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Regulation and its impact on bank performance: The case of Basel Accords

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Thesis for the Fulfilment of the Master of Management in Finance and Investment

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DECLARATION

I, One Maitumelo Masole, of student number 2251830, declare that the research work reported in this dissertation is my own, except where otherwise indicated and acknowledged. The thesis is submitted for the fulfilment of the Master of Management in Finance and Investment at the University of Witwatersrand, Johannesburg, South Africa. This dissertation has not, either in whole or in part, been submitted for a degree or diploma to any other universities.

Signature of candidate: _____ **Date**: _____

ABSTRACT

The purpose of this thesis is to investigate the effect of the Basel Accords regulatory capital requirements on bank performance of the African banking sectors. The sample for the study included countries that had at a minimum adopted Basel II regulatory capital requirements and had data available for the research period. The countries selected were Botswana, Kenya, Malawi, Namibia, Tanzania, Uganda, Zambia and Zimbabwe. The empirical analysis adopted the multiple regression estimations to ascertain the effects of regulatory capital on bank performance. In addressing the research objectives, the study used the three proxies of regulatory capital and these were capital adequacy ratio (CAR), core capital ratio (CC) and total capital to total assets ratio (TCTA). The banking sector performance was measured by the financial soundness indicators of profitability (Return on Assets and Return on Equity) and financial intermediation (Loans to Deposit ratio).

The empirical results showed that the regulatory capital requirements of CAR and TCTA had a positive effect on Return on Assets and Return on Equity, whereas the CC negatively affected the profitability ratios. The financial intermediation was negatively affected by both CAR and CC, and the positively affected by the TCTA. The mixed results of the impact of the Basel Accords capital requirements on the performance of banks was an indication that the regulatory standards can have unintended consequences on bank performance. Thus, it can be deduced that, the adoption of the Basel Accords in Africa should be informed by an in-depth analysis of the possible negative effects which should countered with appropriate regulatory policy decisions.

Table of Contents

DECLARATION 2
ABSTRACT 3
CHAPTER 1: INTRODUCTION 7
1.1 Background of the study 7
1.2 Purpose Statement 10
1.3 Problem Statement 11
1.4 Objectives of the study 11
1.5 Research Questions 12
1.6 Potential significance and/or benefits of the study 13
1.7 Overview of Methodology 13
1.8 Outline of Research Report 13
CHAPTER 2: LITERATURE REVIEW 15
2.1 Overview of the African Banking Structure 15
2.2 Background of Bank Regulation 19
2.3 The Basel Accords 22
2.4 Basel Accords and Effect on Bank Performance 32
CHAPTER 3: RESEARCH METHODOLOGY 40
3.1 Research Methodology 40
3.2 Research Design 40
3.3 Population and sample 41
3.4 Procedure for data collection and data sources 42
3.5 Variables 43
3.6 Research model for data analysis 46
3.7 Estimation Approach 47
3.8 Limitations of the study 47
3.9 Validity and reliability of research 48
3.10 Ethical Consideration 48

CHAPTER 4: PRESENTATION OF RESULTS 49
4.1 Descriptive statistics of the data 49
4.2 Correlation Analysis 50
4.3 Regression Analysis 53
4.4 Summary of Results 59
CHAPTER 5: DISCUSSION OF RESULTS 60
5.1 The effect of capital regulation on bank profitability 60
5.2 The effect of capital regulation on financial intermediation 63
5.3 Overall Results 64
CHAPTER 6: CONCLUSION AND RECOMMENDATIONS 66
6.1 Conclusion 66
6.2 Recommendations 67
6.3 Future Research Areas 68
REFERENCES 69

LIST OF TABLES

Table 1: Banking sector concentration levels

Table 2: Technological developments in banking services

Table 3: A comparison of Capital Adequacy Ratio - Basel I, Basel II and Basel III

Table 4: Minimum Capital Adequacy Requirement and Basel Accords Implementation

Table 5: Financial Soundness Indicators

Table 6: Variable Selection

Table 7: Descriptive statistics variables

Table 8: Correlation Coefficients

Table 9: ROA Model Summary

Table 10: ROA ANOVA

Table 11: ROA Regression Coefficients

Table 12: ROE Model Summary

Table 13: ROE ANOVA

Table 14: ROE Regression Coefficients

Table 15: LD Model Summary

Table 16: LD ANOVA

Table 17: LD Regression Coefficients

CHAPTER 1: INTRODUCTION

1.1 Background of the study

Banks are at the center any country's financial system through the financial intermediation role and other key functionalities of transmitting inflows and outflows of funds in an economy. Therefore, these core functions renders banks as key drivers of any form of an economic activity and channel of economic and financial development on any country (Tchana, 2014). The banking sectors of the African region are at the core of deploying funds to finance economic activity compared to other sources of finance such as the stock and bond markets (Mensah et al.,2012). Therefore, the African economies are anchored on commercial banks which fulfils a critical financial intermediary function in allocating capital in the economy by converting depositors' savings into profitable assets.

The key role of deploying customer deposits in the economy and the possible eventuality of loss of deposits arising from reckless lending by banks is an important externality that has necessitated the need of banking business to be subjected to high level regulation. Therefore, banking regulatory requirements are used to safeguard depositors' funds from insolvency arising from excessive risk-taking by bank managers, which could result in a possible eventuality on a bank failure. A bank failure can result into a chain reaction in the market, spreading the adverse performance to the entire economy owing to the interconnectedness of the financial system. The failure of a large number of banks or few banks but large in size, could subsequently affect the entire banking system resulting in a failure of a financial system (Berger et al., 1995).

Baldwin (2012) defined regulation as a structured intervention by government in an economic activity, which often controls the activities of the free market system. Governments intervene in banking industry using the following administrative powers: bank licensing; restriction of activities; reserve requirements; and capital requirements. In view of this, Berger et al., (1995) opined that banking regulators respond to possible negative consequences of financial

intermediation mainly on behalf of depositors and the key concern being systemic risk if a bank failure occurs. Similarly, Harnay and Scialom (2016) argued that banking regulation envisages to provide an organised platform for curative management of banking systems to guard against market failures and the consequential systemic risk that could spread into the entire economy. The purpose of regulations and supervisory practices is to contribute to achieve well-functioning banking systems (Jamali, 2019).

The regulatory requirements of banking business are guided by the Basel Committee on Banking Supervision (Basel Committee), whose fundamental role is to manage and control the risk appetite of banks. Fundamentally, Basel Committee advocates for the principle of a level playing field of the banking sector globally, achieved by subjecting banks to the same regulatory requirements. The Committee has to date issued three set regulations to guide the operations and supervision of banks. The issuances of the regulatory capital requirements were basically an improvement of the former issue to match the increasing complexity of bank operations as financial markets evolved. These were issued as follows; 1988 - Basel I: 2004 - Basel II and lastly in 2010 - Basel III (BIS, 2019). The Basel Committee envisaged to safeguard soundness and stability of banking sectors in recognition that banks are the primary financial intermediaries that facilitate funding in all sectors of the economy (Boyer & Kempf, 2017; Harnay & Scialom, 2016). This study shall refer to the Basel Committee guidelines for regulation and supervision of banks as the "Basel Accords". The Basel Accords are implemented and enforced internationally through government regulatory agencies or central banks.

In following the developments of the global regulatory framework, African countries adopted the Basel Accords to align with international regulatory standards, in the same manner as the adoption of international financial reporting standards. The African regulators were keen to embrace the Basel Accords owing to the presence of subsidiaries of internationally active banks in the region. The banking markets in Africa are dominated by the subsidiaries of international banks and these had historically maintained a significant market share of the continent's financial services sector (Grigorian & Manole, 2002).

Although the Basel Accords were developed to improve the quality of banking supervision worldwide, there has been rising concern in the empirical literature regarding suitability of the regulatory requirements on banks operating in Africa. Regulation and supervision of African banking sectors has been constantly confronted with the challenge of aligning the regulatory agenda with the international standards against the predominantly adverse macroeconomic conditions. The question of the Basel Accords suitability in the empirical literature was mainly stemming from the maturity of the African financial markets and the unique macro-economic dynamics of the region (Hassan, 2019; Osei-Assibey & Asenso, 2015; Mlachila et al., 2013; Beck & Cull, 2013).

In Africa, the association of regulation and bank efficiency does not follow a positive pattern like in the developed markets due to the inherent differences and weaknesses such as the level of economic and financial development, institutional arrangements of regulatory bodies as well as the social and political environments. Therefore, a "best fit" rather than a "best practice" regulatory approach was more suitable for Africa (Triki et al.,2017). The regulatory framework should have a broad rather than a narrow conception of what drives individual behaviour within the regulatory process (Arch, 2020). As result, the adoption a uniform regulatory approach in Africa was argued to have the potential to affect the efficient performance of banks, as well as encourage and protect dominance of the larger banks who are able to absorb the increased cost of regulation. In relation to this, Ngwu et al., (2019) opined that there was need for instituting regulatory approach that was appropriate to the characteristics and dynamics of the African financial markets.

Kodongo (2018) postulated that the key role of regulatory requirements includes maintaining market integrity, reduction of information asymmetries and mitigating systemic risk caused by a bank failure. However, these may result in unintended consequences which adversely affect the efficient intermediation role of banks. For example, the regulatory capital requirements could result in some weakly capitalised banks exiting the banking business. Moreover, the high cost of regulation could also result in mergers of weakly capitalised banks, thereby giving rise

to the potential of distortion of efficient competition in the market and reduce efficiency in the economy. Hassan (2019) argued that the stringent regulatory requirements in banking business could boost the competitive advantage of non-bank financial institutions since these were not equally subject to stringent and costly regulatory requirements. In other arguments, Corbet & Larkin (2017) indicated that it is possible that established banks experiencing favourable financial performance could advocate to have stringent market entry requirements to deter new entrants and new competitors to preserve high profitability levels.

In the main, empirical literature on banking regulation does not understate the importance of regulation on banking business, but rather posits for increased scrutiny of regulatory approaches to address the downside risk of adopting the globally set regulatory requirements. The proportionality principle is one of the key attributes of good regulation articulated by Baldwin (2012). The author explained that in achieving proportionality, the scope, rigidity, and complexity should be commensurate with the size of the regulated entities. In support of this proposition, Moosa (2018) gave an example that banks in Somalia should not be regulated in the same manner as banks in Sweden, in the case against unification of banking regulations for the purpose of creating a level playing field.

Barth et al., (1997) opined that the stringent regulatory capital requirements could turn out to be restrictive and burdensome to banking business, resulting in adverse performance of banks. In support of this view, Beck et al., (2014) highlighted the need to facilitate the development of an appropriate regulatory framework suitable for Africa, that would drive convergence towards international standards in a similar approach.

1.2 Purpose Statement

On the basis of the afore mentioned, this study seeks to establish the impact of regulatory requirements of the Basel Accords on bank performance in Africa. Particularly, this study seeks

to establish how the regulatory capital requirements had impacted performance of banking sectors in Africa.

1.3 Problem Statement

The African economies are driven and predominantly funded by banking sectors, as such, alignment to the international banking regulatory requirements is important to enable stability of banking systems and foster economic development (Mensah et al.,2012). Allen et al., (2011) highlighted that Africa had the most underdeveloped financial systems, and the banking sectors were the key economic drivers of the region. The authors also indicated that the financial sector reforms which included improvements in bank regulation influenced the opening of the markets in Africa and the attendant entry of foreign banks in the region. Therefore, the adoption of the Basel Accords contributed positively to the market confidence and reliability of the African banking systems as players in the global financial markets.

This notwithstanding, empirical literature showed that the adoption of the Basel Accords had potential to negatively affect bank performance, which would in turn undermine the most important role of being the economic drivers in Africa (Beck & Cull, 2013; Hassan, 2019; Kodongo, 2018; Park et al., 2013; Ngwu et al., 2019; Osei-Assibey & Asenso, 2015; Triki et al., 2017). The key arguments from the authors was that the uniform adoption of the global regulatory requirements increased the potential of having unintended consequences in performance of banks owing to the unique structure of the African financial systems. The regulatory capital requirements affect the quantity and structure of assets composition, including financial intermediation, as well as profitability which derived from the earning assets Therefore, it is imperative to investigate whether the regulatory capital requirements do not stifle the key role banks play in the African economies.

1.4 Objectives of the study

This study seeks to evaluate the impact of the Basel Accords regulatory capital requirements on the financial performance of banking sectors in Africa. The bank specific performance measures of profitability and financial intermediation are used to would allow for meaningful

conclusions in investigating the impact of Basel Accords on bank performance. Profitability shows the efficiency of banks on equity invested and assets deployed, as well as the ability to continue as a going concern. On the other hand, financial intermediation was chosen because of the traditional intermediation function of banks of deploying deposits into the economy.

In this regard, the objectives of the study are to examine the effect of capital regulation on bank profitability and financial intermediation, respectively. The profitability measures used by the study are return on assets and return on equity, whereas financial intermediation is measured as the ratio of loans to deposit. The study used the three proxies of regulatory capital, and these were, capital adequacy ratio, core capital ratio and total capital to total assets ratio.

Thus, in addressing the research objectives this study seeks to measure the impact of:

(i) Capital adequacy ratio on return on assets and return on equity.

(ii) Core capital ratio on return on assets and return on equity.

(iii) Total capital to total assets ratio on return on assets and return on equity.

(iv) Capital adequacy ratio on financial intermediation.

(v) Core capital ratio on financial intermediation.

(vi) Total capital to total assets ratio on financial intermediation

1.5 Research Questions

This research aims to provide answers to the following questions;

(i) How has the capital adequacy requirements affected the profitability;

(ii) How has the core capital requirements affected the profitability;

(iii) How has the total capital to total assets ratio affected the profitability;

(iv) How has the capital adequacy requirements affected the financial intermediation;

(v) How has the core capital requirements affected the financial intermediation;

(vi) How has the total capital to total assets ratio affected the financial intermediation?

1.6 Potential significance and/or benefits of the study

The thesis makes contributions to the rather scanty literature on regulatory capital requirements and bank performance in Africa. Most importantly, this study would make meaningful contributions to policy makers on the relevance and importance of banking regulation, germane to the African banking sector architecture, and provide empirical evidence in conversations on whether uniformity of banking regulation is relevant for African region.

1.7 Overview of Methodology

The empirical analysis adopted the multiple regression estimations to investigate the effects of regulatory capital requirements on financial performance of the African banking sectors. The data was analysed using the correlation and regression analysis to provide empirical explanations to the research questions. The research covered the period 2010 to 2018 and reliance was entirely placed on the secondary data sources, being the annual banking supervision reports of the sample countries.

1.8 Outline of Research Report

The thesis is organised into 6 chapters, the introduction of the thesis summarised in Chapter 1, followed by Chapter 2 of literature review on banking regulation and bank performance. Chapter 3 describes the research methodology, whereas Chapter 4 presents the results of the effect of the regulatory capital requirements on bank performance. Chapter 5 is a discussion of

the empirical results. Chapter 6 provides a summary of the key findings and includes conclusion and recommendations on policy as well as suggestions for future research.

1.9 Delimitations of study

Basel Committee has issued various guidelines intended to guide banking supervision and regulation globally and, this study shall solely focus on the regulatory capital requirements. Moreover, the countries selected for the empirical study in assessing the effect of the regulatory capital requirements on bank performance in Africa shall be those that have adopted Basel II. This research covers the commercial banking sectors from 2010 to 2018, while the national development banks and building societies were not included in the study because these were not strictly adhering to the requirements of the Basel Accords; and in most cases the institutions were not deposit taking.

Furthermore, this study did not include South Africa since the country is a member of the Basel Committee, thereby aligning strictly to the Basel Accords requirements compared to other African countries.

CHAPTER 2: LITERATURE REVIEW

This chapter presents empirical literature relating to banking regulatory requirements and financial performance of banks. To give perspective to the study, literature review chapter is organised in four parts as follows: (i) Overview of the African Banking Structure (ii) Background of Bank Regulation (iii) The Basel Accords (iv) Basel Accords and Bank Performance.

2.1 Overview of the African Banking Structure

African economies are anchored on funding from commercial banks which are core to driving economic activities compared to other sources of finance of stock and bond markets. As a result, the African economies remain predominately funded by bank loans as opposed to publicly traded instruments such as equity and debt which are available in mature financial markets (Motelle & Biekpe, 2014). The following provides a summary of the key stylised facts of the African banking markets.

2.1.1 Highly Concentrated Market Structure

The African banking sectors are characterised by highly concentrated markets wherein on average top three largest banks hold more than 50 percent banking industry total assets as shown in Table 2 below. The nature of concentration varied from one country to the other where in other countries concentration was skewed towards government banks and others towards foreign banks (Banya & Biekpe, 2018; Daumont, Le Gall, & Leroux, 2004; Mlachila et al., 2013). Similarly, Motelle & Biekpe (2014) found an oligopolistic banking market structure of the Southern Africa region, wherein the market share was dominated by few large banks. The highly concentrated African banking sectors had resulted in a market with limited deposit and lending competition. Moreover, there was prevalence of state-owned banks in the region which were established to facilitate development of the banking sector. The African governments set

up some state-owned commercial banks and development banks to finance priority sectors such as agriculture, industry creation, and housing (Daumont et al., 2004; Kablan, 2009).

Table 2 shows the concentration levels of the top three and five banks, respectively for the sample countries of study. Malawi had a highly concentrated banking sector with top three banks with a market share of 86.8 percent, followed by Namibia at 67.5 percent.

Table 1: Banking sector concentration levels

Country	Top 3 banks asset concentration	Top 5 banks asset concentration
Botswana	64.4	89.3
Kenya	36.6	52.9
Malawi	86.8	100.0
Namibia	67.5	98.1
Tanzania	48.9	61.3
Uganda	54.2	73.5
Zambia	45.0	68.3
Zimbabwe	62.3	78.8

Source: Global Development Finance, 2017

2.1.2 Informal sector driven economies

The key macro-economic features of the African region included; large informal sector, low income levels, and low and lack of financial literacy**.** A large proportion of the key economic drivers of the region operate in the informal sector and lack the formal documentation necessary for financial transactions. This was found to increase the costs and risks for region's banking sectors owing to information asymmetry which resulted in a larger proportion of economic activity drivers being excluded in formal financial services (Beck et al., 2014; Mlachilaet al., 2013).

2.1.3 Micro-finance

Over the years, Africa has experienced notable growth on the non-bank credit providers mainly in the form of micro-finance institutions. Beck & Cull (2013) opined that the micro-finace

institutions had a competitive advantage by targeting the unbanked who constitute a significant portion of the African population. Moreover, Triki et al (2017) indicated that the informal finance has become a key competitor of commercial banks as an alternate source of finance.

2.1.4 Information and Communication Technologies

Furthermore, the key developments in the financial services provision in Africa was the advent of the mobile network operators and fintech companies which leverage from technology capabilities (Duho et al., 2019). This innovation has resulted in partnerships of commercial banks with these companies for mobile and electronic banking channel development, changing the banking architecture of the continent (Adeleye et al., 2019).

The developments presented intense competition to banks because banking services were now provided to the unbanked population through the use of mobile phones, enabling the flow of funds through the mobile banking platform (Beck & Cull, 2013; Mlachila, Dykes, et al., 2013). One of the key developments and innovations in mobile money was originated in Kenya, the fintech-based product called M-Pesa which has gained traction in the continent and rest of the world. Table 3 shows how the different African countries have embraced the use of mobile banking through conducting digital payments from bank account using mobile money and internet banking, as well as the domestic remittances through the mobile phones. Kenya and Uganda were at the lead of the mobile remittances. The fintech development entirely changed the banking architecture from the traditional bricks and mortar to branchless banking and has evidently improved the financial inclusion and access to financial services in Africa (Didenko, 2017; Muthinja & Chipeta, 2018).

Table 2: Technological developments in banking services

Country	Digital Payments (%)	Digital Bill Payments (%)	Mobile Remittances (%)
Botswana	34.3	6.4	11.0
Kenya	76.4	37.1	50.1
Malawi	22.3	3.7	10.5
Namibia	63.1	12.2	24.0
Tanzania	39.8	15.5	26.2
Uganda	51.3	9.9	35.1
Zambia	33.1	10.5	18.4
Zimbabwe	49.2	11.7	27.2

Source: Global Development Finance, 2017

2.1.5 Pan-African banking groups

The past decade saw the emergence and growth of Pan-African banking groups, changing African countries from being hosts of the subsidiaries of international banks to having banks originated in Africa. Over the years, the presence of Pan-African banks has increased and aggressively competing against the subsidiaries of international banks that had historically dominated the African market. The Pan-African banking groups which assumed the region's market share leadership were particularly from Nigeria, Kenya and South Africa (Adeleye et al., 2019). Similarly, Mecagni et al., (2015) opined that seven major Pan-African banks dominated market share of the region in terms of geographic footprint, with each banking group present in 10 African countries at a minimum. Although the development of the banking groups indicates growth in Africa's financial systems, this had also increased the contagion risk spectrum since the economies of the region are faced with similar macro-economic vulnerabilities. The cross-border banking would thus be a channel of transferring economic shocks and systemic risk in the banking sectors from one country to the other (Ngwu et al., 2019).

2.2 Background of Bank Regulation

The empirical literature of bank regulation has mainly taken two propositions in explaining the need for and importance of bank regulation, being the public interest theory and contagion risk stemming from interconnectedness of the global financial markets. In explaining the rationale of bank regulation, Berger et al., (1995) opined that regulator respond on behalf of society to the possible negative externalities associated with financial intermediaries, and systemic risk being of principal concern. The authors further reiterated that the stability of the financial system could be compromised by bank failure and the resultant repercussion spreading to all sectors of the economy. The principal goal of regulation and supervision of banks is to ensure the stability of the financial system by mitigating excessive risk taking that can damage the interests of depositors, as well as preventing systemic crisis that can impair the whole economic system (Nyantakyi & Sy, 2015).

2.2.1 Public Interest Theory

According to the public interest theory, regulation of economic activities is conducted to protect the public interests from abuse of power and misconduct which can arise from information asymmetry and market supremacy (Ahmed, 2016). Therefore, bank regulation seeks to maximise benefits to the public and minimise financial losses which may affect the public. Similarly, Baldwin (2012) indicated that the involvement of government through f structured regulation is important to guard against any form of self-interest pursuit by the regulated entities that can adversely affect the interest of the public.

The public interest theories justify regulations on the ground that a government has to protect the public from banks' actions, which might be detrimental to the public, mainly the depositors who entrust their funds with banks. The public lacks resources to monitor, and in some instances, an ability to understand actions of the banks (Naser & Mohammed, 2017). Similarly, Oliveira & Raposo (2019) opined that the excessive risk-taking can be controlled and limited by regulation and supervision. The most commonly used form of regulation for

controlling the risk taking behaviour of banks to protect depositors' funds is the capital-based regulations.

In support of public interest theory Caprio et al., (2001) identified five key theoretical reasons for restricting bank activities through regulation. Firstly, to limit bank's involvement in activities which may give rise to conflict of interest and expose depositors' funds to undue risk. Examples of these activities include trading in high risk speculative financial instruments, underwriting for securities and insurance, investment in real estate and other illiquid assets. Secondly if there was no monitoring, banks would be induced to assume increased risk for profit maximization and could engage in a trading of high-risk activities to the extent that moral hazards encourage riskier behaviour. Third, the activities of complex banks cannot be easily monitored by the public. Fourth, large and complex banks may end up being regarded as "too big to discipline" owing to their political and economic power. Lastly the large financial conglomerates that dominates market share may use bargaining power to control market, resulting in reduced competition.

2.2.2 Contagion Risk

The other proposition of bank regulation is premised on the interconnectedness of the financial system which gives rise to the need to guard against contagion risk arising from the correlation of financial markets. The volumes of financial transactions across the global village has notably increased over the years and the financial markets had become highly interconnected and this heightened the potential of chain reaction in the event of a financial crisis. In support of this view, Boyer and Kempf (2017) opined that since the investments and transactions of banks are conducted freely worldwide, the regulation of banks should also follow in the same manner in view of actively regulating the risk taking behaviour stemming from the financial opening processes of the ever-increasing cross-country financial flows.

Furthermore, Herring (2018) related international cooperation in financial supervision with the global public health collaboration, a field where global cooperation has been evident and

effective in managing a pandemic on any sort. The international cooperation in public health is anchored on information exchanges regarding the proliferation and behaviour of diseases as well as measures that can be adopted for prevention and management, including efforts to standardise the global approach to eradicate contagious diseases. Similarly, banking regulation and supervision has followed this pattern of a global approach, wherein the Basel Committee is a standard setting body for banking operations to ensure financial sector stability and resiliency, as well as providing a structured way of identification of vulnerabilities in the banking system.

Therefore, it is imperative for all the banks across the world to be subjected to regulation and supervision owing to the core financial intermediation function, interconnectedness to all sectors of the economy and performing activities across the world. Moreover, adoption of the regulatory requirement for banks provides a platform to establish an organised structure and approach of crisis management in periods of economic stress.

2.3 The Basel Accords

The Basel Committee was formed by Group of Ten countries[1] (G10) in 1974, following the disturbances in the international currency and banking markets. There was strong recognition by the G10 that there was a need for an organised approach of ensuring stability of the international banking system and resilience of financial markets to domestic and external shocks (Kaur & Kapoor, 2015). Over the years, the size of the Basel Committee has grown from the 10 member states in 1974, to having 45 member jurisdictions in 2019. South Africa is the only African country that is a member of the Basel Committee (BIS 2019).

Basel Committee envisages to attain a consistent approach in regulation and supervision of bank across member jurisdictions as well as ensuring that all banking businesses across the globe are subjected to the same regulatory and supervisory requirements. Moreover, the Basel Committee aimed to improve the quality of banking supervision worldwide which would in turn foster stability of the financial markets. Most importantly Basel Committee provides platform for an organised structure of cooperation amongst the member countries in developing the regulatory and supervisory standards (BIS, 2019).

Basel Committee issued three sets of capital regulations, starting with Basel I, followed by Basel II and lastly Basel III and these were all were primarily designed to achieve a resilient banking system through adequate capitalisation. The following provides a summary of key attributes of the Basel Accords with focus on the regulatory capital requirements, which is the basis for this study.

[1] Belgium, Canada, France, Germany, Italy, Japan, Netherland, Sweden, Switzerland, United Kingdom, and the United States

2.3.1 Basel I

The Basel Committee issued the first work of Basel I in 1988 upon reaching an agreement on the measurement and definition of regulatory capital. This included definition of instruments that constitute regulatory capital and rules for minimum acceptable capital level. Basel I introduced a defined measure of the capital adequacy ratio (CAR), calculated as the ratio of total regulatory capital to credit risk-weighted assets, and prescribed 8 percent as a minimum requirement (BIS 1988).

Vousinas (2015) defined CAR as the rule of 8 percent, being the minimum solvency ratio for the risk of credit default by counterparties, which was also referred to as minimum risk-adjusted capital ratios. Basel I incorporated risk measurement in different categories of assets held by banks by assigning risk-weights to exposures based on inherent risks of counterparties. The off-balance sheet items were also included as part of risk-weighted assets and assigned credit conversion factor to accurately estimate the capital charge for credit risk (Phua 2019). Over the years, as the financial markets evolved, so did the financial instruments and this fuelled the complexity of modern financial transactions. As a result, it was apparent Basel I had become obsolete for the prevailing banking operations and complexities of transactions thereof, thereby the capital requirements were deemed inadequate. There was a clear indication of the need to ensure banks adopt robust risk management practices and as a result, the Basel Committee developed Basel II.

2.3.2 Basel II

In 2004, Basel II was introduced following developments in the financial markets and changes in banking products which had become more complex, thus rendering Basel I insufficient to meet the high-risk banking operations. The key objective for the revision of Basel I was to improve resiliency of regulatory capital by adopting a more risk-sensitive approach in determining the capital adequacy. In achieving this, the Basel II framework had three pillars; Pillar one - minimum capital requirements, Pillar two - supervisory review process and Pillar

three - market discipline. The objective of Pillar one was to strengthen the quality of capital by assuming a more risk sensitive approach in the measurement of risk-weighted assets to reflect the high complexity and high risk of banking activities. In essence, Pillar one was an improvement to the previously issued Basel I with the introduction of the capital charges for operational and market risks when determining the total risk-weighted assets. Thus, the total risk-weighted assets were constituted by capital charges for credit, operational and market risks components. This notwithstanding, the definition of capital and minimum capital requirements was maintained as prescribed in Basel I. The key change with the introduction of Basel II was augmenting the measurement of risk with operational and market risks which resulted in an increase in required capital stock to accommodate the increased capital charge of new risk measurement of operational and market risk (BIS, 2006).

Basel II – Pillar two, also named the supervisory review process entrust supervisors with ensuring that bank capital levels are commensurate with the size and risk profile of each bank, such that the capital stock was sufficient to support the entire risk spectrum of the banking business activities. Additionally, Pillar two prescribed that banks should adopt robust risk management techniques that was commensurate with the risk exposure in transactions of the banking and trading book. Pillar two emphasised that the quality and effectiveness of the risk management and internal control processes can help in reducing the overall risk exposure of the bank, thereby conserving the capital stock. It was apparent that instances of weak risk management systems can subsequently erode the regulatory capital stock in the event of an adverse event. Examples of risk areas to pillar two included business cycle risk, strategic risk, interest rate risk (banking book) concentration risk in credit and liquidity risks (BIS, 2006).

Lastly, the pillar three of market discipline was entirely aimed at reducing information asymmetry by enforcing banks to have adequate disclosures to allow all stakeholders to have reliable information regarding the effectiveness of the risk management systems and controls on the risks assumed by the bank.

Following the financial crisis in 2008, the Basel II regulatory requirements were said to have largely influenced the distress in the financial markets which was mainly attributable to under-estimating some significant risks that banks assumed and over-estimating their capabilities for effective risk management. Pakravan (2014**)** and Vousinas (2015) highlighted the following as key shortcomings of Basel II:

- The use of credit rating agencies to conduct risk assessment of the counterparty was deemed to be susceptible to conflicts of interest;
- Basel II provided a platform for banks to engage in high risk transactions such as securitisation, where banks were allowed to re-packaged toxic loans into asset-backed securities;
- Basel II encouraged complexity of financial products such as conducting some transactions through special investment vehicles to reduce the credit risk-weighted assets, and these were deemed high risk as they were characterised by lack of transparency; and
- It became apparent that the minimum regulatory capital did not have capacity to absorb losses due to high leverage and the capital instruments used could not be transformed to cash in times of stress.

2.3.3 Basel III

The Basel III reforms were introduced in 2010 to strengthen the regulatory capital as well as establishing the minimum liquidity requirements to improve resiliency and stability of banking sector. There was a broad acknowledgment that there were shortcomings from the regulatory requirements mainly on account of failure of the supervisory oversight in identification of vulnerabilities and excessive risk-taking by banks and these contributed to the 2008 financial turmoil (Coban, 2020; Oliveira & Raposo, 2019).

The main novelties of Basel III were the enhancement of quality and quantity of regulatory capital as well as the introduction of internationally harmonised liquidity standards. The Basel III enhancement on the quality of regulatory capital was with respect to adoption of more stringent criterion for capital components. There was greater emphasis on holding more common equity capital because of its high-quality attributes which allowed the instrument to have a higher capacity of absorbing losses in the event of a distress. Moreover, Basel II introduced the capital conservation buffer and the counter-cyclical capital buffer to increase the quantity of capital. The capital conservation buffer was intended to be used in times of financial distress; while the counter-cyclical capital buffer which requires a build-up during periods of excessive credit growth to be used to cushion credit losses during the financial stress periods (BIS, 2010).

Baker et al., (2017) applauded the Basel Committee for the revisions of capital requirements to address the identified vulnerabilities after the crisis by strengthening the quality of capital and prescribing a more stringent criterion for instruments to be included as part of capital. Moreover, there was emphasis on common equity capital on account of its capacity to fully to absorb losses. The loss-absorbing strength was attributable to the highest subordination to all bank creditors in the event of liquidation, and the instruments had no maturity or expectation of redemption. The use of high-quality financial instrument as regulatory capital items enhanced the stability and resiliency to any possible shocks in the financial system.

Furthermore, Basel III also introduced the liquidity standards, namely, Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) and had minimum requirements, following on the rationale of setting the capital standards, and prescribed minimum liquidity requirements. These ratios were intended to attain two different but complementary objectives of ensuring a sufficiently liquid banking sector. The LCR sought to ensure short-term resilience with sufficient stock of high-quality liquid assets to withstand a month-long severe stress scenario. On the other hand, the NSFR promotes sustainability of bank's funding over a longer time horizon which was achieved by incentivising banks to fund the banking book with stable

deposits and other liabilities to a achieve a matched maturity structure of assets and liabilities (BIS, 2010).

2.3.4 Summary of key changes in regulatory capital structure

Table 1 outlines the key changes of the regulatory capital requirements over time when the Basel Accords were revised. Fundamentally, all the revisions were an improvement from each previous issue. The key changes from Basel I to Basel II were envisioned to attain a more risk sensitive approach to measuring the adequacy of capital. The changes resulted in an increase in total risk-weighted assets, thereby growing the denominator of capital adequacy ratio, while the numerator, being definition of capital, remained the same. On the other hand, the revisions in Basel III were centred on redefining the constituents of regulatory capital and enhancing the quantity of capital with additional buffers.

Basel I and Basel II had the same definition of regulatory capital items and the key change was the determination of the risk-weighted assets where two additional measures of risk, being the operational and market risk-weighted assets were introduced to the credit risk-weighted assets. Basel III was mainly anchored on more stringent definition of capital instruments and encompassed thorough and critical analysis on the nature and behaviour of regulatory capital instruments. Moreover, the emphasis on common equity capital was also increased owing to the high loss absorbency capacity of common shares, hence the introduction of the CET 1 ratio of 3.5 % - 4.5%. The capacity to absorb losses for regulatory capital instruments was a key attribute of Basel III definition of capital. For example, the property revaluation reserve is an example of items that do not qualify for inclusion as Basel III regulatory capital since the instrument could be liquidated in times of distress.

Furthermore, there were additional deductions in the Basel III capital with the introduction of regulatory adjustments items applied to regulatory capital. The objective of the regulatory adjustments was to improve the quality of capital by deducting items that do not have the

capacity to absorb losses. Goodwill and intangible assets are examples of regulatory adjustments deducted from capital on account of lack of loss absorbency capacity (BIS 2010).

Table 3: A comparison of Capital Adequacy Ratio (CAR)

	Basel I	**Basel II**	**Basel III**
Minimum capital requirements	Tier I ratio: 4 % **CAR : 8 %**	Tier I ratio: 4 % **CAR: 8 %**	CET 1 ratio: 3.5 % - 4.5% Tier I ratio : 4.5% - 6 % **CAR: 8 %** + Capital conservation buffer (0.625 % - 2.5 %) + Countercyclical buffer: (0 - 2.5 %)
Capital components	Tier I and Tier 2	Tier I and Tier 2	Tier I (common equity Tier 1, + additional Tier 1), Tier II Capital and regulatory adjustments
Total Risk Weighted Assets(RWA)	Credit RWA	Credit RWA Operational RWA Market RWA	Credit RWA Operational RWA Market RWA

$$\text{CAR} = \frac{\text{Regulatory Capital}}{\text{Total Risk-Weighted Assets}}$$

2.3.5 Implementation of Basel Accords in Africa

Almost all African countries have adopted the Basel I and this has been instrumental in shaping the banking sector and supervisory framework of the region. Coban (2020) attributed to a large extent, the dominance of foreign banks in African market to have necessitated the convergence with the international community on banking regulatory requirements.

The African countries do not implement the Basel Accords at the same pace as the Basel Committee members and each country adopts the rules at own pace. However, the African countries are regularly subjected to the financial sector assessment programs to ensure compliance to the Basel Accords regulatory and supervisory requirements. The assessment is used for evaluate the quality of supervisory systems and identify areas of improvement to achieve a sound level of supervisory practices (Gottschalk, 2014).

Table 2 shows the varying levels of capital adequacy ratio and implementation of Basel Accords in the countries selected as a sample of the study. All the sample countries were above the minimum CAR of 8 percent prescribed by the Basel Committee and had implemented at a minimal, the Basel II regulatory capital requirements. Brownbridge (2015) found that majority of the African countries that implemented Basel I capital requirements had imposed a higher minimum total capital requirement which was more than 8 percent prescribed minimum. The higher capital adequacy ratio than the minimum specified in the Basel Accords was attributable to banks in developing economies operating in a riskier environment than banks in advanced economies, for which the minimum ratios in the Basel Accords are primarily intended to apply.

Table 4: Minimum Capital Adequacy Requirement and Basel Accords Implementation

Country	CAR Dec 2018 - %	Number of commercial banks	Basel Accords Implementation	
			Basel II	Basel III
Botswana	15	13	2015	2015 - Partial Implementation
Kenya	14.5	43	2013	2013 - Partial Implementation
Malawi	15	9	2013	Not implemented
Namibia	10	10	2010	2018 - Partial Implementation
Tanzania	15	40	2014	2014 - Partial Implementation
Uganda	15	24	2018	Not implemented
Zambia	10	18	2013	Not Implemented
Zimbabwe	12	15	2018	Not Implemented

Source Central Banks of Countries under study, 2018

All countries under study had adopted Basel I and II as at December 2018, while Basel III was only partially implemented in four countries. The lowest capital adequacy ratio of the countries under study was Namibia and Zambia with a minimum CAR requirement of 10 percent, followed by Zimbabwe with 12 percent while the other five countries were at 15 percent. These countries vary extensively on economic and banking sector development, which may be the reason for differing bank capital requirements. The differing levels of banking sector development were evidenced by the number of banks in these countries, where Kenya had a more mature banking sector with 43 commercial banks as at December 2018, while Malawi was the lowest with 9 banks.

Regarding the financial performance indicators, the banking sectors showed diverse results on net interest margin, lending deposit spread, non-interest income to total income and the cost to income ratios as shown in Table 5. This was indicative of the uniqueness of each banking sector despite operating in similar macro-economic environments. The banking sectors of Malawi, Uganda and Zambia reported higher net interest margin, while the high operating costs were in Tanzania, Zambia and Malawi. All countries under study were mainly relying on interest income revenue stream except for Zimbabwe which had a significant proportion on non-interest income to total income amounting 55.9 percent.

Table 5: Financial Soundness Indicators

Country	Net interest margin (%)	Lending-deposit spread	Non-interest income to total income (%)	Cost to income ratio (%)
Botswana	5.7	5.4	38.5	58.5
Kenya	9.4	6.0	31.4	50.2
Malawi	11.8	-	37.8	60.3
Namibia	5.3	4.1	41.1	53.1
Tanzania	9.4	6.4	31.0	66.6
Uganda	10.3	11.6	34.1	56.3
Zambia	10.1	3.7	39.7	63.0
Zimbabwe	6.5	-	55.9	59.1

Source: Global Development Finance, 2017

2.4 Basel Accords and Effect on Bank Performance

This section covers empirical literature regarding the determinants of bank performance and effect of the regulatory capital requirements on financial intermediation and profitability.

2.4.1 Determinants of bank performance

Empirical literature categorised factors that affect bank performance as internal and external determinants of performance. The internal determinants of performance are those which are within the control of bank management and relates to the strategic decisions made on available resources, which could also be called bank-specific factors indicating how resources are deployed (Dietrich et al 2011; Menicucci & Paolucci 2016). On the other hand, external determinants are those beyond the control of bank management and normally relates to the economic, regulatory and legal environment of the jurisdictions that banks operate in (Duho, et al., 2019; Onuonga, 2014; Pasiouras et al., 2009).

Therefore, profitability and financial intermediation are the internal determinants of banks performance, while the regulatory capital requirements are an external determinant of performance. Therefore, it is imperative to have an empirical understanding of the nature of the interrelationships amongst financial performance variables (internal factors) and regulatory capital requirements (external factors) , as well as empirical evidence on the level, direction, and strength of the interrelationships.

2.4.2 Regulatory requirements and bank performance

The primary objective of the regulatory capital requirements is to safeguard depositors' funds and ensure ability of the banks' capital to absorb losses in the event on a distress. In addition, the requirements control the amount of credit risk a bank can assume and any other risk-taking activities that involves transactions that use depositors funds (Bratanovic & Greuning, 2000). The regulatory capital requirements prescribe the quantity of capital to be maintained by a bank

and should be commensurate to the risk assumed, thus somewhat controlling the bank's risk appetite. The capital requirements govern the maximum level of assets a bank can hold, the type of financial instruments that can be used as capital, amount of capital and subsequently affecting cost of capital. If a bank holds more capital at risk, profit would be maximised from high-risk, high reward activities, however, this would be curtailed by the possible loss of capital. As a result, the regulatory requirements ensure that depositors and other creditors are protected from excessive risk taking of bank owners resulting in more prudent lending and robust risk management by banks **(**Barth et al., 2013**).**

Empirical literature showed that there is growing evidence in the association of regulatory capital requirements and bank performance which were found to be intricately interrelated. Therefore, it is important to examine regulatory indicators to identify those with strong association with banks' performance measures (Dietrich & Wanzenried, 2011).

2.4.2.1 Financial Intermediation

Financial intermediation is defined as the transformation process that of borrowing funds from savers and lending to borrowers, that is, collecting deposits from savers and providing them to borrowers as loans and advances (Ally, 2013;Jiménez-Hernandez et al., 2019;Lindley and Sealey, 1977;Banya & Biekpe, 2018). The traditional core function of banking business involves turning deposits into loans and advances. Thus, when savers place deposits in banks, there would be opportunities to provide loans and advances, and hence to fulfilling the financial intermediary role of funding economic activity. However, Allen et al., (2011) found the African banking sectors to portray a highly dysfunctional banking intermediation that shuns provision of private credit in favour of safer government securities.

According to Pasiouras et al., (2009) capital requirements affect bank efficiency since the influence the quantity and quality of the loanable funds which should be at acceptable risk levels. The regulatory capital requirements influence strategic asset allocation of banks due to the need to preserve capital. Additionally, the requirements influence the proportions of funding

mix for customer deposits, equity, and debt and these bear different costs for banks.

The regulatory capital requirements are undoubtedly essential, however, if these are overly stringent, the banks' credit extension appetite would be adversely affected. Moreover, the high regulatory capital requirements could lead to an increased pricing for loans owing to the high cost of raising eligible capital instruments, which would ultimately be transmitted to loan pricing. African economies are characterised by inherently high credit risk due to informal sector and agriculture driven economies, as well as adverse macro-economic conditions. The credit facilities to informal and agriculture sectors are deemed riskier and would generally attract a higher capital charge, resulting in an increase in the required regulatory capital stock (Beck & Cull, 2013). Similarly, Harnay and Scialom (2016) opined that regulatory requirement caused banking businesses not to function at full capacity as financial intermediaries, which generated inefficiencies in the market.

Furthermore, in Africa economic activity is predominantly funded by bank loans since the debt and equity markets are at infancy or undeveloped levels, therefore, the stringent capital requirements would have an impact on real economic activity. The decrease in lending appetite caused by regulatory requirements, negatively impacted economic activity as result of the decline in loan supply into the economy. Consequently, when banks are faced with higher capital requirements, the reduction in credit extension or increasing loan pricing can be the resultant impact, adversely affecting economic growth (Beccalli, Frantz, & Lenoci, 2018). Additionally, Swamy (2018) concluded that higher capital requirements resulted in an upsurge in loan pricing especially which was more pronounced in instances where cost of capital was more than cost of deposits. The increased loan pricing subsequently resulted in decreased loan demand. This was also supported by Nguyen (2019) who opined that the capital regulation resulted in negative consequences which included a reduction in lending, increased risk-taking in banks and lower economic growth.

Furthermore, Herring (2018) highlighted that the lending appetite of banks reduced because of the Basel Accords as there was a decline in the credit extension with view of preserving the

regulatory capital stock constraint. Moreover, Khan et al.,(2019) comcluded that banks were changing the assets composition from loans and advances, towards risk-free investments such as money market instruments and treasury bonds to maintain profitability and preserve capital. The portfolio rebalancing towards risk-free investments resulted in the improvement in capital ratios as this type of assets did not attract a higher capital charge. Similarly, Sudrajad (2021) found that the adoption of the Basel II framework in the ASEAN member states resulted in banks diversifying their income structure to non-interest income-based activities which do not require holding of additional regulatory capital. The shift from traditional intermediation function of banks resulted in reduced channelling of funds in the economy as loanable funds. The regulatory capital was found to influence the asset composition of banks between lending (loans and advances) and investment (government securities) and this translated to the overall efficiency and competitive position of a bank (Ghanem 2017).

Similarly, Osei-Assibey & Asenso (2015) found that regulatory capital influenced appetite for credit extension and high-risk business activities in Ghana. The authors opined that the stringent capital adequacy regulations and high capital requirements curtailed lending appetite towards the high risk sectors such as agricultural and informal sectors.

In another perspective, Pakravan (2014) argued that banks may ending up shrinking lending activity in view of complying with the new regulatory framework on account of failure to raise the required regulatory capital. The capital requirements were also found to favour the already well-established banks who can easily access additional funding, thereby enhancing their competitive advantage over newly established banks. The adequately capitalised banks had access to cheaper capital funding sources and thus would easily adapt to the stringent regulatory capital requirements without changing the portfolio or asset structure to remain profitable (de-Ramon, Francis, & Harris, 2016).

On the other hand, Maghyere and Awartani (2014) concluded that, adoption of the Basel Accords promoted overall efficiency in bank performance despite instances of contradicting relationships in the movement of the variables. For example, increased capital requirement

reduced lending, enhanced loan quality and resulted in decreased monitoring costs.

Furthermore, the empirical literature indicates that increasing the regulatory capital requirements tend to shift banking business from loans and advances to investment in other assets that can earn interest income and do not attract a higher capital charge. Thus, this capital conservation strategy resulted in notable improvement in profitability and efficiency of regulatory capital. The additional extension of loans would lead to more regulatory capital needed, and also give rise to additional loan losses which reduce profitability (Pellegrina, 2012; Siddika & Haron, 2019).

Moreover, Ghanem (2017) opined that raising capital adequacy ratio may cause banks to employ capital conservation strategies, resulting in a structural change of assets composition, where preference would shift towards risk-free assets or assets which attract a lower capital charge. Similarly, Lee et al., (2015) concluded that there was inverse relationship between change of regulatory requirements and risk appetite where efficient capital management formed a critical component in the credit decision making process. As such, banks became more conservative in increasing the portfolio size and adopted stringent credit underwriting standards in loans selection. Hassam (2019) found the increase in capital adequacy requirements to negatively impact bank's productivity, evidenced by the notable decline in the quantity of loanable funds.

2.4.2.2 Profitability

The regulatory capital requirements affect the quantity and structure of assets composition, and the profitability derived from the earning assets. Therefore, changes in regulatory capital requirements are translated into changes in the structure of earning assets and the income and cost drivers thereof. For instance, an increase equity with profitability remaining constant, the return on equity would be reduced on account of increased denominator (equity) and a constant numerator (profitability). According to De Bandt et al., (2014), the stringent capital requirements result in an increase in pricing of debt instruments which form part of capital since these are subordinated to general creditors and depositors. The subordinated debt holders increase the cost of the instruments due to the increased risk premium arising from absolute subordination. Thus the interest income would increase, causing a decline in profitability level.

Adesina & Mwamba (2016) concluded that the Basel III capital requirements increased bank lending rates to counter the increase in cost of funding. This was attributable to the replacement of unqualifying debt instrument with common equity capital to meet the Basel III definition of capital. Therefore, banks countered the decline in ROE by increasing lending rates to remain at the same profit levels. Similarly Iftikhar, (2016) and Sakar et al. (2019) reached the same conclusion that regulatory capital requirements and banking supervision had a negative impact on bank interest margins mainly due to: (i) the increase in cost of funding of the regulatory capital instruments and , (ii) reduction in loans, which resulted in a decline in interest income. Moreover, Ahmed et al., (2015) concluded that the capital adequacy ratios had a negative relationship with profitability, suggesting that the stringent regulatory requirements and robust supervisory practices contributed in narrowing interest margins and negatively affecting the ROE and ROA.

In other arguments, the investigations of the relationship between capital regulation and risk-taking behaviour of Indian banks observed positive association, where an increase in capital base resulted in reduced expected return causing banks to assume an increased risk by engaging in high risk activities in order to increase the profitability, diverting from the traditional

banking business of lending (Maji & Hazarika, 2018). Moreover, Bose et al. (2012) opined that the stringent regulatory requirement negatively affected the ability of banks to maximise the credit extension, thereby enabling growth of non-bank credit providers and shadow economies. The development of these alternative credit providers implies that the unregulated competitors would share in the profit margins which had been predominately enjoyed by banks. Thus, resulting in weak profitability that further erodes banks' capital buffers over time and undermines the core function of funding and supporting real economic activity.

Phua (2019) opined that there was need for the regulatory capital requirements to be appropriately calibrated and not be too conservative. This implied that the banking regulations should not be too stringent to avoid failure of a bank since this would result in a less-than-optimal lending to the real economy. The commercial banks find it harder to compete in the market with the increased costs of operation, especially against the rising competition from fin-tech players and other alternate credit providers that are not equally subjected to stringent regulatory and supervisory requirements.

The risk-based capital requirements were found to be positively related with bank stability and adversely impacting bank profitability. The negative impact on profitability was due to the fact that when capital requirements were stringent, the cost of borrowing and capital for debt and equity, respectively, would consequently increase particularly for the shallow and illiquid African stock markets (Osei-Assibey & Asenso 2015). Additionally, Oduor et al., (2017) concluded the stringent regulatory capital requirements gave subsidiaries of international banks competitive advantage over indigenous African banks. The foreign banks had access to readily available cheaper funding sources from parent companies and thus, any additional regulatory requirements improved their competitive pricing. On the other hand, the scarcity and high cost of capital made domestic banks less competitive. Similarly Killins et al., (2019) concluded that the effect of financial regulation on ROA and ROE produced mixed results, wherein, financial regulation negatively affected profitability of small banks and positively impacted profits for large banks.

Furthermore, Iftikhar (2016), postulated that increasing the regulatory capital requirements gave rise to the potential of channelling investments to other sectors of the economy where investment could earn a higher ROE. Although the higher the core capital ratio implied that a bank was adequately capitalised, on the downside higher core capital resulted in a fall of the ROE. In other industries other than banking sector, a higher equity implies a risk adverse company which yields a lower expected return on equity. Moreover, a higher equity ratio decreased tax shield that could be provided by deduction on interest payment of debt obligations, thus further reducing the profit efficiency. Handorf (2017) opined that banks ought to retain earnings or issue new stock build capital which would result in a lower leverage multiplier that improves the market view on ROE, thereby giving rise to adverse stock valuation in markets. In contrary, the Chinese banking sector responded positively to the stringent regulatory capital requirements on account of improved efficiency and bank development post-crisis period for the Chinese market (Lee & Lu, 2015).

Overall, the literature presented in this chapter provided clearer perspective to the study in providing empirical explanation to the variables used to define performance of banks and the respective association with regulatory capital requirements.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter presents the research methodology employed to establish impact of the regulatory capital requirements on bank performance and thus, provide answers to the research questions.

3.1 Research Methodology

The empirical analysis adopted the regression estimations to ascertain the effects of regulatory capital on bank performance, being quantitative based research used. Saunders et al., (2016) defined quantitative research as an analysis that uses statistical techniques to examine relationships between numerical variables. This was a distinctive research approach that tend to emphasise quantification and analysis of data to establish association in the variables and deduce the theorical concepts influencing behaviour (Bryman et al., 2014).

The use of regression analysis allowed the research to provide estimates of the population regression coefficients from the sample selected and provided the statistical inferences to answer to the research questions of the thesis. The regression models measured how a change in one variable affects the other and was found suitable for the empirical analysis to provide estimation of how the change in regulatory capital requirements impacted bank performance. (Gujarati & Porter, 2003).

3.2 Research Design

The study of the effect of the Basel Accords on bank performance is a case study type of a research which is an in-depth inquiry that seeks to investigate and establish how bank performance was is affected by the Basel Accords regulatory capital requirements. The case study researchers seek to conduct a critical analysis of a single case which involves a theoretical analysis of the data and in most cases tends to be deductive (Bryman et al., 2014). Moreover Saunders et al., (2016) defined case study research as an in-depth enquiry that seeks to identify

reason of a certain behaviour and understanding the effects thereof. This study used a case study design focusing on the Basel Accords regulatory requirements which allowed the researcher to achieve a comprehensive understanding of the context and behaviour of bank specific variables against the regulatory capital requirements.

3.3 Population and sample

3.3.1 Population

The population refers to an aggregate of objects under study, being collection of all elements about which some reference is to be made (Kevin et al., 2015). Therefore, the population for this thesis is the banking sectors of the 53 African countries. However, South Africa did not form part of the population since the country is adhering strictly to the Basel Accords requirements as a member of the Basel Committee.

3.3.2 Sample

Kevin et al., 2015 described a sample as a tool that represents and allows to draw conclusions of the characteristics of the population. Fundamentally, a sample represents the characteristics of the universe or population which is achieved by examining only a small part of it to draw an inference about the population.

The study employed non-random sampling and sample selection was mainly guided by the adoption of the Basel Accords and data availability in the respective African countries. This followed on the explanation of Dubey et al., 2016 who opined that in a non-random sample, personal knowledge and opinions are used to identify the item from the population. In purposive sampling, the choice of sample items depends on the object of the inquiry (Kevin et al., 2015).

The rationale behind the empirical analysis of this research is to analyse how the adoption of the regulatory capital requirements has affected the bank performance for the period 2010 to 2018. The sample period of 2010 to 2018 allows for an assessment of the different African

banking sectors which have adopted Basel II regulatory capital requirements. In order to draw meaningful conclusions on the effect of Basel Accords on bank performance, the study opted to use African countries which had adopted the more stringent Basel II regulatory capital requirements. The countries selected through purposive sampling for this study were Botswana, Kenya, Malawi, Namibia, Tanzania, Uganda, Zambia and Zimbabwe. The sample countries had all adopted Basel II regulatory capital requirements and had data available for the research period.

3.4 Procedure for data collection and data sources

This study used panel data from the secondary data sources, gathered from the annual banking supervision reports of the countries under study. The data from the websites of these countries was deemed reliable since it was published by the custodians of the data, not third-party. In addition, the data goes through internal scrutiny by the central banks before being shared in the public domain. The data was permanent and available to various stakeholders, making the empirical findings more reliable.

The use of the panel data enabled an empirical analysis of performance of the African banking sectors against the regulatory capital requirements. Brooks (2019), argued that panel data enables an empirical analysis of a broader range of factors and address complex research questions because of information diversity which allows for numerous econometric estimates. The secondary data from the annual banking supervision reports was available in sufficient detail to address the research objectives. These were sourced from websites of central banks making it a multiple-source secondary data.

The data provided in each country was the aggregate data of commercial banks, that is, the consolidated banking industry statements of financial position and comprehensive income, and information relating to regulatory capital requirements. Highlighting the advantages of secondary data Saunders et al., (2016) indicated that the data is readily available and easily

accessible at no cost. In addition, it provides for an unobtrusive measure since the data has already been collected and cannot be modified. The key disadvantage highlighted by Saunders et al., (2016) was that the aggregations and definitions may be unsuitable.

3.5 Variables

Table 6 outlines the variables selection for this study which followed on the related empirical literature of regulatory capital requirements and bank performance.

3.5.1 Dependent Variables

The dependent variables were the profitability measures of Return on Assets (ROA) and Return on Equity (ROE), as well as the financial intermediation measure of Loans to Deposits ratio (LD).

In line with the previous literature ROA and ROE are the commonly used measures of profitability. ROE measures the ability to generate profit from equity invested by shareholders, indicating the capability to use the shareholders fund to grow the banks' earnings. ROA shows the ability of bank to generate profits from the assets deployed, showing the efficiency of assets to generate profit ((Killins et al.,(2019); Anarfo & Appiahene, (2017); Ghanem, (2017); Ozili, (2017); Iftikhar (2016); Menicucci & Paolucci (2016); Ahmed et al., (2015))

The LD was selected as dependent variable owing to the traditional intermediation function of banks of deploying deposits into the economy as loanable funds. This was supported by De Moraes et al., (2019), where loans to deposit ratio was establishing the relationship between non-performing loans and financial intermediation. Similary, Hardianto & Wulandari, (2016) also defined intermediation as loans to deposit ratio. On the other hand, Ozili (2019) used the loans to deposit ratio as a measure of bank liquidity as opposed to intermediation ratio like other studies referenced. The empirical literature of LD as a measure of financial intermediation was scanty.

3.5.2 Explanatory Variables

The independent variables or explanatory variables were Capital Adequacy ratio (CAR), Core Capital ratio (CC) and total capital to total assets ratio (TCTA). These were selected as quantifiable proxy of measuring the regulatory capital requirements in the empirical literature (Majumder & Li (2018); Ozili (2017) Ghanem (2017); Ahmed et al., (2015))

The control variables chosen for the study were Total Assets (TA) and the ratio of non-performing loans to total loans (NPLTL). As shown in Table 3, total assets were used as proxy for the size of the banking sector, whereas the ratio of NPLTL is a measure of credit risk. In line with empirical studies, the thesis used the bank specific performance measures of TA and the ratio of NPLTL because these were deemed more accurate in drawing empirical conclusions in investigating the effects of the regulatory capital on bank performance.

Table 6 also shows how each explanatory variables is expected to affect the dependent variable, following on the results of previous empirical studies. The profitability measure of ROA would be positively affected by the regulatory capital requirements and size of the banking sector, whereas the control variable NPLTL, would negatively affect the ROA. On the other hand, the ROA had mixed results regarding the effect by regulatory capital requirements, the CAR and TCTA had a positive effect, while the CC had an inverse relationship with the ROE. The financial intermediation was adversely affected by most explanatory variables because the regulatory capital requirements are mainly intended to control risk taking behaviour of banks in deploying deposits as loans and advances. The NPLTL, which measures the level of credit risk assumed would adversely affect LD because when the ratio is higher, banks would be conservative in issuing loans.

Table 6: Variables Selection

Variables	Explanation	Expected Effect	Authors
Return on Assets **ROA**	Shows the ability and efficiency to generate profits from the assets employed, indicating management capability of converting assets to earnings. **=Net Profit /Total Assets**	+	Killins et al.,(2019); Anarfo & Appiahene, (2017); Ghanem, (2017); Ozili, (2017); Iftikhar (2016); Menicucci & Paolucci (2016); Ahmed et al., (2015)
Return on Equity **ROE**	Indicates capability of the shareholders equity to yield profitability. **=Net Profit/Total Equity**	±	Killins et al.,(2019); Anarfo & Appiahene, (2017); Ghanem, (2017); Ozili, (2017); Iftikhar (2016); Menicucci & Paolucci (2016); Ahmed et al., (2015)
Loans to Deposit Ratio **LD**	The financial intermediation ratio measures the willingness of banks to deploy deposits into the economy as loanable funds. **=Loans/Deposits**	-	De Moraes, Antunes, & Rodrigues,(2019); Hardianto & Wulandari, (2016) ; Ozili, (2019)
Capital Adequacy Ratio **CAR**	Measurement of ability to assume risk and determines the maximum level of assets a bank hold. **='Total Capital/Total Risk-Weighted Assets**	+	Majumder, M. T. H., & Li, X. (2018); Ozili, (2017) Ghanem, (2017) Ahmed et al., (2015);
Core Capital **CC**	The core capital ratio measures reliance on higher quality of capital against risk assumed **=Core Capital/Total Risk-Weighted Assets**	±	Ahmed et al., (2015) Ozili, (2017) Ghanem, (2017)
Total Capital/Total Assets **TCTA**	The ratio shows the extent of reliance on regulatory capital to funding the bank's total assets. =**Total Capital/Total Assets**	+	Ahmed et al., (2015) Ghanem, (2017)
Size **TA**	Natural logarithms of total assets for commercial banks	+	Iftikhar, S. F. (2016); Anarfo, E. B., & Appiahene, E. (2017) Killins, Johnk, & Egly (2019)
Non-Performing Loans/Total Loans **NPLTL**	measures the level of credit risk stemming from loan delinquencies	-	Osei-Assibey, E., & Asenso, J. K. (2015). Ozili, P. K. (2017) ; De Moraes, Antunes, & Rodrigues, 2019)

3.6 Research model for data analysis

A model explains economic theory in such a form that results in empirical testing of the relationship between variables using mathematical equations (Gujarati & Porter, 2003).

The regression models presented below were used to establish the empirical association between the ROA, ROE and LD against regulatory capital requirements.

$$\mathbf{ROA_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 CC_{it} + \beta_3 TCTA_{it} + \beta_4 NPLTL_{it} + \beta_5 LnTA_{it} + \varepsilon} \quad \mathbf{(1)}$$

$$\mathbf{ROE_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 CC_{it} + \beta_3 TCTA_{it} + \beta_4 NPLTL_{it} + \beta_5 LnTA_{it} + \varepsilon} \quad \mathbf{(2)}$$

$$\mathbf{LD_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 CC_{it} + \beta_3 TCTA_{it} + \beta_4 NPLTL_{it} + \beta_5 LnTA_{it} + \varepsilon} \quad \mathbf{(3)}$$

where, α =constant; ε =error term; t denotes time period t=1…T ; i denote cross section i=1…N.

The linear models are commonly used to establish association of bank performance variables and, in deriving the regression model this study followed on the empirical analysis of Menicucci & Paolucci, (2015) and Ahmed et al., (2015). In their studies, Menicucci and Paolucci (2015) employed a regression model in the investigation of European banks profitability. The empirical analysis employed the descriptive and a multivariate analysis to establish the association of the bank profitability and some key financial indicators. The study used three models wherein the regression analysis was conducted against three dependent variables being the ROE, ROA and Net Interest Margin (NIM). The model had five independent variables, and these were deposits, loan ratio, size, capital ratio, and loan loss provisions.

Similarly, regression model of this study had three dependent variables of ROA, ROE and LD, modelled against five independent variables. The three dependent variables were chosen for measuring bank performance. Profitability was used as measure of sound financial performance, while the use of the intermediation ratio was based on the traditional banking activity of deploying deposits in the economy as loans.

The independent variables for the empirical analysis were the regulatory capital components that are determined according to requirements of the Basel Accords and these were CAR, CC and TCTA. The variable selection of the proxies for the regulatory capital requirements mainly followed on the studies of Ahmed et al., (2015), where the regression model employed these regulatory capital ratios.

The regression models also included control variables TA and NPLTL to get a more profound insight into the bank performance drivers since bank unique businesses that assume a wide spectrum of risk.

3.7 Estimation Approach

Therefore, in addressing the research objectives, the study employed a multiple linear regression model to establish the empirical association of bank performance and regulatory capital. The data analysis was done using Statistical Package for the Social Sciences (SPSS) program. The data was collected from the annual reports of central banks and tabulated in microsoft excel spreadsheet. The data was then loaded into the SPSS and descriptive statistics, correlation and regression analysis were applied to analyse the data.

3.8 Limitations of the study

The limitations of this study were;

- Sample size was relatively small with only 8 countries out of 53 African countries mainly due to data availability limitations.
- The language barrier was another limitation, wherein data was available, but it could not be comprehended. For example, countries in the North-Africa region had annual banking supervision reports in Arabic, while some countries like Angola and Mozambique were Portuguese.

3.9 Validity and reliability of research

The criterion of external validity does not apply to this study since this is a case study based research and thus, is not the purpose of case study research design to generalise beyond the case (Bryman et al., 2014).

3.10 Ethical Consideration

The data used in the study was sourced from banking supervision annual reports of the countries under study, which was availed in the respective websites, thus the research relied on secondary data. The data was freely available on the internet, implying that permission for further use and analysis was acceptable. This notwithstanding, the source of the data was acknowledged accordingly, and the information collected was legitimately for research purposes. Furthermore, Tripathy (2013) argued that, to ensure that the highest ethical standards are adhered to when using secondary data, the data should be evaluated with a methodology for the purpose for which it was collected. Therefore, this study has ensured that the empirical analysis of the data follows a structured methodology for accurate and reliable research results.

CHAPTER 4: PRESENTATION OF RESULTS

This section is a presentation of results from Statistical Package for Social Sciences (SPSS) which was used to carry out the data analysis using descriptive statistics, correlation and regression analysis. The data covers a 9-year period from 2010 - 2018 to establish the impact of regulatory capital requirements on banks performance.

4.1 Descriptive statistics of the data

Table 7: Descriptive statistics variables

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Return on Assets	72	-4.75	4.70	2.2526	1.42696	-1.748	.283	6.906	.559
Return on Equity	72	-13.24	35.20	15.8133	10.08359	-.025	.283	-.138	.559
Loans to Deposits	72	32.66	111.36	74.0469	14.63269	-.351	.283	.430	.559
Capital Adequacy Ratio	72	13.00	27.73	19.9161	3.33098	.337	.283	.320	.559
Core Capital	72	10.80	24.60	16.5768	3.65024	.461	.283	-.437	.559
Total Capital to Total Assets	72	.01	17.60	12.1912	3.23560	-1.990	.283	6.622	.559
Size	72	6.72	10.91	9.0715	1.18098	-.926	.283	-.866	.559
NPL to Total Loans	72	1.30	16.35	6.4776	3.71499	.701	.283	-.108	.559

The sample was made up of banking sectors of eight countries in Africa for a period of 9 years, being a total of 72 observations and the descriptive statistics of the data is shown in Table 7 above. On an average, the dependent variables ROA, ROE and LD had mean values of 2.25%, 15.81% and 74% respectively. The ROA observations ranged from -4.75% to 4.70 %, ROE was from -13.24% to 35.20%, and this implied that some countries' banking sectors realised losses in the period under review. The loans to deposit ratio ranged from 32.66 % to 111.36 % and evidently financial intermediation levels amongst the African banking sectors diverged

broadly with standard deviation of 14.63%. In addition, a greater amount of variation was also present in the ROE with a standard deviation at 10.08%.

The independent variables, CAR, CC and TCTA, had mean values of 19.92%, 16.58%, and 12.19% respectively. The standard deviations of the independent variables were almost similar at CAR (3.33%,); CC (3.65%); and TCTA (3.24%), being in the lower range of variation reported in the sample variables. Furthermore, the control variables were computed in order to get a more profound insight into the bank performance variables of the African banking sectors, using the size (TA) and non-performing loans (NPLTL). The mean values of the control variables TA and NPLTL were 9.07 % and 6.48 %; while the standard deviations were 1.18% and 3.71 %, respectively.

4.2 Correlation Analysis

Correlation analysis was conducted on the 72 observations of the study to find the nature associations between variables. The correlation analysis sought to measure the strength or degree of linear association between two variables. Table 8 below provides a summary of the Pearson's correlation matrix for the variables.

Table 8: Correlation Coefficients

		ROA	ROE	LD	CAR	CC	TCTA	TA	NPLTL
ROA	Pearson Correlation	1							
	Sig. (2-tailed)								
ROE	Pearson Correlation	.823**	1						
	Sig. (2-tailed)	.000							
LD	Pearson Correlation	-.626**	-.474**	1					
	Sig. (2-tailed)	.000	.000						
CAR	Pearson Correlation	.598**	.415**	-.762**	1				
	Sig. (2-tailed)	.000	.000	.000					
CC	Pearson Correlation	.549**	.193	-.693**	.864**	1			
	Sig. (2-tailed)	.000	.104	.000	.000				
TCTA	Pearson Correlation	.364**	.244*	.137	.087**	.113*	1		
	Sig. (2-tailed)	.002	.039	.252	.467	.346			
TA	Pearson Correlation	-.276*	-.200	.008	.109*	-.131	-.187	1	
	Sig. (2-tailed)	.019	.092	.945	.363	.274	.115		
NPLTL	Pearson Correlation	-.095	-.240*	-.207	.187	.364*	-.185	-.209	1
	Sig. (2-tailed)	.426	.042	.082	.115	.002	.120	.079	
	N	72	72	72	72	72	72	72	72

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

There were 11 correlation relationships which were strong at 1% level, while 6 of the relationships were strong at 5% level, and the other relationships were weak.

Overall, there was a positive correlation relationship between the profitability measures (ROA and ROE) and the independent variables that serve as proxy for regulatory capital requirements. The ROA had a strong positive correlation with CAR (p = 0.000, r = 0.594), CC (p = 0.000, r

= 0.549) and TCTA (p = 0.000, r = 0.365); and all these correlations were significant at 1% level. Furthermore, the ROE had a strong positive correlation with CAR (p = 0.000, r = 0.415), and TCTA (p = 0.039, r = 0.244). This implies that an increase in the regulatory capital ratios (CAR, CC and TCTA), results in an increase in the profitability ratios (ROA and RO), at different magnitudes.

On the other hand, there was negative correlation, significant at 1 % level between the LD and the regulatory capital ratios (CAR and CC). LD had a strong negative correlation with CAR, (p = 0.000, r = -0.762) and CC (p = 0.000, r = -0.693), implying that an increase in CAR and CC would result in a decrease in LD. The relationships between LD and the independent variable TCTA was weak.

Regarding the control variables, there was a negative correlation relationship, strong at 5% level, between ROA and TA, and ROE and NPLTL, respectively. This implies an increase in either TA or NPLTL, will result in decreases in profitability ratios, ROA and ROE, respectively. LD had a weak correlation relationship with the control variables.

In other correlation relationships, the results also showed two strong positive relationships between ROA and ROE, (p = 0.000, r = 0.823) and between CAR and CC (p= 0.000, r =0.864). In addition, there was a strong negative correlation found between ROE and LD (p = 0.000, r = -0.626).

4.3 Regression Analysis

4.3.1 Dependent Variable Return on Assets (ROA)

Table 9: ROA Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.773[a]	.597	.566	.93967

The model had an R^2 of 0.597, which implies that the changes to return on assets of 59.7 % can be explained by the independent variables. According to (Dhakal, 2018) R^2 measures the extent to which a chosen model fits for a given set of data. R^2 lies between 0 and 1 and the closer is it to 1, the better the fit. Overall, this model can reliably estimate that the regulatory capital requirements influence to a greater extent the banks' profitability measured through ROA.

Table 10: ROA ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	86.294	5	17.259	19.546	.000[b]
Residual	58.277	66	.883		
Total	144.570	71			

The model fits well in predicting the dependent variable, ROA with ($p = 0.000$), showing that the independent variables statistically significantly predict the dependent variable.

Table 11: ROA Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	.229	1.244		.184	.855					
Capital Adequacy Ratio	.296	.076	.690	3.890	.000	.598	.432	.304	.194	5.148
Core Capital	-.009	.073	-.022	-.120	.905	.549	-.015	-.009	.177	5.649
Total Capital to Total Assets	.083	.037	.189	2.268	.027	.364	.269	.177	.880	1.136
Size	-.451	.109	-.373	-4.139	.000	-.276	-.454	-.323	.740	1.352
NPL to Total Loans	-.100	.035	-.259	-2.853	.006	-.095	-.331	-.223	.752	1.330

The multicollinearity of the model was tested using the VIF predictor. According Dhakal (2018), a common rule of thumb: for any predictor VIF > 10 should be examined for possible multicollinearity problem. The VIF of all variables in the model is less than 10, and this implies that the model does not exhibit any strong signs of multicollinearity that may compromise the reliability of the model. The results show statistically significant positive relationship of ROA with CAR that was significant at 1 percent level with a regression coefficient of 0.296 (p = 0.000). The results imply that an increase of CAR had a positive effect on ROA. This means for every unit increase in CAR there is a 0.296 increase in ROA.

In addition, the relationship between ROA and TCTA was also statistically significant at 1 % level, with a regression coefficient of 0.083 (p = 0.027). The results imply that for every unit increase in TCTA would result an increase in ROA of 0.083. On the other hand, the CC had a negative effect on ROA, although it was not statistically significant with a regression coefficient of -0.009. The control variables, Size and NPLTL had a statistically significant negative effect of ROA with regression coefficients of -0.451 (p = 0.000) and - 0.100 (p = 0.006), respectively. This means for every unit increase in Size and NPLTL, the ROA would decline by -0.451 and -0.100.

4.3.2 Dependent Variable: Return on Equity

Table 12: ROE Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.733[a]	.538	.503	7.11015

The model had an R^2 of 0.538, which implies that the changes to return on equity of 53.8 % can be explained by the independent variables.

Table 13: ROE ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3882.621	5	776.524	15.360	.000[b]
Residual	3336.576	66	50.554		
Total	7219.197	71			

The model fits well in predicting the dependent variable, ROE with (p = 0.000), showing that the independent variables statistically significantly predict the dependent variable.

Table 14: ROE Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	18.040	9.413		1.916	.060					
Capital Adequacy Ratio	3.907	.575	1.291	6.798	.000	.415	.642	.569	.194	5.148
Core Capital	-2.518	.549	-.911	-4.582	.000	.193	-.491	-.383	.177	5.649
Total Capital to Total Assets	.308	.278	.099	1.108	.272	.244	.135	.093	.880	1.136
Size	-4.183	.824	-.490	-5.076	.000	-.200	-.530	-.425	.740	1.352
NPL to Total Loans	-.636	.264	-.234	-2.410	.019	-.240	-.284	-.202	.752	1.330

The VIF of all variables in the model is less than 10, and this implies that the model does not exhibit any signs of multicollinearity.

The results show statistically significant relationship at 1 % percent level, (p= 0.000) of ROE with the regulatory capital ratios CAR and CC, with regression coefficients of 3.907 and -2.518, respectively. The results imply that an increase of CAR had a positive effect on ROE, while CC had a negative relationship. This means for every unit increase in CAR there is a 3.907 increase in ROE, while an increase in CC would result in the ROE declining by 2.518. The regression coefficient TCTA was statistically insignificant (p= 0.272) with a regression coefficient of 0.308.

The control variables, Size and NPLTL had a statistically significant negative effect on ROE with regression coefficients of -4.183 (p = 0.000) and - 0.636 (p = 0.019), respectively. This means for every unit increase in TA and NPLTL, the ROE would decline by -4.183 and -0.636, respectively.

4.3.3 Dependent Variable - Loans to Deposits

Table 15: LD Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.801[a]	.642	.615	9.07781

The model had an R^2 of 0.642, which implies that the changes to loans to deposit ratio of 64.2% can be explained by the independent variables.

Table 16: LD ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	9763.362	5	1952.672	23.696	.000[b]
Residual	5438.842	66	82.407		
Total	15202.205	71			

The model fits well in predicting the dependent variable, loans to deposit ratio with (p = 0.000) which is statistically significant.

Table 17: LD Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	115.065	12.018		9.574	.000					
Capital Adequacy Ratio	-3.206	.734	-.730	-4.369	.000	-.762	-.474	-.322	.194	5.148
Core Capital	-.340	.701	-.085	-.484	.630	-.693	-.060	-.036	.177	5.649
Total Capital to Total Assets	1.085	.355	.240	3.056	.003	.137	.352	.225	.880	1.136
NPL to Total Loans	.126	.337	.032	.374	.710	-.207	.046	.028	.740	1.352
Size	1.590	1.052	.128	1.512	.135	.008	.183	.111	.752	1.330

The VIF of all variables in the model is less than 10, and this implies that the model does not exhibit any signs of multicollinearity.

The results show statistically significant relationship at 1 % level of LD with the regulatory capital ratios of CAR (p=0.000) and TCTA (p=0.003). The regression coefficients of LD with CAR and TCTA were -3.206 and 1.085, respectively. The results imply that an increase of CAR had a negative effect on LD, that is, for every unit increase in CAR, the LD would decline by 3.206. On the other hand, the TCTA had a positive relationship with the LD, wherein, a unit increase in TCTA would increase the LD by 1.085 (p=0.630) with a regression coefficient of -0.340. The regression coefficient CC was statistically insignificant (p= 0.630) with a regression coefficient of -0.340.

The control variables NPLTL and TA had a statistically insignificant effect on the LD with regression coefficients of 0.126 (p = 0.710) and 1.590 (p = 0.135), respectively. This means for every unit increase in Size and NPLTL, the LD would increase by 0.126 and 1.590.

4.4 Summary of Results

The sample of the study had 72 observations which was constituted by eight countries in Africa over a 9-year period from 2010 to 2018. The ROE and LD demonstrated a greater amount of divergence amongst the African banking sectors with standard deviation of 10.08% and 14.63%, respectively.

Overall, there was a positive correlation relationship between the profitability measures (ROA and ROE). ROA had a strong positive correlation with CAR, CC and TCTA and all these correlations were significant at 1% level. The ROE had a strong positive correlation with CAR and TCTA, while the relationships with CC was positive, although weak. Regarding the control variables, there was a negative correlation relationship, between ROA and TA, and ROE and NPLTL, respectively. On the other hand, there was negative correlation, significant at 1 % level between the LD and CAR and CC, respectively. The relationship between LD and TCTA was positive, but weak. The LD had a weak relationship with the control variables TA (positive) and NPLTL (negative).

The regression results show statistically significant positive relationship of ROA with CAR, and TCTA, while CC had a negative effect on ROA, although it was not statistically significant. The results show statistically significant relationship of ROE with CAR (positive) and CC (negative). The regression coefficient TCTA was statistically insignificant. The control variables TA and NPLTL had a statistically significant negative effect on both ROA and ROE. Furthermore, the results show statistically significant negative and positive relationships, respectively of the LD and CAR; and LD and TCTA. The relationship of LD and CC was statistically insignificant, as well as that of the control variables NPLTL and TA.

CHAPTER 5: DISCUSSION OF RESULTS

The following provides an empirical analysis on the impact of regulatory capital requirements on profitability and financial intermediation of banks, which also includes discussion of model results in line with the research objectives of thesis.

5.1 The effect of capital regulation on bank profitability

5.1.1 Impact of capital adequacy on profitability

ROA had a strong positive correlation with CAR (r = 0.598) which was significant at 1% level. The regression results show statistically significant relationship of ROA with CAR, significant at 5 percent level with a regression coefficient 0.296. Therefore, the results imply that the CAR had a positive effect on ROA, with a unit increase on CAR, resulting in a 0.296 increase in ROA. The results were the same with those of Ahmed et al., (2015), Majumder & Li, (2018), Kassem & Sakr (2018) wherein bank capital was positively related to ROA. Kassem & Sakr (2018) and Menicucci & Paolucci (2016) opined that well capitalized banks are normally more profitable due to lower cost of funding and potential bankruptcy costs.

Furthermore, the results also showed that the ROE had a strong positive correlation with CAR (r = 0.415), significant at 1% level, while the regression results also showed a statistically significant relationship at 5% percent level of ROE and CAR with regression coefficient of 3.907. This was in line with the findings of Lelissa (2014) and Menicucci & Paolucci (2016) where capital adequacy ratio was positively related with ROE. Similarly, De Bandt et al., (2014), found that following an increase in the CAR of a bank, there was a resultant improvement in the ROE. The positive association of the CAR and profitability was attributable to enhanced monitoring of loans which increased the banks' asset quality as the loan delinquencies were reduced, thus being a more efficient behaviour of a bank.

In view of the strong linear positive correlation of the CAR and the profitability ratios, ROA and ROE, as well as statistically significant positive regression relationship, the results suggest that CAR positively affects profitability of banks. Therefore, it can be deduced that with adequate regulatory capital against risk assumed, the bank profitability also increases. This may be attributable to the perceived bank stability from adequate regulatory capital which translates to increased business opportunities in both funding sources and earning assets.

5.1.2 Impact of the core capital on profitability

The ROA and CC had a strong positive correlation significant at 1% level (r = 0.549) and the regression results show a negative relationship between ROA and CC, although it was not statistically significant. The results were similar to Beccalli et al., (2018), wherein, increasing the regulatory capital mainly through equity, a core capital component, reduced the ROA and ROE for banks. In other cases, Killins et al., (2019) had contradicting results, where the financial regulations had a positive and statistically significant impact on profitability on the ROA model for the large banks, while there was a negative and statistically significant impact on ROA and ROE for the small banks (Beccalli et al., 2018).

Furthermore, the ROE had a positive correlation with CC (r = 0.193), although it was a statistically insignificant. The regression results were indicative of statistically significant negative relationship at 5% percent level, between the ROE and CC. This implies that increase in CC would result in the ROE declining by 2.518. In the empirical studies of Kassem & Sakr (2018) and Hashem (2016), the capital ratio results show a negative effect on ROE. Hashem (2016) opined that the association of high capital and low risk was consistent with economic theory of low capital yielding high risk and high return, and hence lower profitability for highly capitalised banks (Hashem, 2016).

Overall, the results show a positive linear relationship of the CC and the profitability measures suggesting that as the CC increases, the profitability measures also observe the same increasing

trend. The positive correlation relationship emanates from the CC being largely funded by bank profits through retained earnings, a core component of the core capital. Therefore, as profitability increase, similarly the CC would also increase since part of the bank profit are used to augment capital to fund a bank's business prospects.

The regression results of ROA and CC showed a negative relationship, although it was not statistically significant, while those of ROE and CC were also negative and statistically significant. The results imply that an increase in regulatory capital CC, would reduce the profitability ratios, ROA and ROE, which is attributable to the increase in assets and equity, respectively. For example, regarding the negative impact on ROE, when the denominator (equity) increasing more than the numerator (profit), this would result in decline in the ratio. The equity is a core component of the CC. Therefore, the results imply that where the magnitude of increase in CC was not matched with adequate increase in bank's profitability levels, the profitability ratio would thus be negatively impacted. Therefore, it can be deduced that the increase in profitability should be more pronounced than the increase assets and equity to achieve a positive impact on ROA and ROE with an increase in CC.

5.1.3 Impact of the ratio of total capital to total assets on profitability

The TCTA had a strong positive correlation with the profitability measures, ROA and ROE. Moreover, the regression results showed statistically significant positive relationship between ROA and TCTA, similarly the relationship with ROE was positive, although statistically insignificant. Overall, this suggests that an increase in the ratio of TCTA result in an increase in banks profitability.

5.2 The effect of capital regulation on financial intermediation

5.2.1 Impact of the capital adequacy on financial intermediation

There was negative correlation, significant at 1 % level between the LD and the CAR, with a strong negative correlation with CAR, (r = -0.762). The regression results showed that the LD and CAR had a statistically significant negative relationship, with regression coefficients of -3.206. The negative relationship between CAR and LD, imply that for every unit increase in CAR, the LD would decline by 3.206. The previous studies on assessing the effect of regulatory capital requirements used the quantity of loans to measure financial intermediation. Therefore, in comparison with related studies, S. J. de-Ramon et al., (2016) found that overall bank's reduced lending with more emphasis placed on reducing balance sheet size in response to heightened regulatory pressures. Additionally, Khan et al., (2019) concluded that disintermediation had significantly improved the CAR, which implied that there was a positive relationship between disintermediation and CAR, that is, the more a bank increases its level on disintermediation, the CAR improved. Thus, it can be deduced that banks would be incentivised to reduce extending credit into the economy, in view of preserving the capital stock, hence the positive association of CAR and disintermediation. On other studies, Maredza (2016) concluded that the capital requirements heightened the cost of intermediation resulting in a reduced demand for loans owing to the high cost, thereby negatively affecting the bank's level of financial intermediation into the economy.

Consequently, it can be deduced from the results of this study that the CAR requirements negatively affect the banks' ability to achieve a higher the financial intermediation owing to the negative correlation and regression relationship between the CAR and LD. Thus, the study suggests that the intermediation appetite is negatively driven by CAR owing to the capital preservation strategies because loan assets constituted a larger proportion of the total risk-weighted assets.

5.2.2 Impact of the core capital on financial intermediation

There was negative correlation, significant at 1 % level between the LD and CC. LD had a strong negative correlation with CC (r = -0.693). In addition, the regression results show a negative relationship between LD and CC, although was statistically insignificant (p=0.630) with a regression coefficient of -0.340.

Similar to the impact of CAR on LD, the overall negative impact of the CC on the LD is attributable to the banks' focusing on reducing the capital charges and choosing to deploy assets in assets that do not attract higher capital charges since. The results suggest that regulatory capital requirements impose restrictions on financial intermediation.

5.2.3 Impact of the ratio of total capital to total assets on financial intermediation

There was a positive correlation of the LD and TCTA, although it was statistically insignificant relationship. The regression results of the LD and TCTA showed a statistically significant positive relationship, wherein, a unit increase in TCTA would increase the LD. The TCTA was the regulatory capital proxy that positively impacted the LD.

5.3 Overall Results

The regulatory capital requirements of CAR, CC and TCTA showed mixed impact on profitability. The CAR had a strong positive correlation with ROA and ROE, and the regression results show statistically significant positive relationship of ROA and ROE with CAR. Similarly, the TCTA had a positive relationship with the profitability measures, ROA and ROE. In contrary, the CC a negative relationship with both the ROA and ROE. Furthermore, the empirical results showed a negative impact of the regulatory capital requirements on the financial intermediation on account of the negative relationship of both the CAR and CC on the LD. However, the TCTA was the only regulatory capital proxy that positively impacted the LD.

In conclusion, the results showed both positive and negative impact of the regulatory capital requirements on bank-specific performance variables of ROA, ROE and LD in Africa. The profitability measures ROA and ROE were positively impacted by CAR and TCTA, while the CC negatively affected ROA and ROE. The financial intermediation was negatively affected by both CAR and CC, and the positively affected by the TCTA.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Undoubtedly, banking sectors are at the core of channelling economic development in Africa and the regulation of banks has ensured stability of the banking sectors as well as the economies of the region. This thesis, Regulation and its impact on bank performance: The case of Basel Accords, sought to establish the effect of the regulatory capital requirements on performance of banks in Africa. In measuring performance, the study used profitability (ROA and ROE) and financial intermediation (LD) against the proxies of regulatory capital requirements (CAR, CC and TCTA). The analysis was conducted on the aggregate bank-data for eight African countries from 2010 and 2018.

Overall, the Basel Accords regulatory capital requirements had a positive effect on the profitability of the African banking sectors. The empirical results indicated that regulatory capital requirements of CAR and TCTA were positively associated with ROA and ROE. However, the CC negatively impacted ROA and ROE, although the effect on ROA statistically insignificant. The overall positive effect of regulatory capital on bank performance was mainly attributable to enhanced monitoring of loans which increased the banks' asset quality as the loan delinquencies were reduced. Thus, the results suggested that the regulatory capital requirements of the CAR and TCTA were associated with a more efficient behaviour of the banking sectors.

The negative effect of the CC on ROA and ROE imply that the regulatory capital requirements of core capital which prescribes holding a high-quality common equity capital had a negative effect on profitability of banks. The negative relationship of the core capital and profitability ratio was aligned to the risk-return hypothesis where banks with lower equity capital were deemed riskier, and thus would achieve higher profits, while strongly capitalised banks would be considered risk adverse and attaining lower profits. The core capital requirements are intended to strengthen the resiliency and stability of banking sectors.

Furthermore, the results showed that regulatory capital requirements had a negative and statistically significant effect on the financial intermediation of the banking sectors. This result suggested that the regulatory capital requirements limited bank risk appetite to deploy deposits into the economy as loans and advances evidenced by the negative association of the LD and the proxies of regulatory capital requirements CAR and CC.

The empirical analysis exhibited a combination of positive and negative effect of regulatory capital requirement on the dependent variables ROA, ROE and LD. Therefore, it can be deduced that although the regulatory capital requirements had a positive impact on the bank performance variables, there were also some negative effects in other variables. Thus, that when adopting the regulatory capital requirements there needs to be increased scrutiny to identify the possible areas of negative effects which could result in unintended consequences of the regulatory requirements.

6.2 Recommendations

The empirical results showed that the regulatory capital requirement had both the positive and negative impact on bank performance. Therefore, there was need for calibration of the requirements to ensure suitability to the African financial markets and the macro-economic dynamics. Therefore, in implementing the Basel Accords, the policy makers need to conduct an impact assessment on the bank specific performance variables to identify areas of possible negative impact of the Basel Accords, most importantly performance measures which are core to influencing the economic and financial architecture of the African region. In addition, there need to be increased conversation on the principle of proportionally to ensure that regulatory requirements are suitable for the size and complexity of banking sectors in Africa and accordingly calibrate the regulatory requirements to ensure suitability to the region's banking architecture.

6.3 Future Research Areas

The banking industry has experienced tremendous change over the past two decades, with increased competition from other financial market players which are not equally subjected to stringent regulation and supervisory requirements as the banking sector. Therefore, there needs to be continuous investigation on Basel Accords and bank performance to ensure that the key role of driving economic activity by banks is not stifled by the regulatory developments. In line with developments in banking business and regulatory landscape, the following research areas ought to be explored to enhance the regulatory policy making.

- Fintech development and changes in interest income and non-interest income composition;
- Impact of information technology infrastructure as an intangible asset and a regulatory adjustment item in Basel III regulatory capital; and
- Suitability of risk-weighted capital charges for the informal sector driven African economies.

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