to consider its impact on performance. Empirical evidence from publicly available financial statements of commercial banks in South Africa will be used for the period 2014-2018 using regression analysis.

1.3. Delimitations and assumptions of the research study

The number of commercial banks in South Africa has increased over the years however this study is limited to six commercial banks as the information on these banks were readily available and easily accessible. Furthermore, mutual banks and foreign controlled banks were excluded as these banks may have additional, underlying risks that are not easily identifiable for this research. For this research, only return on equity is used to measure performance by commercial banks as this has been a key focus area for this type of study in other regions.

1.4. Significance of the research study

The significance of this research study adds to the knowledge repository on credit risk management of commercial banks in emerging markets and how these behaviours impact

profitability. It will appeal to finance analysts, bankers and financial managers to consider the significance of credit risk management and its correlation to firm performance.

1.5. Preface to the research report

This report is structured in five parts. The introduction precedes the literature review in Chapter two where critically analysis of studies conducted in the past will assist in developing the empirical framework and hypothesis this study intends to test. The study continues in Chapter three to describe the strategy and method applied to test the hypothesis and the next chapter will be the presentation of findings using raw data as described in Chapter three. Chapter five interrogates the results of the findings, provides a summary and conclusion to the research; and considers further study of the research.

2. LITERATURE REVIEW

The intention is this chapter is to delve further into the research problem and recognise limitations of previous studies similar in nature. This allows the researcher to critically analyse and identify the area of research that is lacking from the body of work. This is provided for in Sections 2.1. and 2.2. Upon reviewing the literature, an empirical framework is developed which will be used to interpret the overall research discovery in Section 2.3.

2.1. Research problem analysis

Commercial bank's main objective is to maximise profits to ensure the highest rate of return to its shareholders. To achieve this, aggressive growth is required in an increased regional and international competitive environment. The aggressive growth is attained in the form of increased loan advances to increase income earned through interest which is the commercial banks principal source of income. Aggressive growth increases credit risk which requires sound credit risk management protocol. Existing literature suggests that rapid growth of loans without proper credit risk management can lead to an increase in bad loans which can result in financial crisis (Bofondi & Ropele, 2011). This has been evidenced by the global financial crisis in 2008 and credit risk management was scrutinised with a number of reforms being introduced. However, the 2008 crisis was preceded by an expansionary economic climate and increased competition which provide eager lending. As economic climates are cyclical in nature it will be pertinent to see how commercial banks in South Africa respond to growth as required by their shareholders bringing with it increased credit risk; and how credit risk management systems, applied correctly, will enhance profitability.

Brown (2014) defines credit risk as "the potential that a contractual party will fail to meet its obligations in accordance with the agreed terms". There are three characteristics to credit which is the exposure, the probability of default and what percentage will be recovered in the event of a loss (Brown & Moles, 2014). Credit risk management are the tools and process used to minimise or mitigate the credit risk. The failure to meet credit obligations directly results in non-performing loans and we need to understand the determinants that cause non-performing loans and the importance of credit risk management protocol to understand the impact on firm performance measured through profitability.

2.1.1. Determinants of non-performing loans

Kumarasinghe (2017) determined that the financial instability of commercial banks is caused by deterioration of the quality of loan advances and that will ultimately impact the financial stability of the economy as a whole. He further purported that macroeconomic conditions have an impact on credit worthiness of end users of loan advances. He determined that loan performance is directly linked to business cycles. In a boom economy non-performing loan are relatively low in comparison to a recessionary cycle. Quagliariello (2007) noted that increased scrutiny of credit management protocol should be adopted through the recessionary business cycle. In a boom economy, lower consideration is given to the ability of end users to meet contractual obligations as there is sufficient income to repay the loan. However, in a recessionary economic environment, the increase of loan advances without the necessary credit risk management can cause increase in non-performing loans which will impact the financial performance of the firm. Messai (2013) shows there is a strong correlation between the perpetuation of non-performing loans and macroeconomic variables such as the prevailing real interest rate, the real rate of unemployment and gross domestic product [GDP] growth rate. As a country's economy goes into recession, unemployment rates increase, GDP growth reduces and the real interest rate increases as a result of quantitative measures applied by the central bank to ensure inflation is curtailed. An increase in the real interest rate has a direct impact on end users' ability to repay loans resulting in a non-performing loan (Bofondi & Ropele, 2011). This is supported by Orenge (2013) who found a positive relationship between how an increase in the interest rate will influence non-performing loans. When GDP growth is stagnant, this results in an increase in unemployment and less disposable income to repay loans which also result in increased non-performing loans.

Rahman (2017) found that the cause of non-performing loans of banks in Bangladesh was as a result of aggressive credit lending and poor monitoring of the loans. Waweru (2013) found that a diminished debt collection policy also attributed to the level of non-performing loans. Asfaw (2016) determined that in Ethiopian banks elevated levels of non-performing loans was a result of poor credit lending principles by banks but also lack of knowledge and understanding of how credit works by end users. This coupled with a low propensity to repay the loans by end-users and wilful negligence resulted in increased non-performing loans. This is supported by Rai (2012) who suggested that commercial or corporate clients of banks do not have a culture of repaying loans as there is no fear of legal repercussion. This is due to legal framework for redundant borrowers in India.

A study by Gaitho (2010) showed that the occurrence of non-performing loans in Kenya was a result of insider lending, macroeconomic instability, liquidity support and prudential regulation, inadequate management of credit risk and economic mismanagement and political interference. The study revealed that there are both push and pull factors relating to non-performing loans with push factors being internal shortcomings through insider lending and the lack of understanding of credit risk mitigation; and pull factors being external influences being macroeconomic issues and political interference. These factors have also been considered by Rajan (2003) who identified the determinants of non-performing loans to be political, environmental, social, technological, economic and legal framework of a country.

Singh (2016) found that in Indian banks the issue of non-performing loans was the result of poor preventative measures of both pre-sanctioning and post-disbursement of loans; which measures should be managed through a credit risk management framework. He further purports than ongoing monitoring of loans should be completed by an external rating agency to identify and potentially diffuse a non-performing loan.

Non-performing loans can be classified into two generalised categories as suggested by Espinoza (2010) being factors outside of the control of the bank (e.g. macroeconomic factors) and existential factors to that specific bank. Banks with higher non-performing loans are more sensitive to macroeconomic shocks as they are unable to pivot when there is a financial crisis. The study found that bank specific factors relate to poor internal and management controls, moral hazard, agency problems, ownership (whether private or public) and regulatory environment. Another outcome of the study found that operating efficiencies are linked to banks risk taking where banks would rather incur greater costs of managing risk without taking a higher risk; thus, impacting the overall profitability of the firm.

2.1.2. Impact of non-performing loans

Singh (2013) identified the impact of non-performing loans as being, (i) a reduction in earning capacity of the firm; (ii) the cost of capital increasing which may cause commercial banks to hold higher provisions for bad debts and this may impact its ability to be competitive; (iii) an asset and liability disparity which may cause a liquidity issue for the commercial bank hampering its ability to borrow and on-lend which will impact its profitability; (iv) commercial bank may have to adjust its capital structure which may lead to austerity measures being put in place to improve its return on investment; (v) decrease in share value impacting shareholder value; (vi) increase of credit

and financial risk in the bank which may impact its efficiency and competitiveness. The collective impact may cause bank failure and a much wider and severe effect on the economy as a whole.

The financial industry is one of the biggest drivers of growth in an economy. A study by Munangi (2020) found that credit risk impacts financial performance of South African banks negatively with specific reference to return on assets (ROA) and return on equity (ROE). This means the higher the number of non-performing loans, the lower the banks profitability; measured by ROA and bank's performance; measured by ROE.

From capital adequacy and management perspective, the Basel Accord has been adopted by many countries ensuring sufficient capital resources for financial institutions to absorb macroeconomic shocks. However, if the non-performing loans are not managed through a successful credit risk management protocol, then capital ratio may still not be adequate causing a larger gap in liquidity which could lead to bank failure.

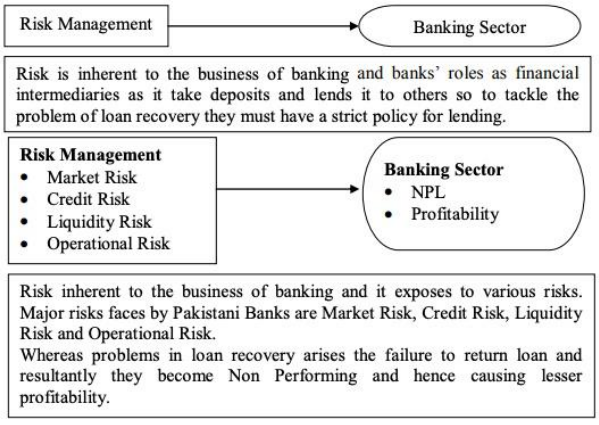
Florin-Mihai (2014) gave consideration to reduce the propensity of non-performing loans by providing a guarantee or some form of collateral security which could include mortgage, personal guarantees. While these are positive reinforcements, it does not necessarily mitigate the risk of a non-performing loan in its entirety as was seen in the sub-prime crisis in America; which led to the global financial crisis in 2008.

Adam Smith, known as the father of modern-day economics, identified the agency theory as internal stakeholders being misaligned with the vision of the shareholders thus creating a conflict in values. This can generally be seen when the internal stakeholder's key performance indicators or KPIs drive the incorrect behaviour by measuring the incorrect variable. In credit risk management, this is highlighted when the measurement of a manager's performance is the number of loans approved regardless of considering any other factors such as the percentage of non-performing loans in the portfolio or maintain the optimum capital adequacy ratio. The manager is incentivised to increase the number of approved loans regardless of the underlying obligor. Abdallah (2016) considered the view of managers increasing operational risk by providing loans to obligors with a higher risk profile to increase profits. However, the overall view is that if there is a loss, the bank's profitability is directly impacted.

Both Abdallah (2016) and Mwangi (2012) express the commercial loan theory as the "real-bills doctrine" which is the concept of a commercial bank providing short-term and self-liquidating paper to ensure a healthy liquidity ratio and not maximising its earning potential. This was also posited by Taiwo, et.al (2017) who further explains that this is still a popular method adopted by commercial banks in modern day. The greatest flaw of this theory is misaligning the liquidation of loans in the ordinary course of business rather than considering alternative or secondary sources of liquid reserves. It does not take into account the stability of demand deposits in that not all deposits will be drawn in one day.

2.2. Research knowledge gap analysis

Risk management is of paramount importance to financial institutions to ensure a healthy firm that will continue into perpetuity. Banks face risk in the form of market risk which is the risk associated to macro and micro economic factors; liquidity risk which is the banks' ability to meet its financial obligations to depositors; operational risk which is the processes and systems in the firm for it to function effectively; foreign currency risk particularly if there is an international presence as fluctuations in currency will impact earnings; and credit risk, which is arguably the most significant risk to be managed as it is directly linked to the activities of the firm to generate income. Haneef, et al. (2012) developed the following model to highlighting the importance of managing the risks that can cause non-performing loans and impact profitability.



The above diagram shows how interlinked risk management is within the banking sector and with low oversight of risk management, this will result in increased non-performing loans and reduced profitability.

2.2.1. Empirical Review

There is an abundance of information and research to ascertain if credit risk management has an effect and if so, the impact thereof on firm performance. Taiwo et al. (2017) identified that

through various studies, the commonality is that credit risk management does affect profitability. Using a multi-linear regression model to analyse the time series data, Taiwo concluded although comprehensive credit management policies improve stakeholder confidence which results in increased deposits, it is less likely to influence growth in loans and advances. Further afield in India, Karthikeyan et al. (2022) found similarly that non-performing loans impacts the bans overall credit risk thus making it difficult to raise capital to on-lend.

Kolapo et, al. (2012) proved that a one hundred percent increase in non-performing loans will reduce profitability by approximately six percent and concluded that bank should improve credit risk analysis pre- and post-loan disbursement. Another study of the impact of credit risk management in Nigerian banks by Oloruntoba et, al. (2018) confirmed, using linear regression analysis, that non-performing loans have a significant influence on profitability measured by return on assets. This is further supported by research of Marshal (2014) using panel data regression techniques they found a positive relationship between non-performing loans and profitability; concluding greater management of credit risk to reduce the pervasiveness of non-performing loans.

Afriye (2012) used panel regression analysis showing a positive significant relationship between non-performing loans and rural banks profitability in Ghana which is a divergence from theoretical confirmation that profitability should decrease with an increase in non-performing loans. It was found that the cost of risk is passed onto the borrower hence the increase in profitability through higher interest rates. This is in lieu of credit management system and policies. Higher interest rates can also serve as a deterrent of non-performing loans as evidenced by Boahene et, al. (2012). Kutum (2017) had similar findings then took the discussion further to the sustainability of profitability at the cost of sound credit risk management principles.

Rwayitare et, al. (2016) concur that bank profitability is reduced by an increased exposure to credit risk and recommends strict credit lending principles with adequate penalty for non-payers to reduce on-performing loans.

In contrast, Olaoye (2020) found an insignificant negative relationship between non-performing loans and profitability but a significant positive relationship between the provision for bad debts and profitability, thus concluding that provision for bad debts should be kept to a minimum. This could be achieved through automated credit monitoring once the loan is advanced to the borrower. The positive relationship between a low provision on non-performing loans and bank

performance can be attributed to performance indicators of management as evidenced by Zahara (2017). However, Shmendi (2019) found that banks in Ethiopia have a significant negative relationship between non-performing loans and profitability showing that banks can still be profitable with a sound credit risk management system. This is augmented by the study of commercial banks in Tanzania by Kaimu (2021) who echoes the management of credit risk and capital adequacy to increase financial performance of commercial banks.

In a similar study of commercial banks in Kenya, Kithinji (2010) found no relationship between non-performing loans and profitability of banks while Oketch et, al. (2018) found a "statistically significant negative relationship" between non-performing loans and bank performance as measured by the share price of the commercial bank. The study found that increase in non-performing loans were as a result of exploitation of asymmetrical information and resulted in a centralised database of information on repayment ability of borrowers.

Increased control and implementation of credit granting policies and loans monitoring systems is recommended in the studies of Jordanian commercial banks by Alshatti (2015) and further strategy implementation for lower risk and higher profitability. Hosna (2009) identified the adoption of Basel II methodology by four banks in Sweden as a strategy increased the negative impact of non-performing loans on the banks return on equity.

In South Africa, Lawrence et, al. (2020) found that non-performing loans in smaller banks have a greater impact to profitability than larger banks (measured by asset size) and older banks; but also concluded that non-performing loans had zero impact to profitability during the period of review. This study will test the hypothesis that notwithstanding of the net asset value of a bank, non-performing loans has an impact on performance (measured by ROE) of South African commercial banks.

It is unknown if the geographical representation has any bearing on the underlying variables affecting profitability and could possibly be a further area of study.

2.3. Theoretical Framework

The theoretical framework is the basis on which a research study is conducted. It is the nexus between the theoretical and practical aspects of the study (Mwangi, 2012). The theoretical framework assists to identify the variables of study and in which way these variables statistically interact (Mwangi, 2012). Varpio (2020) goes on further to explain that a theoretical framework is

developed from various theories. It is "a reflection of the work the researcher engages in to use a theory in a given study" (Varpio, 2020 p.7).

2.3.1. Theoretical Review

Abdallah (2016) describes four theories for review which is relevant to this study as it the theoretical construct of whether credit risk management has an impact on profitability. The four theories are credit risk theory which will describe the use of models in credit appraisal; loan pricing theory which argues that if the interest rate is too high, the lower the propensity for users of credit; agency theory where management and shareholders visions are misaligned and could lead to an increase in non-performing loans; and commercial loan theory in which a bank may not want to lend money for fear of non-repayment of loans.

2.3.1.1. Credit Risk Theory

Anderson (2013) defines credit risk as "the probability that a legally enforceable contract may become worthless (or at least substantially reduced in value) because the counterparty defaults and goes out of business." It is also defined by Saunders et al (2003) as the "risk that the promised cash flows from loans and securities held by financial institutions may not be paid in full." Kwashie (2022) theorises that credit risk can bear the most cost risk to a commercial bank relative to other factors. Financial institutions including commercial banks creates wealth for its shareholders by lending money to obligors who have the means to repay the loans. These funds are deposits from others and on-lent to others at a higher interest rate. Simplistically, the difference between the interest rate paid by the bank to depositors and the interest rate charged to a credit user is profit. However, in order to assess whether the obligor can repay the loan a set of rules or principles are laid down which form the basis of credit risk management framework. These principles are generally qualitative in nature and describe the kind of business or obligor a commercial bank can lend to. It may also describe the maximum amount to be lent and the length of time the loan is provided . According to Zamore, et al. (2018), the Altman (1968) Z-score was one of the first credit risk models to derive quantitative factors to measure the probability of default of an obligor using accounting principles. Although this model may be criticized for its historical methodology, it remains a distinguished method of assessing credit risk (Zamore et al., 2018). Mwangi (2012) purports that a combination of value at risk theory, portfolio theory and credit risk models are probably the ideal way to measure the three components of credit risk. Crouhy (2000) describes the components of credit risk being default risk – the risk of an obligor not meeting its obligations in terms of the contract between the parties; credit spread risk – which is the perceived market view of the counterparty's quality of credit and downgrade risk – the potential of the

obligor's external rating being downgraded due to poor financial performance (Zamore et al., 2018). The Value at Risk [VAR] Theory premise is being able to provide a singular view of market risk of a portfolio; which becomes the loss associated with a given probability (Marimoutou, Raggad, & Trabelsi, 2009). The portfolio theory attempts to manage risk on an asset-by-asset basis but its pitfall is the myopic view of a single asset class without considering other assets within the portfolio or the total impact of credit to the obligor group (Mwangi, 2012). The credit risk models approach is probably the most popular amongst commercial banks, following the Basel Accord in 1997. The adoption of credit risk models includes model validation thus ensuring continuous improvement of the model using the most recent data. These models assist banks in ensuring the minimum regulatory capital requirements are met (Lopez & Saidenberg, 2000).

2.3.1.2. Loan pricing theory

The initial theory of loan pricing by Stieglitz and Weiss (1981) sought to demonstrate that charging a higher interest rate for a loan will not necessarily deter a high-risk obligor, who may still accept the interest rate. An unintended consequence in the application of this theory is the introduction of a moral hazard in which the obligor may participate in riskier investment practices which would ultimately impact the bank should the obligor not be able to repay the loan (Abdallah, 2016). Loan pricing impacts the overall performance of the commercial bank and understanding its significance in credit risk management is relevant to this study.

2.3.2. Hypothesis Development

Using the knowledge gained from the theoretical and empirical reviews this study will attempt to test the following hypotheses:

1. Null hypothesis: non-performing loans has an impact on performance of commercial banks in South Africa

   Alternative hypothesis: non-performing loans have no impact on performance of commercial banks in South Africa

2. Null hypothesis: capital adequacy ratio has an impact on performance of commercial banks in South Africa

   Alternative hypothesis: capital adequacy ratio no impact on performance of commercial banks in South Africa

2.3.3. Conclusion

Many studies have been done on the determinants of non-performing loans with an over-arching theme of affecting profitability, however this study aims to see if there is a direct correlation between poor credit risk management and the performance of commercial banks in South Africa. Macroeconomic factors such as inflation and rate of unemployment are positively correlated to non-performing loans and negatively correlated to GDP growth. The literature reiterates the significance of sound credit risk management systems and protocol within the bank to ensure the minimum level of non-performing loans. Additionally, the literature highlights the banks need to pivot in times of recession to respond positively while still maintaining a sound credit management system and process.

Successful credit risk management includes developed credit policies and procedures in line with the regulatory and legal environments in which the bank operates; strong portfolio management which speaks to the long-term financial objectives and risk appetite of the firm; effective credit controls which may include first and second line of defence strategies, deep due diligence pre-sanction and effective post-disbursement management; and skilled employees to implement credit risk management systems (Asfaw et al., 2016). Kithinji (2010) and Bauer (2010) further states that the principles of good credit risk management include establishment of a clear organisational structure, defined roles and responsibilities to promote accountability; which should include clear communication of these roles and responsibilities and priority of a disciplined approach to credit risk management process. The framework below describes continuous credit risk management engagement which includes the pre-assessment and post disbursement of loans.

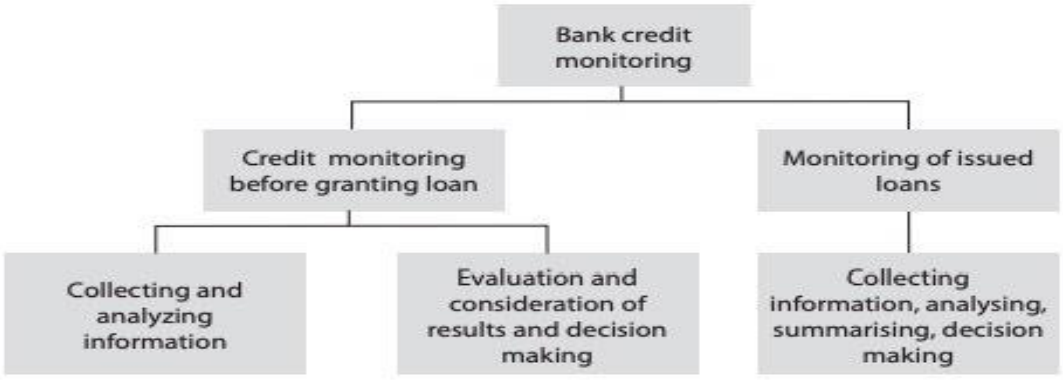


FIG. 9. Bank credit monitoring scheme

Source: Jasevičienė (Jasevičienė & Valiulienė, 2013)

By having a continuous credit risk management program, banks would be able to identify any defaulting loans sooner rather than later.

Technological advances, machine learning and artificial intelligence will start playing an integral role in managing risks of banks. Existing credit policies in banks lend its inception from pact incidents which is generally a point in time. However, with the number of financial crises increasing and in quicker succession, credit risk management systems which include credit policies needs to be agile to respond to current macro and micro environment shocks. Misheva (2021) postulates that the current technology use algorithms to determine a credit score but it is very difficult to trace the reason why a person may be granted a loan or not due to the lack of transparency in the models. However, machine learning and artificial intelligence may be able to explain specific traits of credit scoring.

If commercial banks follow a standard risk framework of identification, evaluation and management it stands to reason that the non-performing loan ratio should be as much lower than what is currently experienced by South African banks. Of course, macroeconomic factors and impact of Covid-19 has exacerbated this phenomenon but if a bank has sound credit risk management protocol, they should be able to respond to any crises effectively and efficiently.

3. RESEARCH METHODOLOGY

This section describes the strategy adopted to guide the research methodology. It is the blueprint of how empirical data will be collected and analysed and the technique to interpret the findings. Paragraphs 3.1. to 3.3. (and sub-paragraphs) provide the direction of the strategy, design and procedure together with the description of how the data is collected and the selection criteria for the data. Sub paragraphs describes the target population and the ethical considerations to the data; including details from where the data is sourced. Paragraph 3.4 describes the analysis of the data to provide the regression equation. Paragraph 3.5 and 3.6 lends itself to the credibility of the outcome and any limitations to the study respectively.

3.1. Research strategy

Bryman (2016) describes a research strategy as the method in which the research will be carried out. The three strategies are either qualitative, quantitative, and mixed. For this study a quantitative methodology strategy will be applied. Empirical analysis obtained from publicly available information will be used to determine the correlation between the credit risk management and performance of South African commercial banks.

Adekunle (2015) used a similar strategy as the aim of the study was to ascertain credit risk management and financial performance of commercial banks in Nigeria. They applied a multi-regression analysis on ten banks in Nigeria. This method will be beneficial to this research report as it comprises similar information and seeks to ascertain similar outcomes but for South African commercial banks.

3.2. Research design

A research design is best described as “it represents a structure that guides the execution of a research method and the analysis of the subsequent data (Bryman & Cramer, 2012)”. It is the method in which a researcher collects the data. The five generic research designs as described by Bryman (2012) are: cross-sectional, longitudinal, case study, comparative, and experimental. Based on the literature reviewed, a cross-sectional design will be used as the sample of cases will be commercial banks in South Africa that vary in size determined by asset value. The benefit of using this type of design is that it allows comparison of different variables at the same time. As the study will be looking at the variables of non-performing loans and capital adequacy ratio on the performance of the commercial banks, this research design allows a quantitative

methodology to be applied which is relevant to this study which uses empirical, secondary data to be analysed

3.3. Research procedure and methods

This section documents the actual procedure and the methods employed in this research to collect, collate, process, and analyse empirical evidence.

3.3.1. Research data and information collection instrument(s)

Data collection is the gathering of information and compiling it in a structured method Bryman (2016). Quantitative data is a collection of numerical data that can be statistically analysed. Data can either be discrete or continuous with the former being finite with a constant value and the latter having fractions or decimals. Quantitative data is objective and verifiable and collected in a systematic manner. It allows for precision and replicability to be able to build the research further. It is also important to test the hypothesis using the variables and understanding the relationship between the variables. The data collected for this research is values obtained from annual audited financial statements of six commercial banks in South Africa. This method of data collection is most suited to this research as it uses finite and numerical information that has already occurred.

3.3.2. Research target population

3.3.2.1. Research target population

The target population of this research article is commercial banks in South Africa. A commercial bank is a deposit taking institution and which is regulated by the South African Reserve Bank.

3.3.2.2. Sampling

Sampling is a selection of population for the purpose of the research conducted. Sampling is either qualitative or quantitative. Based on the literature reviewed the sampling strategy will be quantitative. For this research, six commercial banks data was used over a period of five years, 2014 – 2018. These banks are public, deposit taking financial institutions as defined by the South African Reserve Bank. The banks were chosen for the availability and accuracy of information and given that these banks are publicly listed on the Johannesburg Stock Exchange, their financial information is readily available.

3.3.2.3. Ethical considerations when collecting research data

Ethical considerations in research are tremendously important to ensure that information used is correct and accurate; credit is given where it is due and vulnerable people in society are not objectified or victimised. Credit risk management is of great value to better understand the

consequences of improved credit risk management. As this study will use publicly available information, there is little to no risk of harm to participants but aims to add to the abundant body of work on credit risk management and firm performance.

3.3.2.4. Research data and information collection process

Research data collection will be from publicly available information on the internet; more specifically, audited annual financial statements of commercial banks in South Africa.

3.4. Research data and information processing and analysis

3.4.1. Research data and information processing

Research data processing is the method to edit, code and classify data with the intention to reduce data into a form that that is relevant to the research. Data coding is the process of organising data into categories and classifying the categories.

3.4.2. Research data and information analysis

Research analysis is the method in which the raw data is deciphered and used to form a prognosis. Examples of quantitative data analysis can include regression analysis, cluster analysis and content analysis. Based on the literature review, a multi-regression analysis will be done which describes the relationship between a dependent variable and multiple independent variables (Mwangi, 2012). Adekunle (2015) used the same methodology and will be useful in interpreting the data sourced in this research paper.

For this research, we adopt the methodology used by Mwangi (2012). As seen from the literature review, the measure of profitability is return on assets [ROA] or return on equity [ROE] and will be used as the financial performance indicator and dependent variable. ROE is measured using net income divided by total shareholders equity. It is the measure of return earned by shareholders for capitalising the business. The capital risk management risk indicators for this study are (i) non-performing loans [NPL] which is expressed as non-performing loans divided by total loans on the bank and (ii) capital adequacy ratio [CAR] which is calculated by dividing Tier I and Tier II regulatory capital requirement in a bank by its risk weighted assets, expressed as a percentage. The multi-variate regression model can be expressed as follows:

$Y = \alpha + \beta 1X1 + \beta 2X2 + \varepsilon$

Where:

Y = ROE

α = constant term

β = coefficient of function

X = value of independent variable [X1 = NPL; X2 = CAR]

ε = disturbance or error term

The regression equation is thus stated as:

ROE = α+β1NPL + β2CAR + ε

The regression function will determine the relationship between the credit risk management indicators to the performance indicator. The variances between the variables, if any, will determine if the variables are related and if so, to what degree of relation.

3.5. Research strengthens—reliability and validity measures applied

Validity as defined by Morse (2002) is how correct the outcome was of what the research is measuring and what it intended to measure. Bryman (2012) describes reliability as the consistency of the results of the chosen research methodology. Ensuring reliability and validity gives credence to the research and researcher. It also ensures continuity of the research – for it to progress into the next sphere if so required. As the chosen research method is quantitative, internal validity

3.6. Research weaknesses—technical and administrative limitations

The technical limitations that may affect the study could be the time taken to analyse the data. It may also require expert knowledge outside of the academic field which could result in further ethical considerations.

4. RESEARCH RESULTS AND FINDINGS

In this section we aim to address the research questions the stated hypothesis as outlined in Chapter 2. For our first and second hypothesis we will analyse the results derived from our Correlation Analysis which evaluates whether CAR (%) as well as NPLR (%) has a significant relationship with the ROE% variable. Next, we attempt to address our last set of hypotheses which looks at the impact that credit risk management (measured by non-performing loans and capital adequacy ratio) has on the performance (measured by ROE) of banks in South Africa. It should be noted that no validity or reliability analysis was conducted due to our data being from a secondary data source. Lastly, we will then close out and summarise the results from our findings

4.1. Analysing the correlation matrix consisting of our ROE%, CAR% and NPLR% variables

For the first part of our analysis, we evaluate whether CAR% and NPLR% has a possible relationship with ROE%. First, we will interpret the descriptive statistics. Second, we will go into the results concerning the various inferential statistics. Our hypothesis has been identified as follows:

H0*: non-performing loans has an impact on profitability of commercial banks in South Africa*

H1*: non-performing loans does not have an impact on profitability of commercial banks in South Africa*

4.1.1. Descriptive Statistics – Pearson's' Correlation Matrix

Table 1: Descriptive Statistics for ROE%, NPLR% and CAR%

	Mean	Std. Deviation	N
ROE (%)	18.0333	5.54383	30
NPLR (%)	3.1057	1.58581	30
CAR (%)	18.7967	7.90288	30

The descriptive statistics in Table 1 shows that CAR (%) recorded the highest mean as well as the highest variance (*M* = 18.7967, *SD* = 7.90288).

4.1.2. Statistical Hypothesis Testing – Pearson's Correlation analysis

The results from our Pearson's correlation analysis are depicted in Table 2 below as follows:

		ROE (%)	NPLR (%)	CAR (%)
Pearson Correlation	ROE (%)	1.000	.667	.672
	NPLR (%)	.667	1.000	.809
	CAR (%)	.672	.809	1.000
Sig. (1-tailed)	ROE (%)	.	<.001	<.001
	NPLR (%)	.000	.	.000
	CAR (%)	.000	.000	.
N	ROE (%)	30	30	30
	NPLR (%)	30	30	30
	CAR (%)	30	30	30

Table 2 Shows that all the relations between our variables are statistically significant at the 99% confidence level. NPLR (%) had a strong relationship with CAR (%) ($r(30) = .809$, $p < .01$). This could cause a potential concern when running a multiple regression analysis if both these variables are independent variables. This however is analysed in the later part of this analysis. Moreover, CAR (%) had the strongest relationship with our dependent variable (ROE%) ($r(30) = .672$). Based on the results above we can reject the null hypothesis in both cases and conclude that NPLR% as well as CAR% does have a relationship with ROE%.

4.2. Analysing whether CAR% and NPLR% has an impact on ROE%

For this part of our analysis, we wanted to test the impact that our independent variable (CAR%) has impact on our dependent variable (ROE%). For this we decided to run a simple regression analysis due to the number of independent variables. The null and alternate hypothesis has been identified as follows:

H0*: capital adequacy ratio has an impact on performance of commercial banks in South Africa*

H1*: capital adequacy ratio does not have an impact on performance of commercial banks in South Africa*

The results from our regression analysis are denoted below.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.488[a]	.238	.215	4.85017	1.925

a. Predictors: (Constant), CAR (%)

b. Dependent Variable: ROE(%)

Table 2 above demonstrates that CAR(%) is able to explain 23.8 % of the variance in ROE(%). Moreover, the model is not suspect to any issues concerning autocorrelation as it falls between the range of 1.5 – 2.5. This is an important measure considering that we are dealing with time-series data (Salkind & Frey, 2021).

Table 3: ANOVA TABLE

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	242.323	1	242.323	10.301	.003[b]
	Residual	776.297	33	23.524		
	Total	1018.620	34			

a. Dependent Variable: ROE(%)

b. Predictors: (Constant), CAR (%)

The ANOVA table in Table 3 shows that our model does indeed comply with the linearity assumption concerning our simple linear regression model. This is seen by the statistically significant result ($F(1,34) = 10.301$, $p = .003$, $R^2 = .238$). This supports the assumption that the model is a good fit.

Table 4: Coefficients Table

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	10.590	2.236		4.736	<.001		
	CAR (%)	.339	.106	.488	3.210	.003	1.000	1.000

a. Dependent Variable: ROE(%)

Table 4 above that our CAR(%) variable is statistically significant at the 95% confidence level (β = .339, t=4.746, p = .001).

Based on the results above, we would reject the null hypothesis and conclude that capital adequacy ratio has an impact on performance of commercial banks in South Africa.

4.3. Further Notes on regression analysis

4.3.1.1. Normality Assumptions

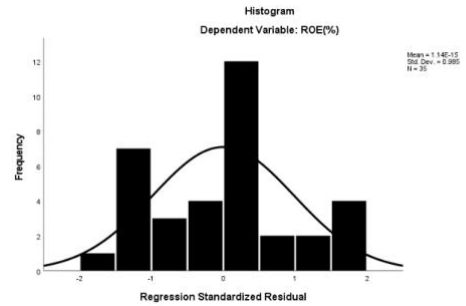


Figure 1: Histogram

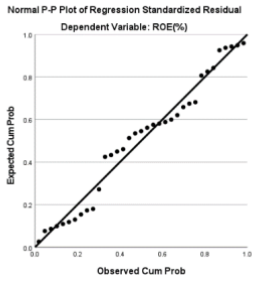


Figure 2: Normal P-P Plot

Figure 1 and 2 shows the normality results from our regression analysis. We can see that the normality assumption does not hold in both diagrams. However, the normality assumption does not impact the results from our regression analysis and no further transformations was done as a result.

4.3.1.2. Homoscedastic Assumptions

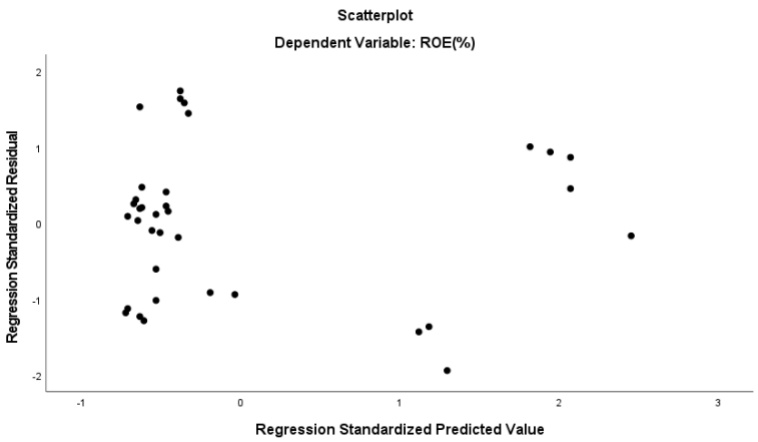


Figure 3: Partial Plot

Figure 3 Above shows that there isn't enough evidence to suggest that the homoscedastic assumption has been violated as majority of the values lie within plot range of 3.

4.4. Summary of Presentation of the Findings

The purpose of this chapter was to analyse the results derived from our research instrument. First, we ran a Pearson's correlation analysis to assess whether CAR(%) and NPLR(%) has a relationship with our performance variable (ROE%). It was found that both variables indeed do have a significant relationship with ROE(%). Next, since our CAR(%) variable and NPLR(%) is strongly correlated, for our next hypothesis we only included the CAR(%) variable in our regression analysis to avoid any potential issues concerning multicollinearity. In our regression analysis, it was found that the CAR(%) variable had a significant impact on ROE(%). Moreover, we also found that majority of our regression model assumptions had not been violated. The results from this analysis will be discussed further in the next chapter.

5. INTERPRETATION OF RESULTS, CONCLUSION AND RECOMMENDATIONS

5.1. Interpretation of results

The Pearson correlation is used to establish a relationship between the dependent variable being bank performance (measured by ROE) and the independent variables being non-performing loans and capital adequacy ratio. The data shows that capital adequacy ratio was the highest and also had the most variation (more upswings and downswings in the data) and further suggests that every time capital adequacy ratio went up by a factor on one, the return on equity would increase by an average of 33.9%. This is supported by the results of Munangi (2020).

The regression analysis shows a statistically significant relationship between non-performing loans and capital adequacy ratio on return on equity; which confirms that both independent variables can reliably predict the dependent variable. This was also found in the study by Mwangi (2012).

5.2. Implications for business

The study showed that both non-performing loans and capital adequacy ratio have an impact on profitability. In any business, there will be factors that are outside of its control but what can be managed internally, should be. A non-performing loan does not start as a non-performing loan. Adequate risk mitigation tools should be employed to ensure the best possible outcome for all parties. These would be embedded in the credit risk policies and should be followed as strictly as possible. However, a business should also be agile in its approach and methodologies to address non-performance through regular checks and reviews; staying close to the customer and the industry in which it operates to identify any potential risks early on in the process.

Given that South African commercial banks are highly regulated with the South African Reserve Bank maintaining the correct Tier I and Tier II capital is essential in ensuring profitability in the long-run. This may require heavier cost of capital requirements for products where a high possibility of loss exists, for example real estate. This will also allow for banks to absorb macroeconomic and global shocks that may be out of its control.

5.3. Conclusion

The nature of any business is to maximize profits with minimal risk. Commercial banks achieve this by accepting deposits and using the deposits to on-lend to potential users of credit; at a profit. The key to maximizing this profit is ensuring repayment of the loan within the given period. To do this, credit risk policies are in place to evaluate the capability of the credit user to repay the loan. If these policies are not in place or at a rudimentary level, this could lead to non-payment of the

loan and thus the creation of a non-performing loan. The research has concluded that credit risk management, using non-performing loans and capital adequacy ratio has a direct impact to the performance of the commercial bank, using return on equity as a measurement.

5.4. Recommendations

From the overall research and findings, it is clear that credit risk management has an impact on commercial banks' performance. South African commercial banks have robust and rigorous credit policies which have cushioned most from external factors like the word financial crisis and Covid-19. The regulatory framework for commercial banks in South Africa is also quite progressive which allows for further cushioning to shocks in the global financial system. Continuous loan surveillance before and during the life of the loan is paramount to keep non-performing loans to a minimum to minimally impact the return on equity. Furthermore, unremitting management and monitoring of Tier I and Tier II capital will positively impact the performance of the commercial banks in South Africa.

5.5. Recommendations for further research

The scope of this study can be broadened to include other measure of credit risk management and also measure non-performing loans and capital adequacy ratio to profitability measured by return on assets. From the research of various studies in various geographical locations, it may prove erstwhile to consider if geographical location has an impact on credit risk management.

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