CAPITAL ADEQUACY OF BASEL III AND BANK PROFITABILITY: A CASE OF DEVELOPING COUNTRIES

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DECLARATION

I, Mohau Mochebelele declare that the research conducted in completing this dissertation is my own work, except in the instances where is indicated otherwise and acknowledged. This work was done under the supervision of Dr. Euphemia Godspower-Akpomiemie. This dissertation is submitted in fulfilment of the requirements for the degree of Master of Management in Finance and Investment with the University of Witwatersrand.

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28th February 2020

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ABSTRACT

This study examines the effects of bank capital adequacy and asset quality on banks' profitability in developing countries. The study further examines whether there are significant differences in the levels of bank profitability in Africa versus other developing countries, and cross sectional 2018 data on 235 banks in 50 developing countries are used in an Ordinary Least Squares (OLS) regression analysis. Tier 1 Capital Ratio and 100% less the Impaired Loans Ratio are used as proxies for Capital Adequacy Ratio and Asset Quality respectively.

Bank capitalisation and asset quality are found to have positive effects on profitability as measured by return on average assets (ROAA) in the sample of developing countries' banks. These positive relationships are found to be consistent in the groups comprising all the sampled banks, as well as the relatively high and low capitalised banks. Moreover, we found that African banks higher ROAA measures except in instances where the banks have relatively low levels of capitalisation.

Furthermore, bank capitalisation is found to be a positive determinant of bank profitability as measured by net interest margin (NIM); especially for banks that are relatively highly capitalised. Bank asset quality is found not to have any impact when profitability is measured as NIM.

Based on the findings of this study, we recommend that the policies and bank regulations that enforce increased bank capital adequacy and bank asset quality levels. These policies can be implemented in conjunction with prescriptive methods to improve individual borrowers' quality so as to curb the potential for bank disintermediation arising from financial exclusion.

CHAPTER ONE

1. INTRODUCTION

1.1. Background Information

The theory of bank intermedition postulates that banks ought to be in existence because of frictions in the market pertaining to matters such as agency costs and asymetric information of borrowers, and inefficient allocation of resources (Scannella, 2010). According to Schumpeter (2016) banks create deposits through the lending function. The deposit taking function guarantees claims which are demandable and riskless. The lending function mostly requires a bank to acquire relevent information that will enable it to have sufficient knowledge of the borrower in order to reduce the probability of default. The suppliers of funds to banks are households and firms that have excess cash; and these are the parties that would require the bank to guarantee the value of their deposits. The banks then lend out deposited funds to households and firms that have a liquidity shortage. At a macro-economic level, a bank intermediated credit decline can have a significants negative effect on economic output (Chen & Zha, 2015).

Banks have become a key component in wealth creation for most countries around the world. Therefore, banks' health and sustainability can no longer be ignored by both governments and the general public. Over the years the banking sector has been plagued with crises (for instance, the recent 2007/2008 financial global crisis) that had devastating effects on economies around the world. The magnitudes of these crises necessitated the need to have strict oversight on the first world banking system in order to bring about stability. In Mauritius, as the Developing Country case in point, the estimated cost of the financial crisis is estimated to be 3.4% to 5.4% of GDP (Ramlall, 2015).

Bank crises could be contagious; they spread across borders and can even have more devastating effects in seemingly unrelated countries. A shock in the banking sector in a developed country could have a profound impact on the banking sector of country where

local banks depend on international funding (Schnabl, 2012). Banking crises are generally characterised by contagion and it was for this reason that the Committee on Banking Regulations and Supervisory Practices (Basel Committee) was established in 1974. The Basel Committee established the Basel Accords which have come to be known as the standards for the banking sector. The Basel Committee has established itself as the global de facto banking supervisor with its recommendations being implemented by most states (Peihani, 2015).

The main objectives of the Committee are to enhance bank supervision and global bank stability (Rost, 2010). The first Basel Accord was released in 1988 (later known as Basel I). The Basel I Accord prescribed the minimum capital adequacy ratio of 4% of risk weighted assets in Tier 1 Capital and 8% of risk weighted assets in Tier 2 Capital.

The second set of standards was released under the Basel II Accord in 2004. The standards comprised three pillars, namely, Minimum Capital Adequacy, The Supervisory Review Process, and Market Discipline. The Minimum Capital Adequacy Pillar set out the determination of eligible capital. The Supervisory Review Process Pillar required regulators to establish review processes of banks' systems and controls for measurement and risk exposures. The Market Discipline Pillar required banks to be more transparent through the disclosure of procedures and policies for mitigating the different types of risk.

The deficiencies of the Basel II Accord led to the release of the third set of standards, Basel III Accord, 2010. Basel III enhanced the minimum capital adequacy requirements. Moreover, Basel III incorporated liquidity requirements as part of the banking supervision framework. Over the years the Basel Committee has advocated for increasing capital adequacy ratios and central banks around the world have enforced the increasing trend.

The state of the banking sector is more profound in the developing world where access to capital is mostly limited to commercial banks. A heavy reliance on commercial banks for the supply of capital makes the real economy, especially the Small Medium Enterprises (SMEs) sector, of a country highly sensitive to vicissitudes that take place in

the banking sector (Lawless *et al.*, 2013). According to Kongolo (2010), SMEs in South Africa generate more than half of the employment and economic output. These facts put a strong emphasis on the need to minimise the risk of the banking sector in order to keep developing economies afloat.

Being a relatively matured industry, the level of competition amongst banks over the years has necessitated innovation in order to protect margins and to diversify out of competitive product markets. While the innovations have been paramount to the development of the banking sector, there have been instances where undesirable outcomes were realised, thus, leading to crises. Carlson *et al.* (2019) postulate that high levels of competition lead to high levels of lending and risk taking by banks; which, in turn, lead to greater financial instability. The 2007-2008 global financial crisis has forced regulators, investors, governments and managers to revisit the global regulation framework in order to ensure banks' survival and sustainablity. Crises that occur in the financial sector cannot be ignored and have, in some instances, had significant negative consequences (Honohan & Klingebiel, 2003).

The factors that affect banks' sustainability can range from profitability, cost efficiency, bank ownership and some macroeconomic variables. The African environment might require banks operating on the continent to have a slightly higher risk appetite. While higher risk taking may trigger challenges of illiquidity and insolvency, African economies need financing institutions that are strongly aligned with the growth policies and plans set by policy makers to increase welfare on the continent. Moreover, increased liquidity in economies as a result of bank lending will have a positive impact on the GDP growth. Higher GDP growth rates are desirable for a healthy profitability in the banking sector. However, excessive risk taking can lead to banks fragility, if banks eventually venture into non profitable investments, especially in the course of trying to meet up with regulatory requirements.

This study makes use of cross-sectional analysis in order to make inferences on degrees of sensitivity and the nature of the various relationships between bank profitability and its

determinants in developing countries. An emphasis is made on the impact of stricter capital adequacy policies in developing countries; particularly on the African continent which has been dubbed the Next Economic Frontier.

1.2. Problem Statement

Emerging markets are mostly characterised by poorer bank asset quality owing to factors such as lower levels of economic output, portfolio inflow and outflow volatilities, and currency devaluations (Bock & Demyanets, 2012). Bank asset quality and the credit book risk management thereof have been earmarked as some of the critical core principles for effective banking supervision amongst a comprehensive list of twenty-five core principles designed by the Basel Committee on Banking Supervision (BCBS, 1997). Moreover, bank capital adequacy has also proven to be a significant determinant of bank fragility, and thus, profitability. Compared to their more developed counterparts, African banks and those of other developing countries have, over the years, faced with ever increasing capital adequacy requirements and the need to improve asset quality as prescribed by the Basel Accords. While the prescriptions of the Basel Accords may ensure bank profitability, they may well be beyond the control of banks' management and could exacerbate financial exclusion in developing countries. This paper looks into the relevance of the Basel Accords prescriptions around capital adequacy and asset quality in the context of developing countries, especially African countries.

1.3. Research Questions

This study reviews the capital adequacy ratio of Basel III and its effect on banks' profitability in Developing Countries. However, being that the objective of Basel capital accord is to improve asset quality, to avoid asset deterioration, this research investigates whether bank asset quality and capitalisation have any effect on banks' profits.

Moreover, the study seeks to answer the following questions:

- Is asset quality a determinant of bank profitability in the developing countries context?
- Do higher bank capitalisation ratios affect banks' profits (return on assets and net interest margin), especially in an African context?

1.4. Significance of the Study

The significance of this study is to contribute to the knowledge base required by the myriad of stakeholders in the banking industry. Bank investors need more insights on mechanisms that can implemented to ensure bank profitability and safety of their financial interests. With the need to comply with regulatory compliance while ensuring commercial viability, banks' management can benefit from the findings of this study. In addition, policy makers will gain more knowledge on the nuanced effects of prudential regulation across various regions around the world. The study will provide further understanding on the role of capital adequacy and asset quality as critical determinants of bank financial performance.

1.5. Organisation of the Research

The study is structured as follows: Chapter 1, comprises the introduction and overarching description of the subject matter, the problem statement, research questions and the significance of the study. Chapter 2 consists of the literature review, detailing the sequential adoption of the Basel Accords, measures and determinants of bank profitability. Chapter 3 contains the research methodology, the data collected, and the research design used in the study. Chapter 4 presents the results and analysis of the determinants of bank profitability determinants. Finally, Chapter 5 concludes the report in accordance with the research questions, policy implications of the research and what requires further research intervention.

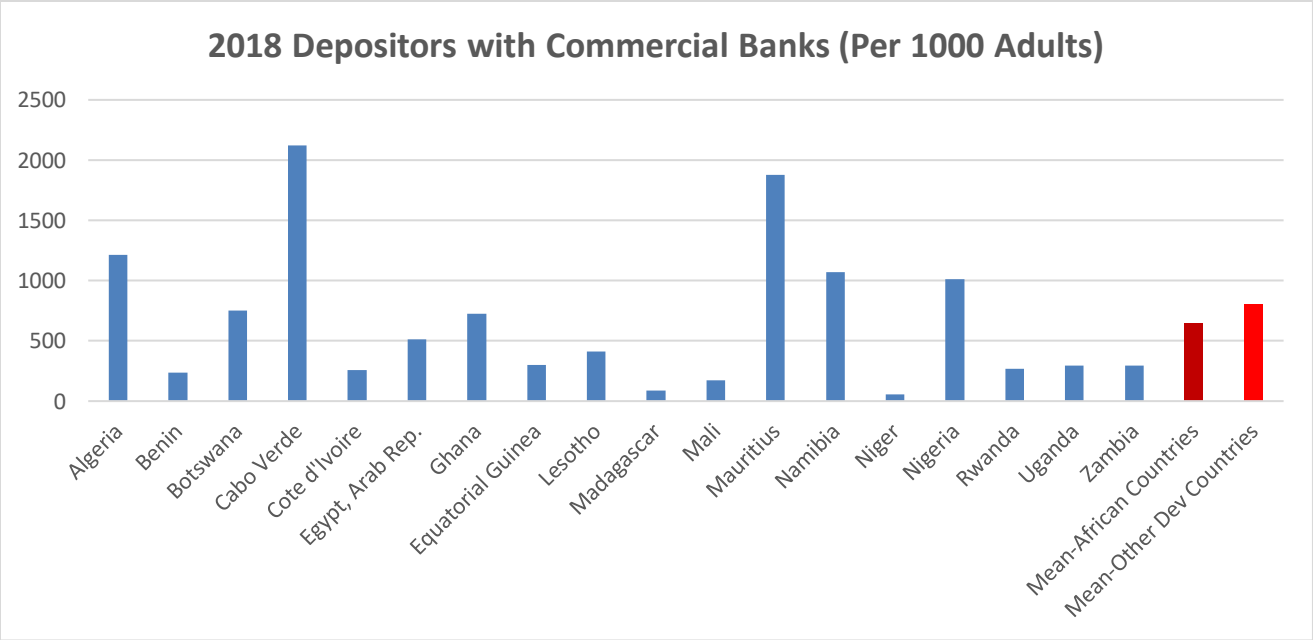
CHAPTER TWO

2. LITERATURE REVIEW

2.1. Overview of Banking Markets in Africa: Stylized Facts

According to Chummun & Ojah (2016), the level of savings in Africa, especially in Sub-Saharan Africa, is concerningly low. Their study shows that there is a positive relationship between savings and financial inclusion; with savings being a leading determinant of financial inclusion over time. Figure 2.1 below depicts the disparity in the access to savings products between African and other developing economies using the 2018 Depositors with Commercial Banks as a measure. Cape Verde had the 2,122 while Niger has 53 depositors with commercial banks per 1,000 adults in 2018. The sampled mean of depositors with commercial banks per 1,000 adults in 2018 was 648 for African countries and 803 for other non-African developing countries.

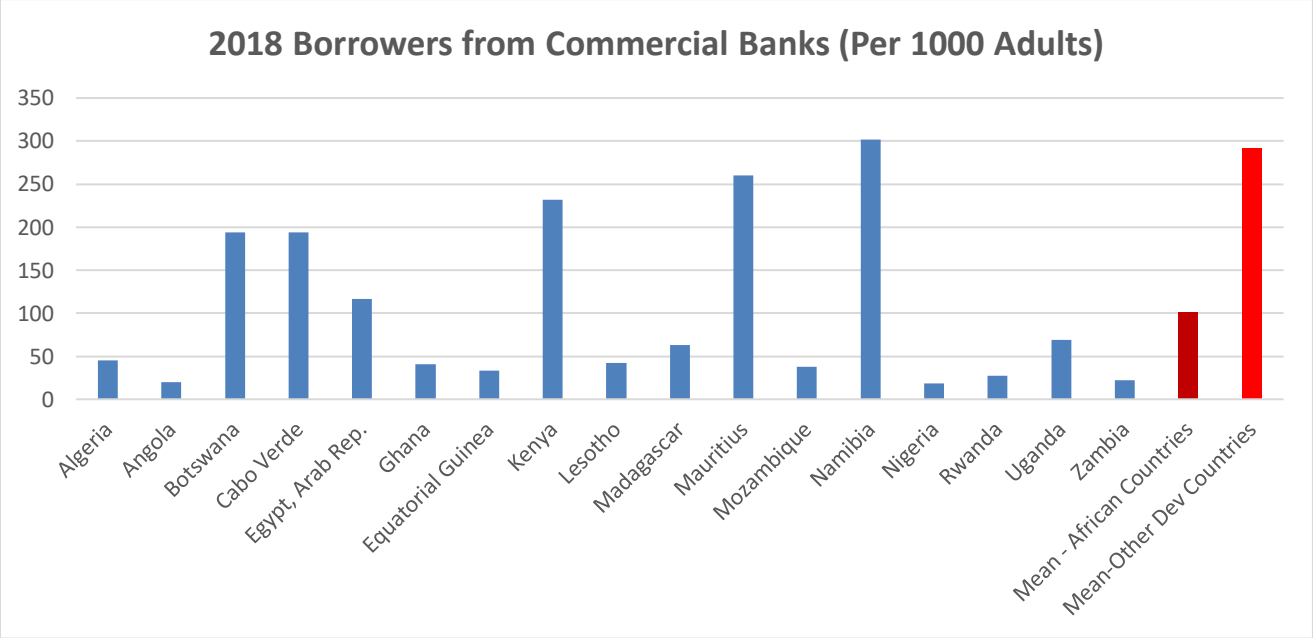
Figure 2.1: Sampled Access to Savings with Commercial Banks in Africa



Source: World Bank World Development Indicators (WDI)

Okurut (2006) postulates that there is a significant positive relationship between level of household income and access to credit from formal financial institutions such as banks. African economies are characterised by lower household incomes compared to other peer economic regions. Figure 2.2 illustrates the level of access to formal credit in Africa using the 2018 Borrowers from Commercial Banks Per 1,000 Adults as a measure. In the sampled group Namibia recorded the highest level of 302 while Nigeria recorded the lowest figure of 19 borrowers from commercial banks per 1,000 adults. The sampled mean of borrowers from commercial banks per 1,000 adults in 2018 was 101 for African countries and 292 for other non-African developing countries.

Figure 2.2: Sampled Access to Credit with Commercial Banks in Africa

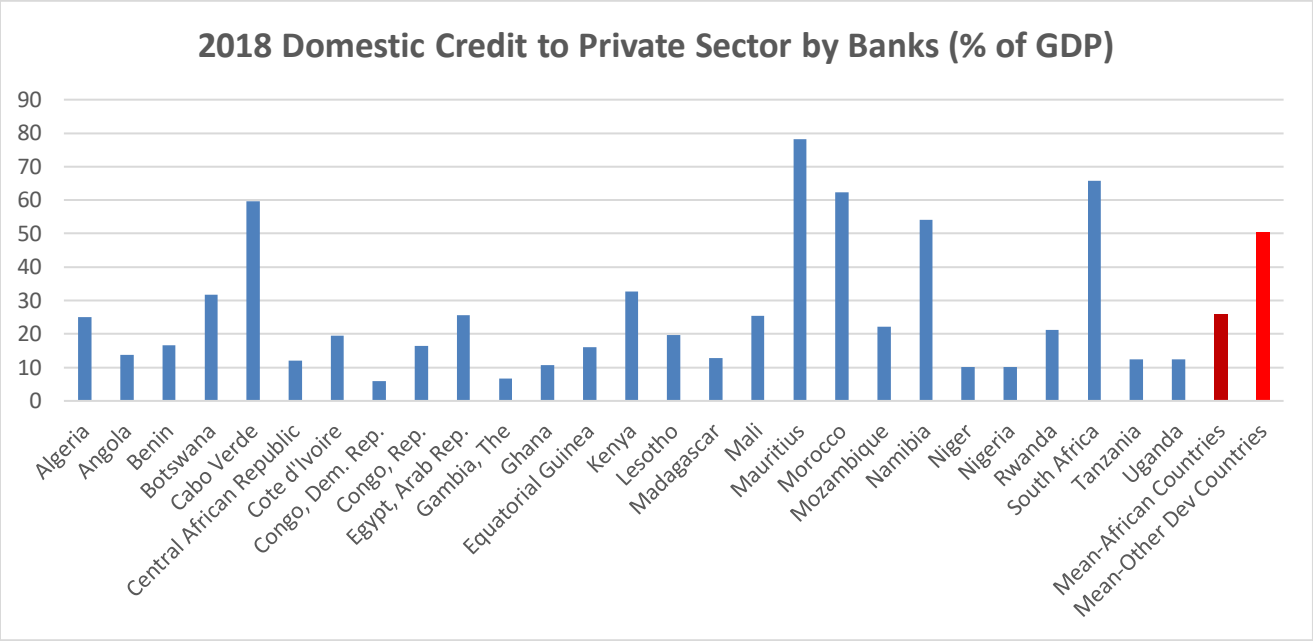


Source: World Bank World Development Indicators (WDI)

In their research on Small and Medium Enterprises (SMEs) in South Africa, Fatoki & Odeyemi (2010) identified managerial competencies, business information, manager networks, location, crime, business size and proper business incorporation as significant determinants for SMEs' access to formal credit. According to Sacerdoti (2005) the stock of African bank credit to the private sectors has been subdued over the years compared to other developing countries. This is phenomenon is illustrated in Figure 2.3 using 2018 Domestic Credit to Private Sector by Banks as percentage of GDP. In the sampled group

The Democratic Republic of Congo recorded the lowest level of 6% of GDP while Mauritius recorded the highest level of 78% of GDP. Figure 2.3 further shows the gap between African countries and other developing countries with the African sample mean of 26% and 50% for other developing countries.

Figure 2.3: Private Sector Level of Credit in Africa



Source: World Bank World Development Indicators (WDI)

2.2. Theoretical Framework

A bank's sustainability and financial performance thereof are largely affected by banks' capital adequacy, asset quality, management quality, earnings quality, liquidity and sensitivity to market risk (Tuna, 2013). These factors are collectively utilised under a single qualitative regulatory assessment framework known as the CAMELS Framework. Moreover, numerous studies have been undertaken to determine the efficacy of the CAMELS approach in the analysis of bank financial performance (Tuna, 2013 and Gasbarro *et al.,*2002). Under the CAMELS approach, banks are subjectively given ratings by regulators. The ratings range from 1 to 5; with a rating of 1 indicating a strong rating and a rating of 5 indicating an unsatisfactory rating. This paper focuses on the

capital adequacy ratio and asset quality as determinants of banks' financial performance of the CAMELS approach.

2.2.1. Capital Adequacy and Financial Performance

The Capital Adequacy Ratio (CAR) is the level of capital to be maintained by a bank to mitigate credit, market and operational risks (Dang, 2011). In addition, the capital adequacy ratio serves as buffer to protect the bank and absorb potential losses thus shielding depositors and other debtholders, and is determined on the risk-weighted assets (RWAs) of the bank. The capital adequacy component of the CAMELS approach comprises factors such as the size of the bank, volume of poor quality assets, quality of capital, retained earnings, access to capital markets, non-ledger assets and sound values not shown on the financial report, and a bank's growth experience, plans and prospects (Sahajwala & Bergh, 2000). Naceur (2003) and Poudel (2012) reported a positive relationship between capital adequacy and financial performance in a study on Tunisian and Nepalese banks respectively.

2.2.2. Asset Quality and Financial Performance

Under the asset quality component of the CAMELS approach, the volume of classifications, special mention loans, volume of concentrations, volume and character of insider transactions, and the level, trend and comparison of non-accrual and renegotiated loans are identified determining factors (Sahajwala & Bergh, 2000). In order to ensure good asset quality, banks need to apply robust credit risk management techniques and tools. The Non-Performing Loans (NPLs) ratio is commonly used as an indicator of bank asset quality (Frost, 2004). Grier (2007) postulates that asset quality is a major determinant of bank fragility, and thus, financial performance. Flamini *et al.*, (2009) reported a strong relationship between bank asset quality and financial performance in study on Sub-Saharan banks.

Regulators around the world implement various tools such as the CAMELS approach to assess the soundness of banks. When African banks are assessed under the same CAMELS criteria as their developed markets counterparts they may be hindered from lending to households and SMEs in domestic economies in order to meet capital adequacy and asset quality requirements.

2.3. Overview of Global Bank Regulation

Until the mid-1970s bank regulation was fragmented with no uniform global regulatory framework. Banks reported to their respective national regulatory bodies wherein the applicable regulatory framework would be unilaterally determined by the regulator of each country. In most cases, the regulatory guidelines were not compatible across borders, therefore. This rendered them unrepeatable and with limited scale. The failure of Bankhaus Herstatt and the revocation of its banking license on 26 June 1974 led regulators of the G10 countries to conceptually rethink the global regulatory practices that prevailed at the time (BCBS, History, 2019). This incidence gave birth to the establishment of the Basel Committee on Banking Supervision (BCBS) in 1974.

The Basel Committee (BCBS), which initially was made up of group 10[1] (G10) countries, was tasked with the cross-country regulatory development and its main objectives are to enhance the understanding of key supervisory issues and to improve the quality of banking supervision worldwide (Rost, 2010). The Basel Committee remains the most influential regulatory entity with its prescriptions and recommendations not being mandatory, but required. The Committee recommendations have been widely accepted around the world as standards of best practice.

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

To date, the membership of the Basel Committee spans 45 members in over 28 jurisdictions. Moreover, the Committee is subdivided into the following major functional groups that carry out the execution of the objectives set out by members:

- Policy Development Group (PDP);
- Supervision and Implementation Group (SIG);
- Basel Consultative Group (BCG);
- Macroprudential Supervision Group (MSG); and
- Accounting Experts Group (AEG).

The Policy Development Group (PDG) establishes supervisory policies that foster a robust banking operation across the globe and develops high supervisory standards (BIS, 2019). The policy Development Group can further be broken down into more working and task groups (see Figure 2.4).

Figure 2.4: PDG Working Groups/Task Forces

Name	Purpose
Working Group on Capital	Assesses issues associated with the definition of regulatory capital
Credit Risk Group	Assesses issues with the credit risk regulatory framework. Reports to the PDG and SIG
Market Risk Group	Assesses issues with the market risk regulatory framework. Reports to the PDG and SIG
Ratings and Securitisation Workstream	Reviews the regulatory framework for securitisation exposures
Leverage Ratio Working Group	Responsible for the technical work associated with the Basel III leverage ratio
Working Group on Liquidity	Assesses issues related to the liquidity framework
Large Exposures Working Group	Responsible for the Committee's large exposures framework
Working Group on Disclosure	Responsible for ensuring that disclosure initiatives for Pillar 3 are coordinated and consistent
QIS Working Group	Monitors the evolution of capital requirements during the transition to Basel III and over the long term
Task Force on Expected Loss Provisioning	Addresses issues related to the regulatory treatment of provisioning. Reports to the PDG and AEG
Research Task Force	Acts as a forum for economists to engage in research projects on supervisory and financial stability issues, and as a liaison with the academic sector
Operational Resilience Working Group	Assesses issues related to cyber-risk and broader operational resilience. Reports to the PDG and SIG

Source: www.bis.org/bcbs

The Supervision and Implementation Group (SIG) aims to achieve timely, uniform and effective implementation of the Basel Committee's standards and guidelines, and to improve banking supervision (BIS, 2019). Moreover, the SIG further monitors the implementation of the Basel III Accord and is sub-divided into smaller working and task groups (see Figure 2.5).

Figure 2.5: SIG Working Groups/Task Forces

Name	Purpose
Working Group on Supervisory Colleges	Develops guidance to enhance the effectiveness of supervisory colleges and assists supervisors in putting the guidance into practice
Pillar 2 Working Group	Acts as a forum for exchanging ideas and good practices related to the implementation of the Pillar 2 of the Basel capital framework
Working Group on Stress Testing	Reviews developments in bank and supervisory stress testing programmes and, as needed, develops further guidance to enhance these programmes
Task Force on Financial Technology	Assesses the risks and supervisory challenges associated with the innovation and technological changes affecting banking
Risk Data Network	Supports the SIG to foster sound and consistent implementation of the Basel Committee's *Principles for effective risk data aggregation and risk reporting*
Operational Resilience Working Group	Assesses issues related to cyber-risk and broader operational resilience. Reports to the PDG and SIG
Credit Risk Group	Assesses issues with the credit risk regulatory framework. Reports to the PDG and SIG
Market Risk Group	Assesses issues with the market risk regulatory framework. Reports to the PDG and SIG

Source: www.bis.org/bcbs

The Basel Consultative Group (BCG) facilitates consultations and engagements with regulators across the globe on matters pertaining to regulatory issues. In an inclusive approach, the BCG also engages non-member countries on new and upcoming initiatives. The Macroprudential Supervision Group (MSG) monitors and evaluates the global financial sector systemic risk. In addition, the MSG provides guidance to other Basel Committee groups in order to rectify any regulatory inefficiencies and unintended consequences of the broader Committee regulatory framework.

The Accounting Experts Group (AEG) ensures the global uniformity in banking accounting practices and sets high international standards. As standardised accounting reporting framework mitigates global systemic risk and fosters market discipline by banks. The AEG

also has an audit function that ensures high audit standards to further mitigate risk in the global financial sector, and to assist regulators in their respective oversight compliance issues. A Memorandum of Understanding between the Basel Committee and the IFRS Foundation has been put in place in order to further solidify the significance of the AEG accounting reporting standards (BIS, 2019).

2.4. The Basel Accords

Banking crises across the globe have had adverse effects on the socio-economic spheres of world economies. The contagion of these crises can go across borders, as the global financial system a highly interlinked network of banks. In order to mitigate banking system failure risks, central banks (mostly through the Basel Committee) have over the years provided the regulatory framework and guidelines to guide banking operations through the use of macroprudential policies (Rochet, 2009). The major roles of central banks include formulation of monetary policy and ensuring monetary stability, issuing of money, regulating and supervising banks, being the lenders of last resort, and being the state commercial banks (Chorafas, 2013). While it is important for banks to be profitable, a central bank has the role of ensuring that, in banks' pursuit of profit, banks in its jurisdiction operate in a sustainable and stable manner.

Capital structure theory suggests that reducing the leverage of a bank will reduce the risk and cost of equity but with no effect to the weighted average cost of capital; including lending interest rates to borrowers (Baker & Wurgler, 2015). However, deposit-taking financial intermediaries, as asset transformers, are required to hold minimum level of equity and equity-like capital (Capital Adequacy) to act as a buffer against losses from balance sheet and off-balance-sheet transactions (Saunders & Cornett, 2006). Therefore, as depository intermediaries, banks have to hold minimum equity balances. The Basel Committee, through its working groups and task forces, has released a series of regulation recommendations around capital adequacy, supervision and bank opaqueness (BCBS, Groups, 2019). Moreover, there is an increasing trend in the Capital Adequacy ratios that have been required under the Basel Accords (I, II, III etc.) over the years.

2.4.1. The Basel I Accord

The first Basel Accord (Basel I) was proposed and released in 1988, it prescribed standardised rules to determine how banks' capital would be constituted. Capital on the balance sheet of a bank was tiered and structured in a hierarchical format, reflecting the order of claims on the assets of the bank in the case of a liquidation arising from insolvency. Tier 1 Capital can be defined as the common equity contributions of the owners of the bank plus any retained earnings and reserves that have accumulated from subsequent years of operation. Tier 1 Capital is more suited to absorb losses as common equity holders have the last claim to bank assets in the case of insolvency; wherein depositors, followed by other providers of non-equity capital, have first preference on claims.

Tier 2 Capital comprises contributions that are subordinate to depositors' contributions. In the case of a run on a bank, Tier 2 Capital claims will be met after all depositor claims have been met. The seniority of Tier 2 Capital to Tier 1 Capital allows banks to further leverage their balance sheet by acquiring assets through intermediation activities without having to increase customer deposits. Basel I recommended that banks in member countries hold minimum capital (Tier 1 and Tier 2) of 8% of risk-weighted assets (BIS, 2001). A minimum of 4% was also set for Tier 1 capital. Tier 1 capital consisted of shareholders' equity and retained earnings and Tier 2 consisted of supplementary capital.

Basel I being the first Accord was instrumental in curbing potential crises but fell short in that it focused on a single measure (Capital Adequacy) to mitigate risk and it was a universal, one fits all, approach to regulate complex banking activities that tend to differ greatly across borders (BIS, 2001).

The concept of Risk Weighted Assets (RWAs) took into the consideration the levels of credit risk inherent the pool of permitted assets that banks are allowed to hold on their balance sheets. The credit risk levels were categorised into standardised risk buckets with the following risk weights; 0%, 20%, 50% and 100%. Assets with relatively lower

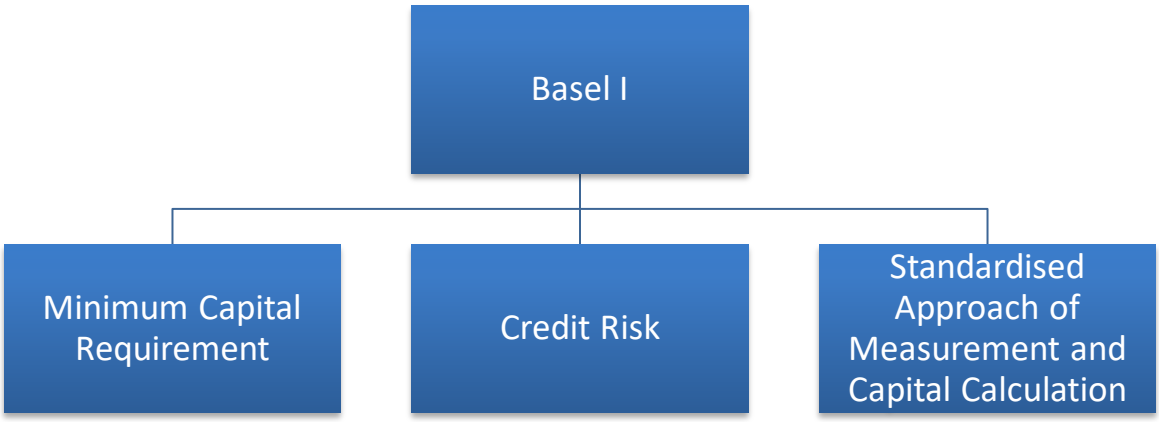
credit risk such as cash and loans extended to Organisation for Economic Co-operation and Development (OECD) countries were allocated a 0% risk weighting. Conversely, relatively risky assets such as consumer and commercial business loans, and credit extended to Non-OECD governments were assigned a risk weight of 100%.

Table 1: Risk Weights and Buckets

Risk Weight	Asset Description
100%	Credit extended to Non-OECD countries, retail and commercial business customers
50%	Mortgage loans on housing that is owner occupied or let out for rent
20%	Credit extended to banks operating in OECD countries and cash items which are due for collection
0%	Cash and credit extended to OECD countries

Source: Salasa (2013)

Figure 2.6: Basel I Framework



Source: Author's Compilation

2.4.2. The Basel II Accord

To address the key shortfalls of Basel I, a new Accord that emphasises more on banks' own internal methodologies, supervisory review and market discipline was initiated. A publication in 2004 titled *International Convergence of Capital Measurements and Capital Standards* and later known as the Basel II Accord (Basel II) was released. Furthermore, Basel II emphasised on risk sensitivity and was more flexible and accommodative in its risk management prescriptions to tackle the rigid, one size fits all, regulation problem that came to be one of the major shortfalls of Basel I (BIS, 2005). It was expected Basel II would be implemented widely by January 2007 and this was so in the European Union while the United States of America lagged behind. Although the US Federal Reserve was in full support of Basel II, the implementation thereof never materialised due to the 2007-2008 global recession that led the US Government to focus on resuscitating its economy.

Basel II consisted of three pillars, namely: Minimum Capital Adequacy, The Supervisory Review Process, and Market Discipline. The Minimum Capital Adequacy Pillar prescribed the calculation of minimum capital requirements for credit, market and operational risk. The capital ratio would be derived by using the regulatory capital divided by the risk-weighted assets. The Supervisory Review Process Pillar aimed to foster banks to develop and implement better risk management policies and procedures in monitoring and managing their risks. The last pillar, Market Discipline, sought to enforce market discipline by imposing bank disclosure requirements which would allow market participants to assess important information the scope of application, capital, risk exposures, risk assessment processes, and capital adequacy of banks (BIS, 2005).

Under Basel II the capital requirement was still set at 8% of risk-weighted assets but the framework went on to break the capital requirements into Tier 1 (Core Capital), Tier 2 and Tier 3 (BIS, 2005). Tier 1 comprised ordinary share capital and premium, disclosed reserves, retained earnings and any innovative capital instruments. Tier 1 (Core Capital) had to account for at least 5% of risk-weighted assets. Tier 2 consisted of cumulative preferred stock and long-term unguaranteed subordinated debt while Tier 3 consisted of subordinated unguaranteed debt with shorter term maturities of around two years.

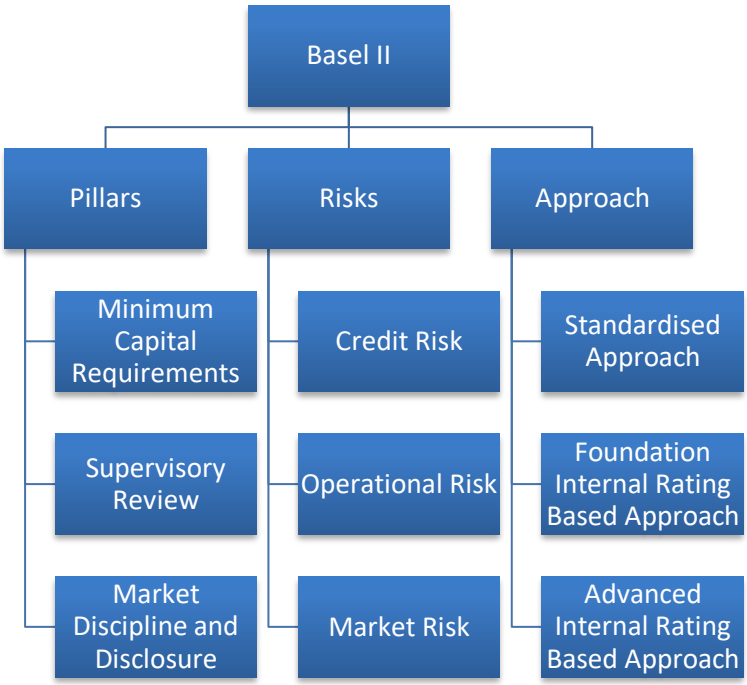
Furthermore, special provisions and considerations are made to factor in Credit, Market and Operational Risk. Credit Risk is the risk that a borrower will fail to honour the agreed obligatory repayments of the principal amount plus interest for the duration of the loan term. Market Risk is the uncertainty in the earnings of banks' earnings on their trading portfolios arising from changes in market conditions such as asset prices, interest rates, market volatility and market liquidity (Saunders & Cornett, 2006). Operational Risk pertains to potential losses resulting from the inadequacies and/or malfunctioning of internal processes and systems, and malpractice from the people within a bank (BIS, 2005).

There are further differences between Basel I and Basel II. Under Basel I, all assets on banks' balance sheets were determined using a single risk measurement methodology thus giving the same risk ratings to the different asset classes despite their varying risk levels. Basel II introduced the concept of 'risk weighting' wherein weights would be assigned to the different assets classes in order to reflect their relative riskiness (Gleeson, 2012). In order to determine the risk weightings for each asset class, Basel II proposed the Standardised and Internal Ratings Based (IRB) Approaches. The Standardised Approach recommends the use of external credit rating agencies such as Standard & Poor's (S&P), Moody's and Fitch Group. Moreover, risk ratings are also determined by asset type.

The Internal Based (IRB) Approach permits banks to use their own internal statistical and risk models to determine risk weightings upon approval of such models by local regulators. The IRB Approach consists of two variants, foundation and advanced. Under the Foundation IRB method, supervisors provide key inputs for risk analysis models while banks provide granular estimates of default probabilities of each borrower. Under the Advanced IRB method, banks with robust internal capital allocation processes are permitted to provide further inputs into risk models over above what is required under the Advanced IRB method (BCBS, 2001).

While Basel II utilised a wider approach to bank regulation, the complexities of the banking sector proved to require a more robust framework. According to Embrechts *et al.* (2001) Basel II failed to address the procyclical nature of bank regulation. The procyclical effect of bank regulation leads to periods of reduced bank lending arising from depletion of banks' capital during recessions. If the banks are unable to raise capital during times of recession in order to comply with capital requirements, banks hold back on lending thus exacerbating the negative effects of economic downswings. Embrechts *et al.* (2001) further argue that the reliance on rating agencies posed challenges as individual client credit rating forecasts lacked consistency. Furthermore, rating agencies' risk models are largely undisclosed and lack transparency; which could lead to biased analyses favouring some clients over others. Banks that could afford to develop their own risk models largely resorted to implementing the Advanced Internal Rating Based (A-IRB) Approach to determine risk weights. This approach later led to the use of statistical models that have over time proved unreliable due to their inability to capture the joint downside risk of bank assets.

Figure 2.7: Basel II Framework



Source: Author's Compiliation

2.4.3. The Basel III Accord

As an augmentation to Basel II, Basel III was released in 2010 and the main aim was to address the major challenges that brought about the 2007-2008 global financial crisis. Basel III went a step further to include an aspect of macro prudential regulation while Basel I and II only focused on individual bank risk. A Countercyclical Buffer was incorporated in order to mitigate the procyclical nature of prior regulations, and this was done in conjunction with the capturing of on- and off-balance sheet risks that predominantly led to the 2007-2008 financial crisis. Furthermore, Basel III recognised the importance of liquidity and has the objectives of building banks' robustness through holdings of high quality liquid assets to survive periods of extreme stress, and by encouraging banks to implement sustainable maturity structures of assets and liabilities (BCBS, 2010).

The Basel III recommendations restated the minimum capital adequacy ratio through the use of a build-up approach consisting of the following minimum and buffer ratios: minimum total capital ratio, Conservation Buffer and the Countercyclical Buffer (BCBS, 2010). The Minimum Common Equity Tier 1 ratio of risk-weighted assets was set to 4.5%, the Total Tier 1 Capital Adequacy ratio was 6% while the Total Capital (including Tier 2) was set to 8%. A Conservation Buffer was incorporated and set at 2.5% of risk-weighted assets. Therefore, the minimum Total Capital Adequacy ratio plus Conservation Buffer requirement was 10.5%. An additional Countercyclical Buffer was set at a range of 0-2.5% of risk-weighted assets.

The requirement for banks to build Capital Conservation Buffers under Basel III has increased the capital adequacy levels banks are supposed to comply with. The capital buffers are to be built up by banks during periods of excess liquidity and are to cushion against the depletion of the minimum capital adequacy levels in times of market illiquidity. Upon the depletion of the capital buffers banks are required to rebuild them by reducing distributions to shareholders and employees in the form of dividends, share buybacks and management performance bonuses. Moreover, banks can seek more Common

Equity Tier 1 from the private sector capital in instances where earnings retention is insuffiecient to rebuild buffers (BCBS, 2010).

Moreover, financial instruments that are classified as liabilities on banks' balance sheets should allow for loss absorption. Such instruments must be convertible to common equity shares at some pre-agreed trigger points or should allow for write-downs which would attribute some losses to the instruments. The loss absorption mechanisms arising from write downs will have the effect of partially or fully reducing the periodic payments (coupons or dividends) to these instruments, minimising the claim participations of such instruments upon liquidation, and reducing the amount prepaid when call options are exercised (BCBS, 2010).

According to Gordy & Howells (2006) the Internal Ratings Based (IRB) under Basel II created the regulatory procyclicality problem; wherein, capital requirements increased when economies entered recessionary periods and reduced when economies entered expansionary periods. The impact of the regulatory procyclicality problem was the amplification of recessions and expansions. As a way to curb the procyclical nature of Basel II, Basel III introduced a Countercyclical Buffer that enables banks to take into account the macro-economic environment when determining capital adequacy requirements. Under the Countercyclical Buffer regime, national regulators monitor the credit growth trends and impose the countercyclical buffer requirements ranging from 0 to 2.5% of RWA depending on the excessiveness of swings in the credit growth trends in their jurisdictions (BCBS, 2010).

Before Basel III, the liquidity of the global banking sector did not receive much attention until the 2007-2008 financial crisis necessitated prioritisation by regulators. In periods of high stress, liquidity in the financial sector can evaporate and, in some instances, over prolonged durations. In response to this phenomenon the Basel Committee on Banking Supervision published the *Principles of Sound Liquidity Risk Management and Supervision* in 2008 to be implemented in conjunction with the provisions of Basel III. This publication highlights the importance of banks having knowledge of their liquidity risk

tolerance, maintaining sufficient liquidity levels, incorporating liquidity costs and benefits in financial products and business units designs, designing and implementing liquidity stress test scenarios, and the need for strong contigent funding plans to insulate banks during periods of prolonged stress. In addition, the publication requires banks to publish their liquidity levels in order to enforce market discipline (BCBS, 2008).

An introduction of the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) in Basel III aimed to standardise the liquidity risk management in an objective manner. The LCR is intended to guide banks to manage liquidity risk over a thirty day period, and recommends high-quality liquid assets that are free of encumbrance and readily acceptable by central banks during periods of high stress in the financial markets. The NSFR recommends a sustainable mix of capital sources to fund the variations in liquidity across assets classes held by banks. It further requires banks to incorporate contigent liquidity requirements stemming from off-balance sheet activities over the a one year time horizon. In essence, the NSFR prescribes that banks seek alternative sources of funding other than the short-term wholesale deposits during periods of high market liquidity (BCBS, 2010).

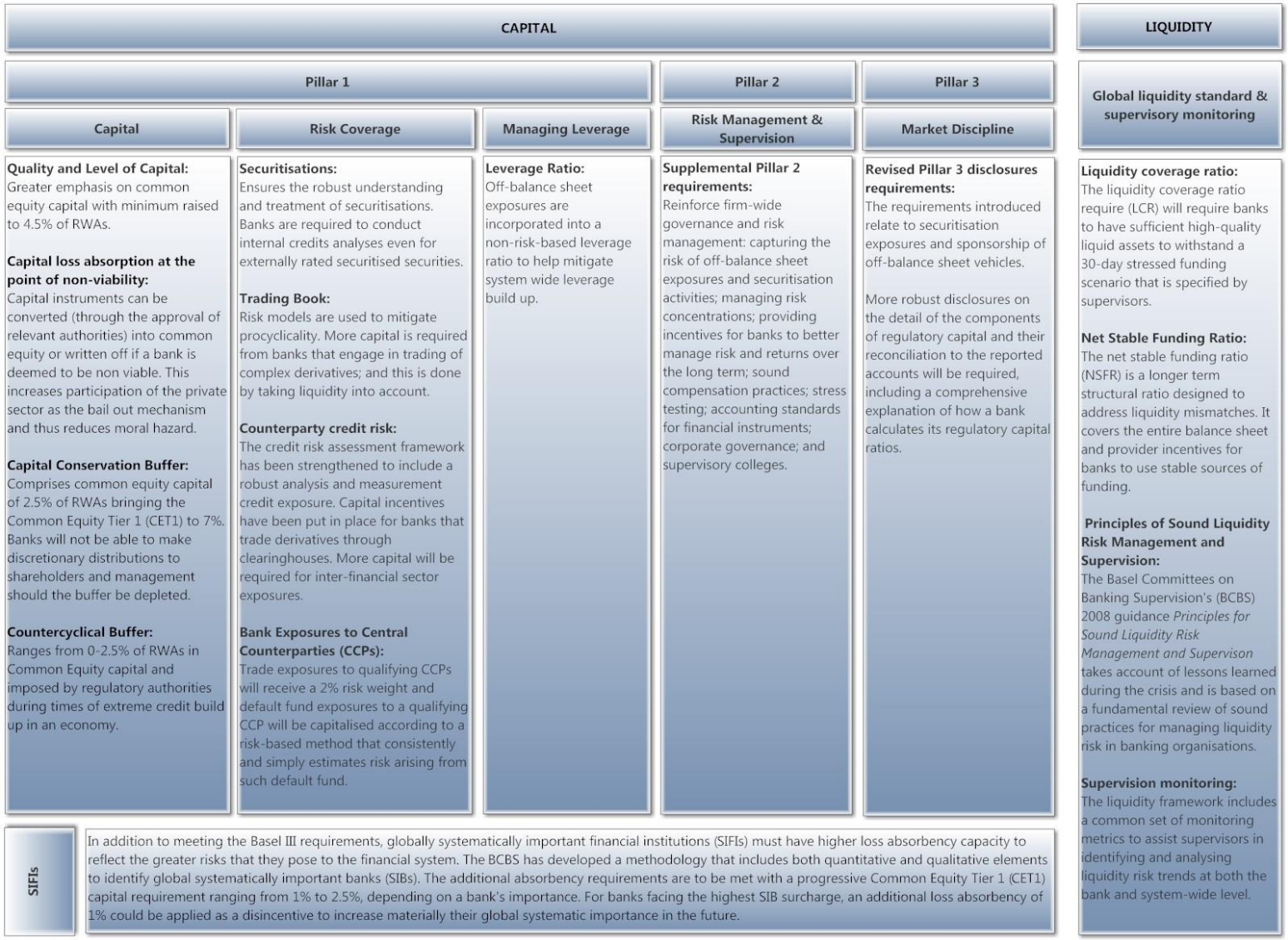
Akin to the need for banks to maintain healthy liquidity levels is the introduction of the Leverage Ratio under Basel III. One of the key lessons from the 2007-2008 financial crisis was the unsustainable build up of on- and off-balance sheet gearing by banks. The Leverage Ratio is a more objective and non-risk based metric introduced with the intention to mitigate the over build up leverage in the banking system. Banks are required to maintain minimum Leverage Ratios of 3%, measured as Tier 1 Capital divided by Total Exposure. The Total Exposure measure is determined by incorporating on-balance sheet items, repurchase agreements and securities finance, derivatives, and other off-balance sheet items.

One of the blatant shortcomings of Basel II was its high reliance on credit rating agencies under the proposed Standardised Approach. Basel III mitigated this over reliance on credit rating agencies by requiring banks to assess, at all times, the credit risk of each

borrower or counterparty to a transaction. The credit risk assessment was also to be carried out at the portfolio level. The key requirement under Basel III was that banks were forced to internally rate each counterparty irrespective of whether the counterparty was externally rated or unrated. In the event of rated counterparties, under the Standardised Approach, banks' analyses had to confirm whether the credit ratings were congruent with the inherent risk. Upward adjustments to the prescribed risk weights assigned under the Standardised Approach had to be done in instances where internal bank risk assessments suggested such adjustments (BCBS, 2010).

According to Liu *et al.* (2015), high levels of banking sector interconnectedness leads to the rapid and extensive contagion of stresses world wide. During the 2007-2008 financial crisis some large banks, later to be known as global Systematically Important Financial Institutions (SIFIs), that were under severe distress created a domino-effect scenario that spread across borders. As a curbing mechanism to this phenomenon, the Basel Committee prescribed higher capital requirements for Global Systematically Important Banks (G-SIBs) with the aim to increase their going concern loss absorbency thereby reducing the probability of failures of G-SIBs, and improve global recovery and frameworks used to resolve failures (BCBS, 2011).

Figure 2.8: Basel III Framework



Source: Author's Compilation

2.5. Profitability Measures

Several research studies have identified Return on Average Assets (ROAA) and Net Interest Margin (NIM) as indicators of profitability. The ROAA indicates the level of management efficiency in generating income on resources held by an institution, and a higher ROAA in comparison to peers indicates that management is more efficient in generating income from utilisation of resources (Wen, 2010). In order to attract deposits and investment, a bank has to prove to providers of resources that their desired return on investment can be achieved. Banks, like most companies, compete for limited financial resources in order to fund operations and future opportunities that will yield economic value. For this reason, ROAA could be considered as one of the suitable measures of banks' performance due to its overarching ability to capture all Capital Adequacy tiers, and therefore should play a very important role on banks' survival and sustainability. Khrawish (2011), Flamini *et al.* (2009) and Qin & Dickson (2012) determine that Return of Average Assets is one of the determinants of profitability.

Net Interest Margin is the difference between the rate of interest a bank receives from its interest earning assets and the rate of interest it pays on its interest bearing financial obligations. Interest earning assets can be in the form of loan advances and interest earning financial securities while interest bearing obligations can be in the form of deposits and financial instrument liabilities such as bonds. A higher interest rate received from bank assets is preferred because it translates to higher profits. However, a higher net interest margin could be an indication that the bank partakes in risky lending practices that could later lead to financial losses (Khrawish, 2011). Moreover, while higher interest rates have a positive effect on Net Interest Margins in emerging markets, Godspower-Akpomiemie & Ojah (2017) postulate that interest rate shocks have no significant effect on bank net interest margins in Africa.

2.6. Bank-Specific Characteristics and Profitability

Dang (2011) argues that sufficient levels of bank liquidity are positively related to bank profitability. Bank liquidity is the ability of a bank to meet its short-term financial obligations to depositors and other providers of interest bearing obligations (Ongore & Kusa, 2013). Adequate bank liquidity ensures that trust in a bank is upheld so as to minimise the probability of a bank run; which could lead to bank failure. Furthermore, in order to minimise expenses from the intermediation function, banks need to maintain sustainable loan advance default rates. The quality of the loan portfolio will therefore determine the level of defaults. Salike & Ao (2017), in their study on Asian banks, argue that poor asset quality (stated as impaired loans over gross loans) has a significant negative impact on banks' profitability.

Moreover, Yakubu (2016) postulates, in his study on Ghanaian banks, that there is a positive relationship between the size of a bank and its profitability. In Tunisia, the total assets of a bank are an indicator of size and the bigger the bank, the more able it is to realise economies of scale (Naceur & Goaied, 2005). Akhmedjonov & Izgi (2015) suggest that higher bank capitalisation has a positive effect on profitability and the effect is more so during financial crises. The increase in bank capital adequacy ratios is therefore desirable for bank investors and lenders providers of capital to banks. In the African context, Owoputi *et al.* (2014), Maredza (2014) and Onuonga (2014), confirm that increased bank capital adequacy has a positive impact on bank profitability.

2.7. Macroeconomic Factors and Profitability

The macroeconomic factors are the external determinants of bank profitability. Gross Domestic Product, Inflation, and Interest Rates are some of the significant external factors as determined by Beck *et al.*(2013), Tan & Floros (2012), English *et al. (*2018), Genay & Podjasek (2014) and Einchengreen & Hausmann (1999). Beck *et al.*(2013) postulate that a fall in the GDP of a country will negatively affect the quality of assets held by a bank and, in most instances, there are increases in non-performing loans. During periods of

contracting economic activity, income levels in economies are expected to decrease leading to defaults and contractions in banks' total assets. Moreover, low GDP growth rates are highly correlated to poor bank profitability (Tan & Floros, 2012).

According to Tan & Floros (2012) a positive reationship between the inflation rate and bank profitability exists. Inflation rates are factored into lending rates that are charged to borrowers leading to higher lending rates and profitability. Furthermore, asset valuation theory suggests that inflation rates increase risk premia thus increasing the required return; while unanticipated increases in short-term interest rates have an adverse effect on bank returns due to sharp decreases in bank equity prices (English *et al.*, 2018). Genay & Podjasek (2014) argue that there is a positive relationship between interest rates and bank profitability. As with inflation, asset valuation theory suggests that there is a positive relationship between inflation and the discount rate, thus, leading to higher returns that are commensurate to the high risk premia.

The 2007-2008 global financial crisis forced policy makers to rethink the regulation around bank fragility. Capital adequacy continues to be a one the primary variables that determine the fragility of a bank. Well capitalised banks stand a better chance of survival during crises and show strong signs of performance (Berger & Bouwman, 2013).

CHAPTER THREE

3. DATA AND METHODOLOGY

3.1. Introduction

This section details the research methods deployed in examining the research objectives and questions of this study. The research design, population and sample used in this study are also explained in this section, along with data collection method and econometric model applied in testing the relationships between the study variables.

3.2. Research design

This study deploys a quantitative research approach to examine the impact of asset quality and level of capitalisation on banks' profitability. A Cross-Section Analysis which studies the data on variables collected at a single point in time is used to determine the relationship between the independent variables (Asset Quality, Bank Size, Liquidity, Tier 1 Capital Ratio, Inflation Rate, Real Interest Rate, GDP Growth Rate and a Dummy variable for Bank Domicile) and dependent variables (Return on Average Assets and Net Interest Margin).

3.3. Description of Variables Variables

3.3.1. Dependent Variables

In this study ROAA is the Return on Average Assets measured as Net Income divided by Average Total Assets recorded in the current and previous years. NIM is the Net Interest Margin measured as Net Interest Revenue divided by Loans Advanced. These variables are measured as determined by Khrawish (2011).

3.3.2. Bank-Specific Independent Variables

The bank specific independent variables indicate policies and decisions within the control of banks' management. For the purpose of this study, these determinant factors are capital adequacy, liquidity, size and asset quality.

Capital adequacy: In this paper it is measured as Tier 1 Capital Ratio determined according to Basel III standards and is the ratio of equity to total assets. Berger (1995) postulates that capital adequacy and profitability are positively related. A higher Capital Adequacy Ratio is desirable as it depicts the ability of a bank to finance its operations and absorb losses in periods of stress.

Liquidity: It is measured as the ratio of liquid assets to deposits and short-term funding. According to Rasiah (2010), banks are required to hold a certain level of liquid assets to ensure sufficient liquidity to mitigate the likelihood of bank failures. Bank liquidity is positvely related to profitability (Bourke, 1989).

Bank size: It is measured as Total Assets of a bank and banks can utilise size to achieve economies of scale (Naceur & Goaied, 2005). Bank size is positively related to bank profitability (Smirlock, 1985) and the proxy used in this paper is the natural logarithm of Total Assets [ln(TA)].

Asset Quality: It is desirable for banks to maintain high quality credit books as poor asset quality and high levels of non-performing loans deteriorate the ability of banks to withstand high stress events (Olweny & Shipho, 2011). In this paper, asset quality is measured as 100% less the ratio of impaired loans to gross loans.

3.3.3. Macro-Economic Independent Variables and the Dummy Variable

Macro-economic factors affect bank profitability. The macro-economic determinants used in this literature are the real growth is growth domestic product (GDP), annual inflation rate, real annual interest rate. A dummy variable is also used to determine the effect of the domicile of a bank; whether in Africa or other developing country.

GDP: Real GDP growth is used a proxy for GDP as a determinant of bank profitability in this paper. GDP and profitability are expected to have a positive relationship (Dermiguc-Kunt & Huizinga, 1999). It is a measure of economic activity which affects supply and demand factors in the demand and supply of bank savings and credit products.

Inflation: This a measure of the overall increase in consumer goods and services prices determined by the annual increase in a given country's Consumer Price Index (CPI). Inflation also determines real prices for revenues and costs. Inflation is expected to have a positive relationship with bank profictaility (Bourke, 1989; Kosmidou, 2008).

Real Interest Rate: Real interest rates are expected to have a positive relationship with bank profitability as banks' profits rise and fall with real interest rates (Samuelson, 1945). Real interest rates have a direct bearing on the costs of banks' funds and revenues.

Dummy Variable: In this research the dummy variable is used to distinguish between the African banks and other developing countries' banks groups. The African banks groups is allocated a value of 1 (one) while the other developing countries' banks group is allocated a value of 0 (zero). The dummy variable is expected to be positively related to bank profitability owing to generally higher and favourable macro-economic determinants compared to other developing countries (Dermiguc-Kunt & Huizinga, 1999; Bourke, 1989; Samuelson, 1945).

Table 3.1: Expected Relationship between Bank Profitability and bank-specific and macro-economic Determinants of Profitability

Independent Variables	Expected Relationship
Increase in Economic Growth	Positive
Increase in Inflation	Positive
Increase in Real Interest Rates	Positive
Increase in Capital Adequacy	Positive
Increase in Asset Quality	Positive
Increase in Bank Size	Positive
Increase in Liquidity	Positive
Dummy Variable	Positive

Source: Author's Compilation

3.4. Population

The population of this study consists of all developing countries' banks. The reason is to study the effect of increasing trend in capital adequacy ratios (as required by Basel capital accord) on developing countries' banks; especially in the African banking sector as the region continues to integrate economically. The developed markets are characterised by more liquid markets and interconnected financial sectors. An interconnected financial system in Africa and the developing world would lead to increased shock transmission (Hale *et al.*, 2017).

3.5. Research sample

The sample for this research consists of 235 banks from 50 developing countries. These countries were chosen based on availability of data required to carry out this research so as to be able to come up with reliable statistical results. The research duration is for the period of one year, 2018. The reason for choice of this duration is to analyse a single period effect of the variables, and the year 2018 is chosen because it is the most current year available during the period of this research study, as 2019 data have not been updated by both BankFocus and World Bank data base during the period of data collection for this study. In order to determine the impact on bank profitability (measured by ROAA and NIM) and compliance with the Basel III prescribed Tier 1 Capital ratios of 13% of RWAs, the sample is categorised into two subgroups of banks that have Tier 1 Capital ratios less than 13% and those with Tier 1 Capital ratios greater than or equal to 13% of RWAs.

Table 3.2: Countries with high Tier 1 Capital ratios

	Number of Banks in Country	Average T1Cap	Average ROAA	Average NIM	Average AQ	Average Liq	Average S	Average GDP	Average Inf	Average RIR	Dummy
Angola	8	35.6	9.6	9.1	69.4	63.5	6.4	-1.2	20.2	-10.5	1
Bosnia & Herzegovina	1	20.5	0.5	3.6	93.1	39.0	5.6	3.6	1.4	2.4	0
Brazil	1	16.5	4.1	9.7	92.2	42.6	4.8	1.1	3.7	35.0	0
Botswana	2	21.3	1.3	3.9	91.8	38.4	5.6	4.5	3.2	5.5	1
Belarus	1	20.5	2.0	8.9	91.3	32.7	5.3	3.1	4.9	-2.6	0
Central African Republic	1	26.0	1.5	3.2	95.7	35.8	5.2	3.8	1.6	7.4	1
Colombia	1	13.1	1.5	9.2	96.1	17.3	7.1	2.6	3.2	8.5	0
Cape Verde	2	15.2	0.6	4.7	88.6	35.4	6.0	5.1	1.3	7.4	1
Czech Republic	2	18.5	0.7	1.8	95.9	36.7	7.9	3.0	2.1	1.0	0
Egypt	12	15.7	1.6	4.4	94.5	45.9	8.7	5.3	20.9	-2.6	1
Georgia	1	18.3	2.8	5.2	95.6	12.8	6.3	4.7	2.6	7.2	0
Ghana	4	34.1	4.9	10.5	71.9	39.0	6.7	6.3	9.8	7.9	1
Gambia	2	30.2	2.8	6.4	96.3	71.1	4.8	6.5	6.5	21.1	1
Indonesia	3	17.8	1.0	5.8	97.2	107.5	6.7	5.2	3.2	6.5	0
India	3	17.1	0.4	3.4	96.6	14.7	7.4	6.8	4.9	5.1	0
Kenya	5	28.9	2.7	6.5	90.0	33.9	6.4	6.3	4.7	9.9	1
Lebanon	1	16.6	0.7	2.5	92.8	41.7	9.4	0.3	6.1	3.1	0
Lesotho	1	16.0	0.3	9.5	96.4	11.5	5.0	2.8	4.0	5.1	1
Morocco	3	14.0	0.9	3.6	91.8	29.1	9.5	3.0	1.9	2.3	1
Mali	1	14.6	1.3	3.3	98.2	17.7	5.9	4.7	1.7	4.5	1
Mauritius	3	18.4	0.6	2.3	94.5	43.5	7.1	3.8	3.2	6.7	1
Malawi	1	28.1	-5.3	7.3	95.3	44.1	4.0	3.2	12.4	21.8	1
Mozambique	6	25.4	-0.1	14.2	81.9	39.6	5.1	3.3	3.9	4.6	1
Namibia	5	15.6	2.1	4.5	97.0	21.0	7.9	-0.1	4.3	3.5	1
Niger	1	14.9	1.3	3.9	91.2	16.7	6.4	6.5	3.0	6.1	1
Nigeria	8	27.5	0.1	4.5	92.3	49.9	8.1	1.9	12.1	6.1	1
Philippines	2	15.0	0.6	4.3	98.1	17.9	7.6	6.2	5.2	2.3	0
Pakistan	1	16.7	0.9	3.5	91.7	10.9	8.4	5.5	5.1	6.3	0
Russia	3	40.0	-1.7	6.5	91.6	121.1	3.6	2.3	2.9	-1.3	0
Rwanda	2	18.2	2.0	7.2	96.0	33.0	5.5	8.6	-0.3	17.9	1

Tanzania	8	16.2	-0.5	9.5	83.4	31.1	5.8	7.0	3.5	12.9	1
Ukraine	2	16.8	-9.8	8.1	41.1	22.0	6.3	3.3	11.0	3.1	0
Uganda	6	19.0	1.8	10.6	92.1	40.9	5.5	6.1	2.6	16.0	1
South Africa	14	17.0	0.8	4.7	92.8	31.6	8.6	0.8	4.5	5.9	1
Zambia	3	44.1	6.0	16.7	95.2	47.1	5.9	3.7	7.5	0.4	1
Grand Total	**120**	**21.9**	**1.6**	**6.7**	**89.2**	**41.5**	**6.9**	**3.7**	**7.5**	**5.2**	**1**

Table 3.3: Countries with low Tier 1 Capital ratios

	Number of Banks in Country	Average T1Cap	Average ROAA	Average NIM	Average AQ	Average Liq	Average S	Average GDP	Average Inf	Average RIR	Dummy
Angola	1	11.2	-1.4	3.5	27.1	22.4	8.7	-1.2	20.2	-10.5	1
Azerbaijan	1	-7.2	-1.4	0.3	26.2	21.9	5.5	1.0	1.9	5.0	0
Bangladesh	6	-22.4	-1.2	1.0	67.8	11.1	7.2	7.9	5.5	3.8	0
Benin	1	10.1	0.8	3.0	98.5	24.6	6.9	6.7	1.0	5.1	1
Bolivia	5	11.1	0.7	6.8	98.6	13.3	7.3	4.2	2.3	4.8	0
Brazil	5	6.1	-0.2	13.0	79.0	35.5	6.0	1.1	3.7	35.0	0
Botswana	1	12.5	1.4	4.6	96.6	33.4	5.6	4.5	3.2	5.5	1
Democratic Rep. of Congo	1	6.6	-1.1	8.7	93.1	31.0	5.4	5.8	29.3	-4.1	1
Ivory Coast	4	9.2	1.5	4.6	92.2	17.4	7.0	7.4	0.4	4.5	1
Chile	1	11.1	0.5	3.0	92.2	24.2	11.0	4.0	2.4	2.1	0
China	20	11.1	0.5	2.1	96.8	13.7	10.2	6.6	2.1	1.4	0
Colombia	7	11.5	-0.6	9.3	94.3	15.0	5.8	2.6	3.2	8.5	0
Cape Verde	1	12.9	0.7	4.7	83.8	37.3	5.5	5.1	1.3	7.4	1
Dominica	1	12.9	-0.3	2.3	78.4	54.8	6.4	0.5	1.4	6.9	0
Algeria	1	12.9	2.3	7.1	92.7	29.2	8.1	1.4	4.3	-2.6	1
Egypt	2	11.3	1.1	5.4	92.0	43.0	7.5	5.3	20.9	-2.6	1
Ghana	1	11.0	1.1	12.6	84.9	45.7	6.3	6.3	9.8	7.9	1
Guinea	1	11.4	1.7	11.0	91.0	55.8	5.3	5.8	9.8	2.5	1
Guatemala	1	10.6	-3.3	2.5	98.3	21.0	4.8	3.1	3.8	9.7	0
India	7	11.6	-0.5	2.5	89.2	9.6	9.3	6.8	4.9	5.1	0
Kenya	3	-4.0	-9.1	3.9	62.3	19.3	4.8	6.3	4.7	9.9	1
Sri Lanka	3	7.0	-0.6	9.8	86.8	17.6	4.5	3.2	2.1	6.9	0
Morroco	1	12.6	0.9	3.6	91.4	31.5	10.3	3.0	1.9	2.3	1
Madagascar	1	11.9	3.4	9.5	100.0	52.6	6.6	5.2	7.3	44.8	1
Mali	1	9.1	1.3	4.6	80.6	25.0	6.7	4.7	1.7	4.5	1

Mauritius	1	13.0	1.1	2.9	94.6	36.1	7.1	3.8	3.2	6.7	1
Mexico	3	7.9	1.3	5.0	98.0	23.1	6.1	2.0	4.9	2.6	0
Mozambique	1	9.6	4.6	25.0	88.6	46.7	4.8	3.3	3.9	4.6	1
Niger	1	12.3	2.6	4.9	88.1	13.6	6.3	6.5	3.0	6.1	1
Nigeria	2	-124.4	-1.4	8.0	76.9	27.1	6.9	1.9	12.1	6.1	1
Philippines	3	9.0	0.1	5.6	93.3	16.0	7.4	6.2	5.2	2.3	0
Pakistan	3	10.8	0.1	3.4	86.4	14.2	7.4	5.5	5.1	6.3	0
Russia	17	8.6	0.5	5.5	88.8	28.3	7.4	2.3	2.9	-1.3	0
Tanzania	2	11.3	1.0	12.3	81.0	15.7	4.7	7.0	3.5	12.9	1
Ukraine	2	11.0	-2.5	2.4	54.9	27.5	5.8	3.3	11.0	3.1	0
South Africa	2	11.0	1.1	1.9	98.7	39.7	10.6	0.8	4.5	5.9	1
Zambia	1	12.8	1.8	11.1	90.1	24.9	6.8	3.7	7.5	0.4	1
Grand Total	**115**	**5.6**	**0.0**	**5.3**	**87.6**	**21.9**	**7.5**	**4.5**	**4.3**	**5.0**	**0**

Figure 3.1: Sampled African Banks

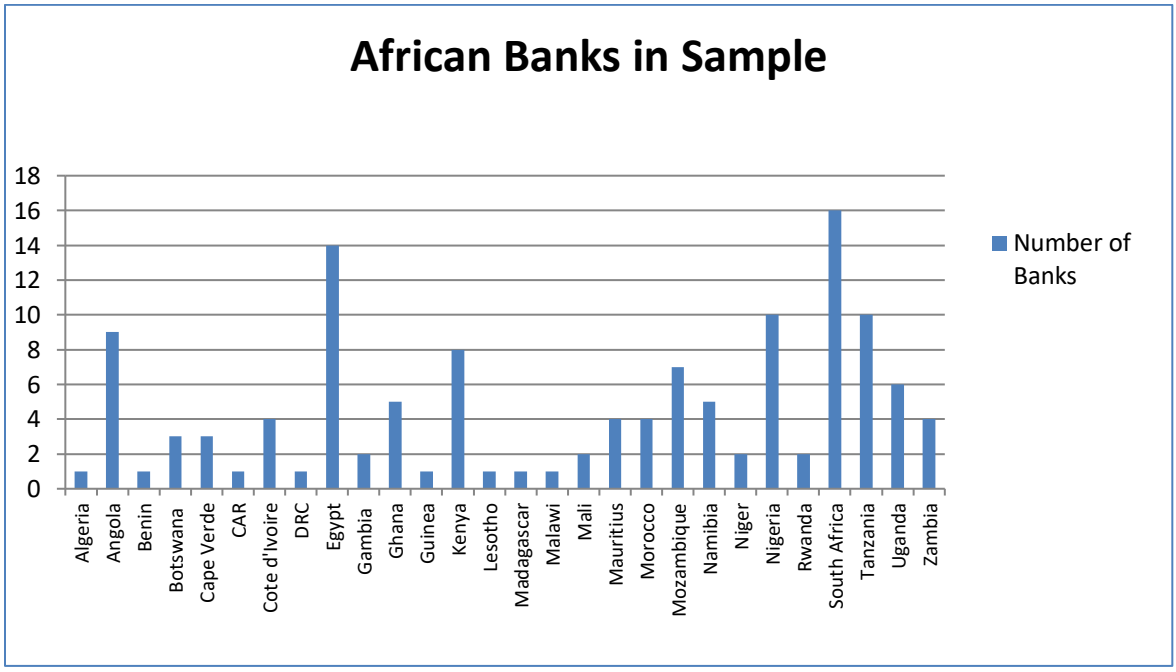
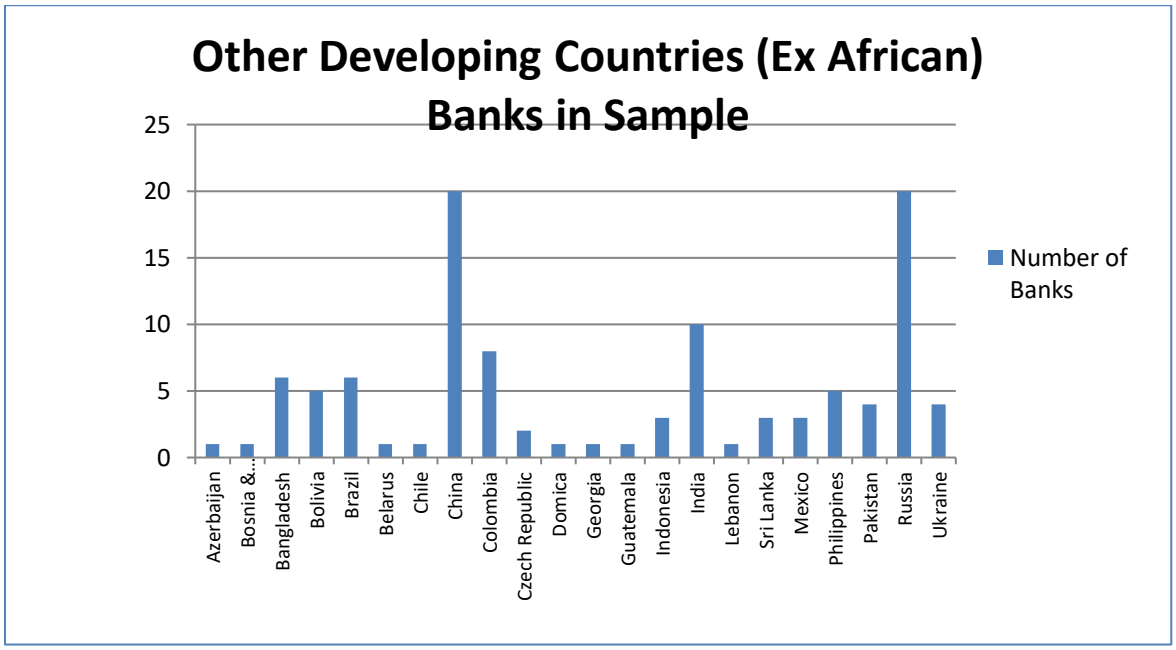


Figure 3.2: Sampled other developing country banks



3.6. Data Sources

The bank specific secondary cross-sectional data used were obtained from the BankFocus database, while the macroeconomic cross-sectional data were obtained from the IMF and World Bank database. Table 3.3 defines the variables collected for the purpose of this study.

3.7. Econometric Model

In order to study the factors affecting bank profitability in Pakistan, the authors used a multivariate regression model using Return on Equity and Return on Assets as profitability proxies. A multivariate analysis is used to study multiple dependent variables such as in the case of this study where Return on Average Assets and Net Interest Margin are set as the two dependent variables (Hair *et al.,* 2014). A similar method and model were adopted by Akhtar *et al.* (2011). The factors that Akhtar *et al.* (2011) focused on were Bank's Size, Gearing Ratio, Non-Performing Loans Ratio, Asset Management, Operating

Efficiency and Capital Adequacy. This study will focus on Bank Size, Liquidity, Asset Quality, Tier 1 Capital Ratio, Inflation, and Real Interest Rates as the independent variables. The Ordinary Least Squares Method (OLS), a method that minimises $\sum(Y_i - (\hat{\alpha} + \hat{\beta}_1 X_{i,1} + \hat{\beta}_2 X_{i,2} + \cdots + \hat{\beta}_k X_{i,k}))^2$ to ensure the estimated regression coefficients of the multiple variables are linear, unbiased, efficient and consistent (Gujirati & Porter, 2009).

This study is carried out in two different models, and each model has part one and two. Model 1 deploys return on average asset (ROAA) as a measure of profitability while Model 2 uses net interest margin (NIM) as a profit measure. The objective of the first part on both models is to test the impact of asset quality with a dummy variable for a bank's domicile. The second part of models 1 and 2 tests for the impact of bank capitalisation on ROAA and NIM respectively, while incorporating a dummy variable of bank's domicile. Other control variables included in the models are Liquidity ratio, Bank Size, GDP Growth Rate, Inflation and the Real Interest Rate, and these are used in both parts one and two in models one and two.

Model 1:

A. $ROAA_i = \alpha + \beta_1 AQ_i + \beta_2 Liq_i + \beta_3 S_i + \beta_4 GDP_i + \beta_5 Inf_i + \beta_6 RIR_i + \beta_7 \text{Dummy} + \epsilon$

B. $ROAA_i = \alpha + \beta_1 T1Cap_i + \beta_2 Liq_i + \beta_3 S_i + \beta_4 GDP_i + \beta_5 Inf_i + \beta_6 RIR_i + \beta_7 \text{Dummy} + \epsilon$

Model 2:

A. $NIM_i = \alpha + \beta_1 AQ_i + \beta_2 Liq_i + \beta_3 S_i + \beta_4 GDP_i + \beta_5 Inf_i + \beta_6 RIR_i + \beta_7 \text{Dummy} + \epsilon$

B. $NIM_i = \alpha + \beta_1 T1Cap_i + \beta_2 Liq_i + \beta_3 S_i + \beta_4 GDP_i + \beta_5 Inf_i + \beta_6 RIR_i + \beta_7 \text{Dummy} + \epsilon$

Table 3.4: Variable definitions

Abbreviation	Variable Name	Source
$ROAA_i$	Return on Average Assets	BankFocus
NIM_i	Net Interest Margin	BankFocus
AQ_i	Asset Quality [100-(Impaired Loans/Gross Loans)]	BankFocus
Liq_i	Liquidity (Liquid Assets/Deposits & Short Term Funding)	BankFocus
$T1Cap_i$	Tier 1 Capital Ratio	BankFocus
S_i	Bank Size [Ln(Total Assets m USD)]	BankFocus
GDP_i	Country GDP Growth Rate	World Bank
Inf_i	Country Inflation Rate	World Bank
RIR_i	Country Real Interest Rate	World Bank
Dummy	Dummy variable equals 1 for an African bank and 0 for a Non-African Developing country bank	
ϵ	Regression Error Term	

3.8. Statistical Package

The models were performed EViews 10^{+} Student Version Lite (EViews). The package is used to run statistical models and is readily available online to registered students.

3.9. Data Collection

The cross-sectional 2018 bank-specific data was collected from BankFocus for banks operating in African countries and some other developing countries. To ensure availability of different categories of data, a filter to only show banks with all the required bank-specific data was used. In addition, a cross check using some banks' financial statements was done on bank specific data and some macro-economic data was checked using the different countries' central bank data. The data was then exported as Microsoft Excel

Workbook. The IMF and World Bank databases were used to collect the 2018 macroeconomic data. Banks operating in countries with missing 2018 macroeconomic data were eliminated leaving only banks with available data for the year 2018. The data were imported into EViews for statistical testing and analysis.

3.10. Summary

The empirical methodology uses 2018 cross-sectional data acquired from the Word Bank and BankFocus databases. In order to study the impact of the independent variables the Ordinary Least Squares regression method is used. Return on average assets (ROAA) and net interest margin (NIM) are used as measures of bank profitability. Moreover, these two measures are also used as the dependent variables. The independent variables asset quality (AQ) and bank capitalisation (T1Cap) with the bank domicile; that is, whether banks operate in Africa or in developing non-African countries (Dummy variable) are studied to determine their impact on the banks' profitability. GDP growth (GDP), bank size (S), inflation rate (Inf) and the real interest rate (RIR) are used as independent control variables.

CHAPTER FOUR

4. RESULTS AND ANALYSIS

4.1. Introduction

This chapter presents the results of the analysis carried out using the methods outlined in Chapter 3. The descriptive results are presented, comprising the summary statistics and correlation metrics of the variables of interest. Secondly, the regression analyses are presented and interpreted, according the different models proposed in chapter 3.

4.2. Descriptive Statistics and Correlation Analysis

Table 4.1 shows the descriptive statistics of the variables of interest, dependent variables, which are Return on Average Assets (ROAA) and Net Interest Margin (NIM) as well as the independent variables, which include, Asset Quality (AQ), Capitalisation (T1Cap), Liquidity ratio (Liq), Bank Size (S), GDP Growth (GDP), Inflation Rate (Inf) and Real Interest Rate (RIR).

Table 4.1: Summary statistics of variables of interest for the sampled banks

	Mean	Standard Deviation	Skewness	Kurtosis	Minimum	Maximum
ROAA	0.80	3.88	-0.58	15.31	-22.14	24.39
NIM	6.02	5.40	3.76	24.27	-3.69	51.17
AQ	88.44	15.51	-2.68	7.55	18.00	99.99
T1Cap	13.95	20.68	-5.85	56.14	-198.56	58.98
Liq	31.90	28.75	4.34	30.98	0.53	289.18
S	7.20	2.05	0.46	-0.33	2.74	13.24
GDP	4.08	2.46	-0.31	-0.96	-1.20	8.60

Inf	5.96	5.73	1.90	2.69	-0.30	29.30
RIR	5.12	7.84	1.82	6.56	-10.51	44.75

The mean, standard deviation, skewness, kurtosis, minimum and maximum values of the sampled banks operating in developing markets are presented in Table 4.1, which describe the distribution characteristics of each variable. The results show that the ROAA of banks in developing countries have an average of 0.8% and this variable ranges from -22.14% to 24.39%. NIM has a mean of 6.02% and ranges from -3.69% to 51.17%. AQ has a mean of 88.44% and ranges from 18% to 99.99%. T1Cap has a mean of 13.95% and ranges from -198.56% to 58.98%. This means that on average, banks in developing countries maintain higher Tier 1 Capital Ratios that are relatively higher than the prescribed 13% of RWAs under the Basel III Accord. Higher capitalisation ratios in developing countries could mean that banks in developing countries have relatively low risk appetites. And this could, in turn, lead to stunted economic activity in developing markets due to restrictive lending behaviour by banks.

Liq has an average of 31.9% and ranges from 0.53% to 289.18%. S has an average relative value of 7.2 and ranges from relative values of 2.74 to 13.24. GDP has an average of 4.08% and ranges from -1.2% to 8.6%. Inf has an average of 5.96% and ranges from -0.3% to 29.3%. RIR has an average of 5.12% and ranges from -10.51 to 44.75%.

Table 4.2: Correlation analysis of variables

	ROAA	NIM	AQ	T1Cap	Liq	S	GDP	Inf	RIR	Dummy Variable
ROAA	1.000									
NIM	0.271***	1.000								
AQ	0.283***	-0.083	1.000							
T1Cap	0.274***	0.178***	0.190***	1.000						
Liq	0.150**	0.070	-0.042	0.248***	1.000					
S	0.107*	-0.389***	0.250***	-0.058	-0.227***	1.000				
GDP	-0.161**	-0.119*	0.105	-0.100	-0.207***	0.052	1.000			
Inf	0.202***	0.050	-0.188***	0.081	0.236***	0.039	-0.203***	1.000		
RIR	-0.160**	0.208***	0.044	-0.061	-0.030	-0.267***	0.168***	-0.380***	1.000	
Dummy Variable	0.203***	0.189***	-0.022	0.171***	0.211**	-0.137**	-0.100	0.369***	0.040	1.000

Table 4.2 shows the correlation matrix for all the model variables. ***, **,* indicate significance levels at 1%, 5% and 10% respectively.

According to Kennedy (2003) and Bryman & Cramer (2002) high correlation between variables exists when the correlation coefficient exceeds (positive or negative) 0.8. That is also to say that multicollinearity exists when the correlation coeffiecient exceeds (positive and negative) 0.8. For the independent variables (AQ, T1Cap, Liq, S, GDP, Inf, RIR and the Dummy Variable) in Table 4.2, all correlation coefficients are lower than 0.5, which means that multicollinearity does not exist between any two independent variables.

4.3. Presentation of summary statistics

The summary statistics were detailed further graphically showing the level of banks' specific variables (factors), as well as macroeconomic variables (factors) that affect

banks' profit in each sampled country as at the year 2018. Also, the measures of banks' profit (ROOA and NIM) were also graphically presented per country. For ease of explanation, Table 4.3 presents the country codes used in the graphs. The graphs were presented to show the trend for both African countries and other non-African countries sampled in this research.

Table 4.3: Country Codes

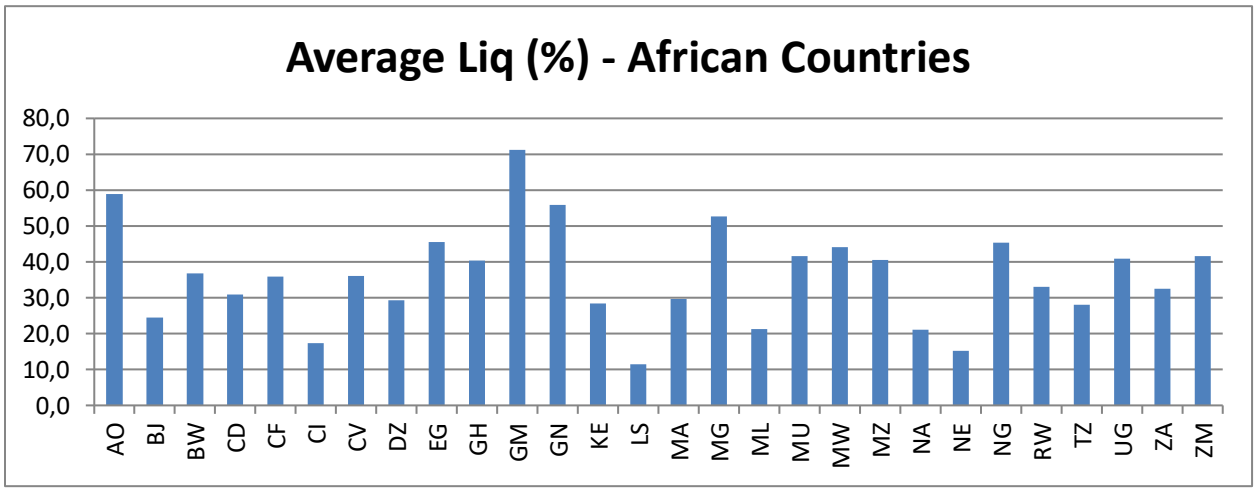
Country Code	Country	Country Code	Country	Country Code	Country	Country Code	Country
AO	Angola	CN	China	IN	India	NE	Niger
AZ	Azerbaijan	CO	Colombia	KE	Kenya	NG	Nigeria
BA	Bosnia and Herzegovina	CV	Cape Verde	LB	Lebanon	PH	Philippines
BD	Bangladesh	CZ	Czech Republic	LK	Sri Lanka	PK	Pakistan
BJ	Benin	DM	Dominica	LS	Lesotho	RU	Russia
BO	Bolivia	DZ	Algeria	MA	Morocco	RW	Rwanda
BR	Brazil	EG	Egypt	MG	Madagascar	TZ	Tanzania
BW	Botswana	GE	Georgia	ML	Mali	UA	Ukraine
BY	Belarus	GH	Ghana	MU	Mauritius	UG	Uganda
CD	Democratic Republic of the Congo	GM	Gambia	MW	Malawi	ZA	South Africa
CF	Central African Republic	GN	Guinea	MX	Mexico	ZM	Zambia
CI	Ivory Coast	GT	Guatemala	MZ	Mozambique		
CL	Chile	ID	Indonesia	NA	Namibia		

4.3.1. Determinants of banks' profitability – Bank specific factors

Figure 4.1a shows that African banks in the sample exhibit higher liquidity than banks in other developing countries. The mean of liquidity ratio for African banks is 37.4% while that of the other developing countries is 25.3%. In the sample of African banks, Lesotho

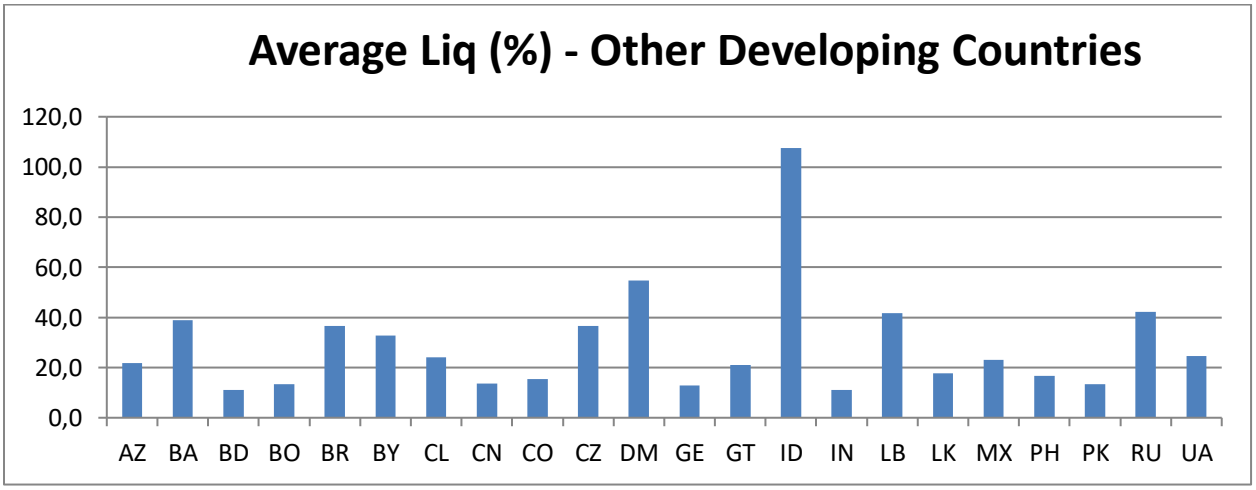
has the lowest average Liquidity at of 11.5% while Gambia has the highest Liquidity measure of 71.1%. In the sample of other developing country banks (Figure 4.1b), Bangladesh has the lowest average Liquidity of 11.1% whereas Indonesia has the highest average Liquidity of 107.5%.

Figure 4.1a: Average bank liquidity ratios in African countries



Source: Author's computation, using BankFocus Data

Figure 4.1b: Average bank liquidity ratios in other Developing countries

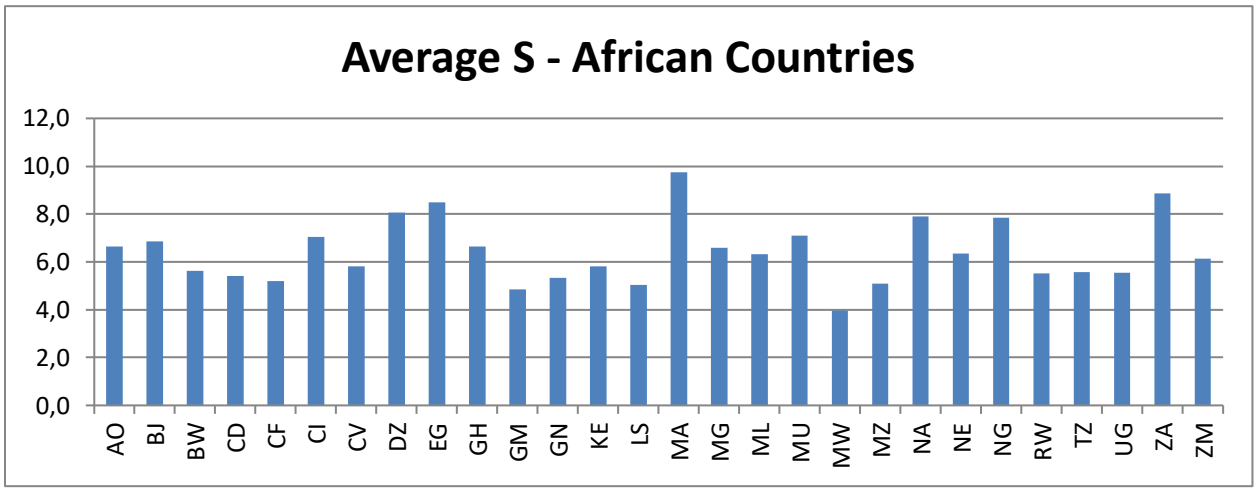


Source: Author's computation, using BankFocus Data

Looking at Figures 4.2a and 4.2b, banks in other developing countries are larger in size than banks operating in Africa. The average measure of bank size (S), using natural log of bank's total asset is 7.5 while that of African banks is 6.9. In the sample of African

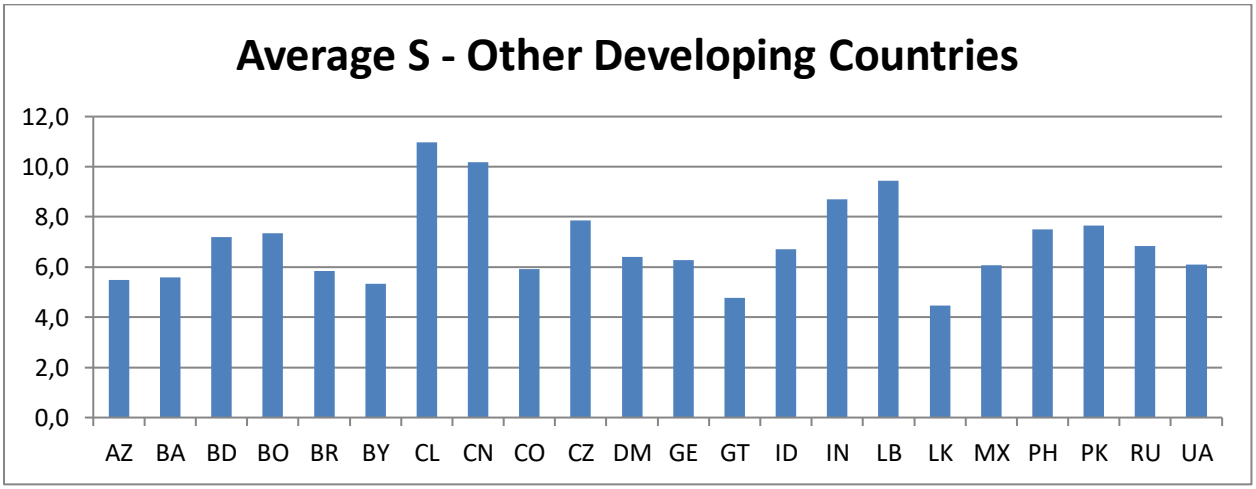
banks, Malawi has the lowest average measure of size of 4.0 while Morocco has the highest measure of size of 9.7. In the sample of other developing country banks, Sri Lanka has the lowest average size measure of 4.5 whereas Chile has the highest average size measure of 11.0.

Figure 4.2a: Average bank sizes in African countries



Source: Author's computation, using BankFocus Data

Figure 4.2b: Average bank sizes in Other Developing countries

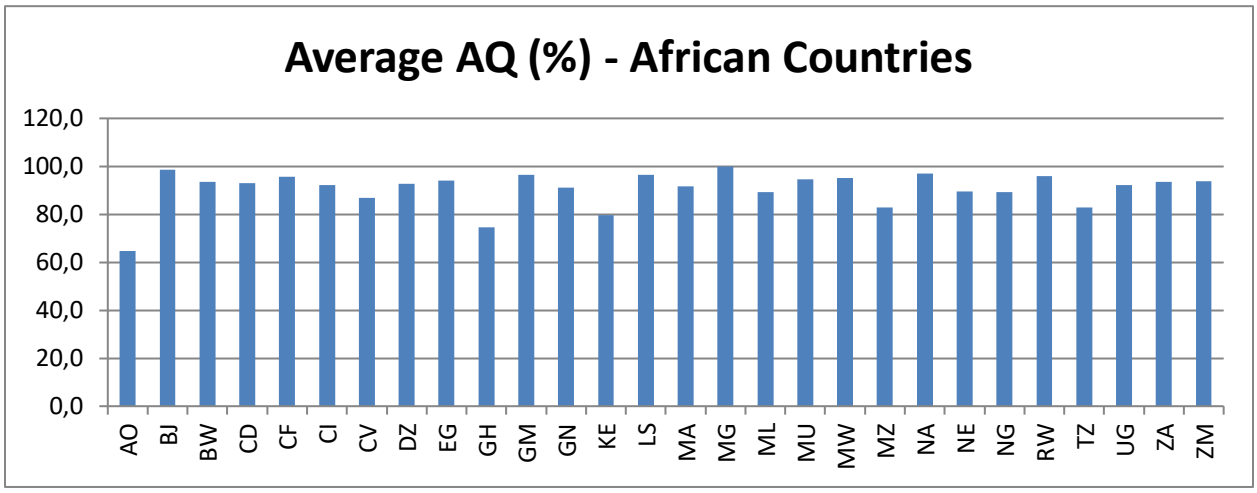


Source: Author's computation, using BankFocus Data

Looking at Asset quality (Figures 4.3a and 4.3b) African banks exhibit similar asset quality levels compared to those in developing countries as illustrated below. The average asset quality measure is 88% for African banks and that of other developing country banks is

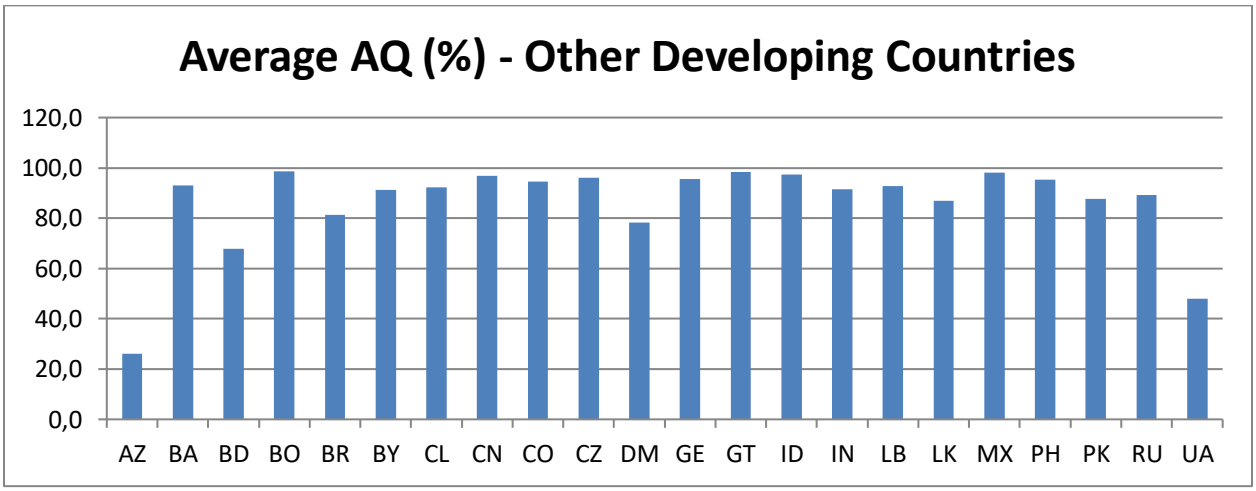
89%. In the sample of African banks, Angola has the lowest average asset quality of 64.7% while Madagascar has the highest average asset quality of 100.0%. In the sample of other developing country banks, Azerbaijan has the lowest average asset quality of 26.2% whereas Bolivia has the highest average asset quality of 98.6%.

Figure 4.3a: Average bank asset quality in African countries



Source: Author's computation, using BankFocus Data

Figure 4.3b Average bank asset quality in other developing countries

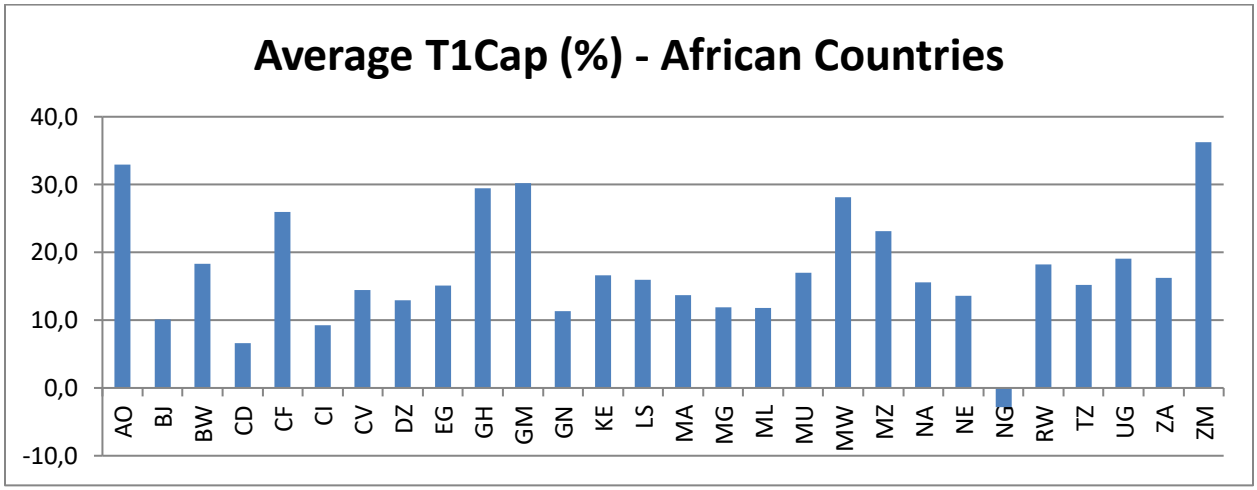


Source: Author's computation, using BankFocus Data

From figures 4.4a and 4.4b, banks in Africa are more capitalised in terms of Tier 1 capital ratio than banks in other developing countries. The average Tier 1 capital ratio in Africa

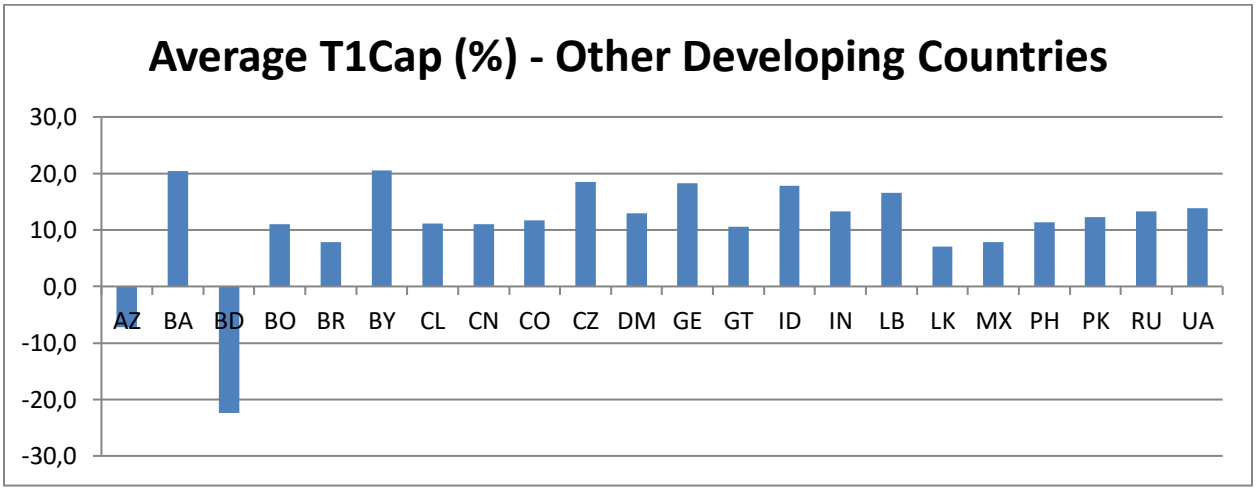
is 17.2% of risk-weighted assets (RWAs) and that of other developing countries is 10.1% of RWAs. In the sample of African banks, Nigeria has the lowest average Tier 1 capital ratio of -2.9% while Zambia has the highest average Tier 1 capital ratio of 36.3%. In the sample of other developing country banks, Bangladesh has the lowest average Tier 1 capital ratio of -22.4% whereas Bosnia and Herzegovina has the highest average Tier 1 capital ratio of 20.5%.

Figure 4.4a: Average bank Tier 1 capital ratios in African countries



Source: Author's computation, using BankFocus Data

Figure 4.4b: Average bank Tier 1 capital ratios in other developing countries

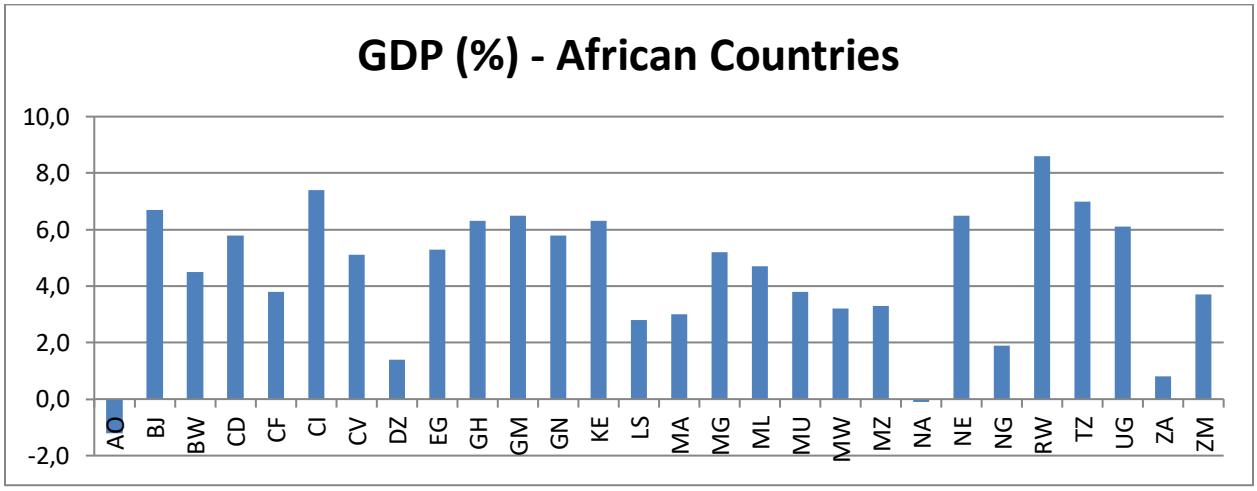


Source: Author's computation, using BankFocus Data

4.3.2. Determinants of banks' profitability – Macro-Economic factors

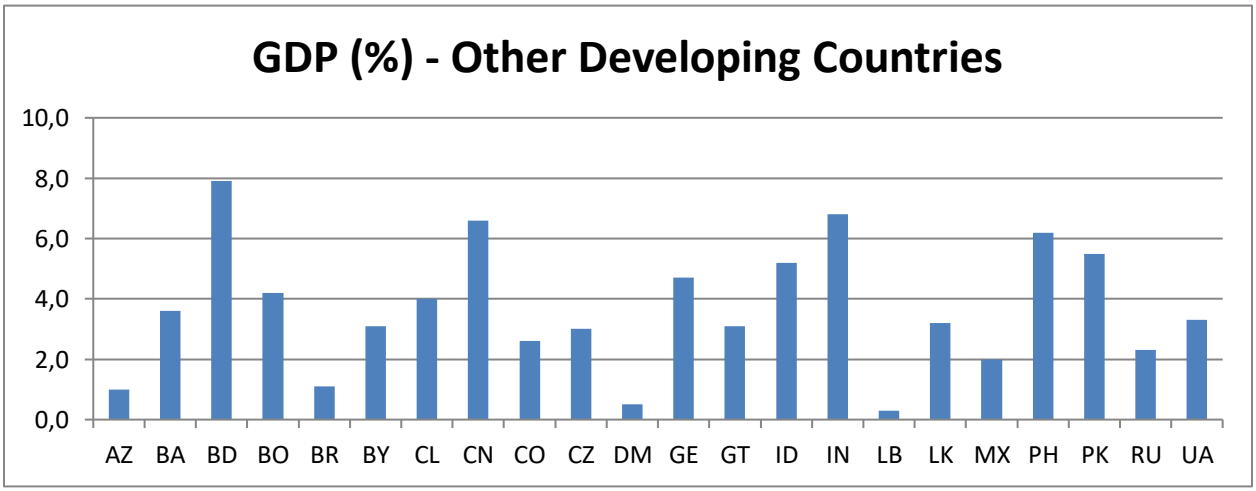
The 2018 average GDP growth rate in African is 3.9% while that of other developing countries is 4.4%, as illustrated in Figures 4.5a and 4.5b. In the sample of African countries, Angola has the lowest GDP growth rate of -1.2% while Rwanda has the highest GDP growth rate of 8.6%. In the sample of other developing countries, Czech Republic has the lowest GDP growth rate of 0.3% while Bangladesh has the highest GDP growth rate of 7.9%.

Figure 4.5a: 2018 Average GDP growth rates in African countries



Source: Author's computation, using BankFocus Data

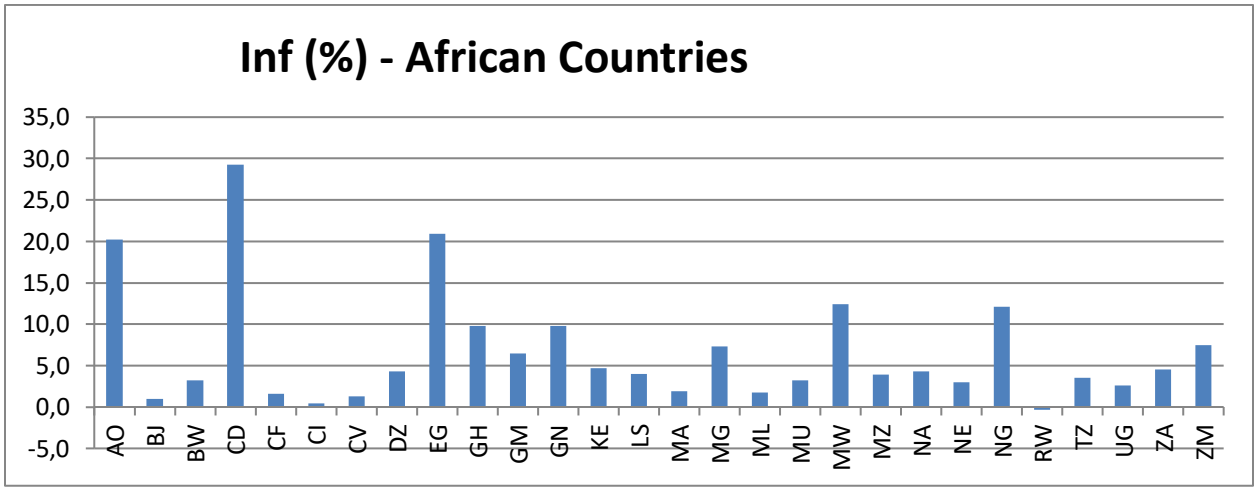
Figure 4.5b: 2018 Average GDP growth rates in other developing countries



Source: Author's computation, using BankFocus Data

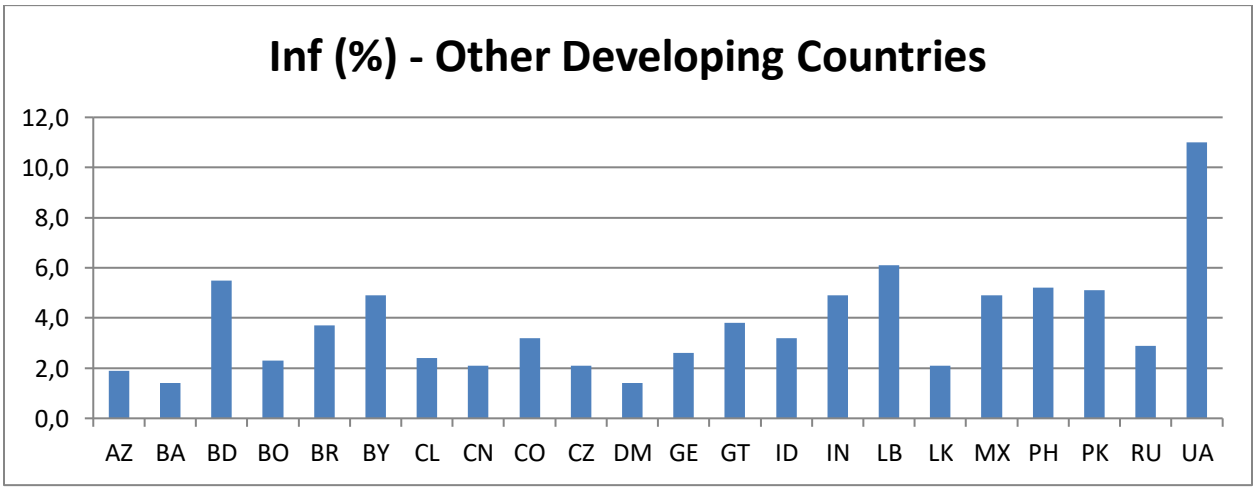
Figures 4.6a and 4.6b show that African banks operated in more inflationary environments compared to banks in other developing countries. The average inflation rate for African countries is 7.9% whereas the average inflation rate for other developing countries is 3.7% in 2018. In the sample of African countries, Rwanda has the lowest inflation rate of -0.3% while the Democratic Republic of the Congo has the highest inflation rate of 29.3%. In the sample of other developing countries, Bosnia and Herzegovina has the lowest inflation rate of 1.4% while Ukraine has the highest inflation rate of 11.0%.

Figure 4.6a: 2018 Average inflation rates in African countries



Source: Author's computation, using BankFocus Data

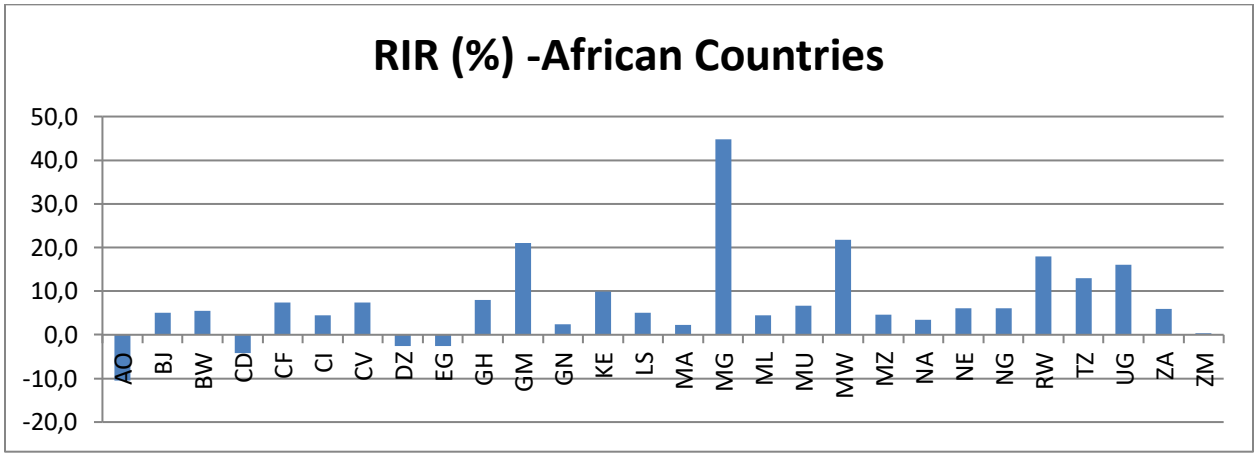
Figure 4.6b: 2018 Average inflation rates in developing countries



Source: Author's computation, using BankFocus Data

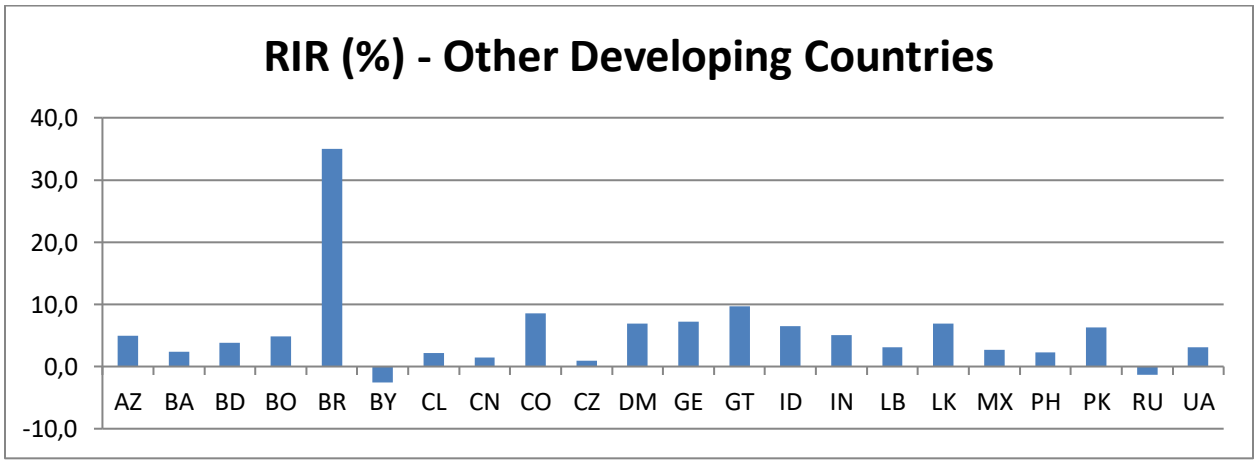
In 2018 the real interest rate average is 5.4% for African countries and 4.8% for other developing countries (see Figures 4.7a and 4.7b). This is an indication that the cost of borrowing was higher in Africa compared to other developing countries as depicted in Figure 4.7 below. In the sample of African countries, Angola has the lowest real interest rate of -10.5% while Madagascar has the highest real interest rate of 44.8%. In the sample of other developing countries, Belarus has the lowest real interest rate of -2.6% while Brazil has the highest inflation rate of 35.0%.

Figure 4.7a: 2018 Average real interest rates in African countries



Source: Author's computation, using BankFocus Data

Figure 4.7b: 2018 Average real interest rates in other developing countries

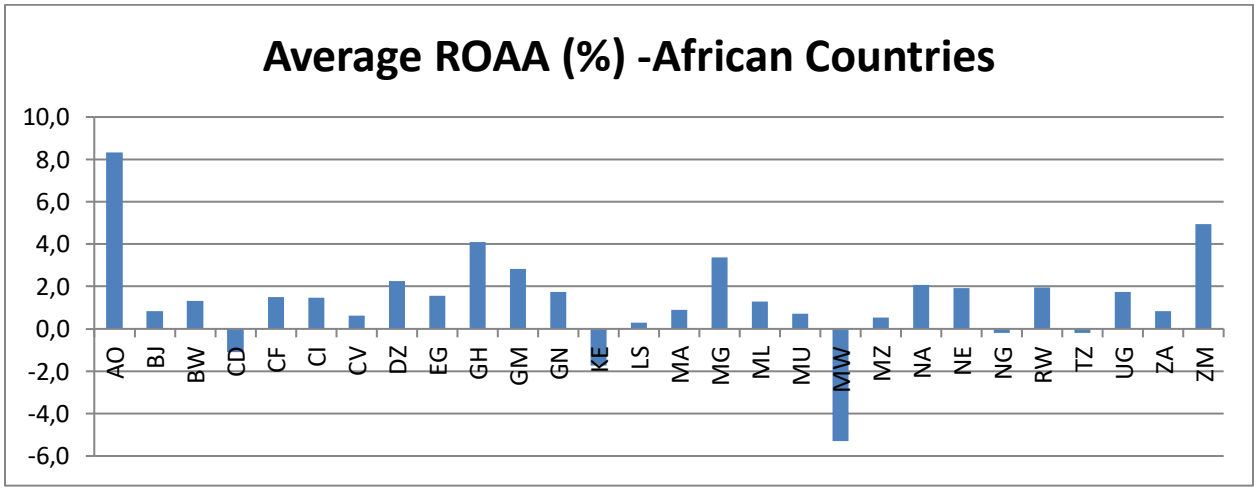


Source: Author's computation, using BankFocus Data

4.3.3. Bank Profitability measures

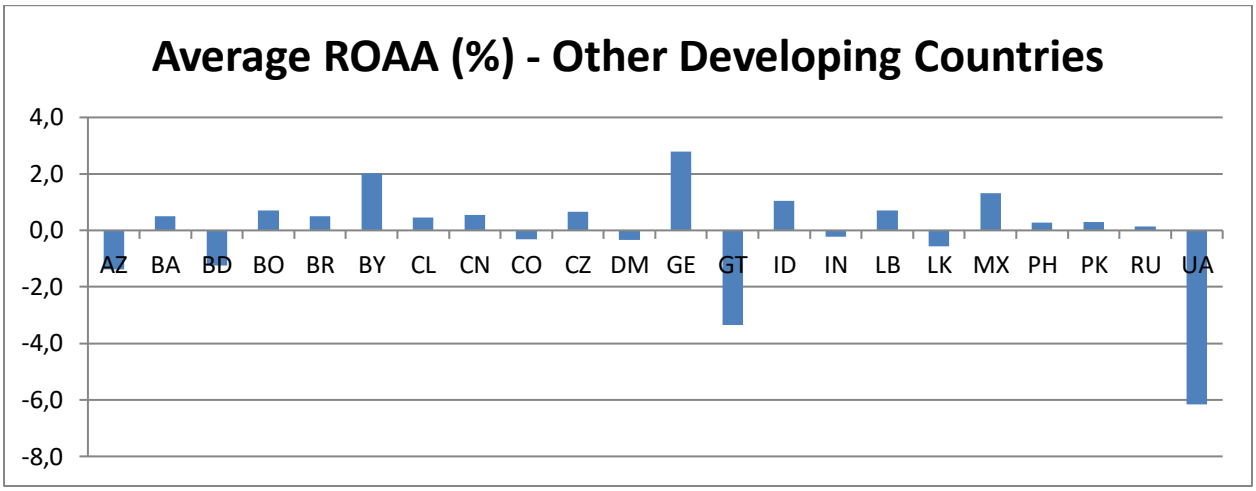
The average Return on average assets (ROAA) for banks operating in Africa is 1.5% while that of other developing countries is -0.1% in 2018, as illustrated in Figure 4.8a and 4.8b. In the sample comprising African banks, Malawi has the lowest average ROAA of -5.3% while Angola has the highest average ROAA of 8.3%. In the sample comprising other developing country banks, Ukraine has the lowest average ROAA of -6.2% whereas Georgia has the highest average ROAA of 2.8%.

Figure 4.8a: Average bank ROAA in African countries



Source: Author's computation, using BankFocus Data

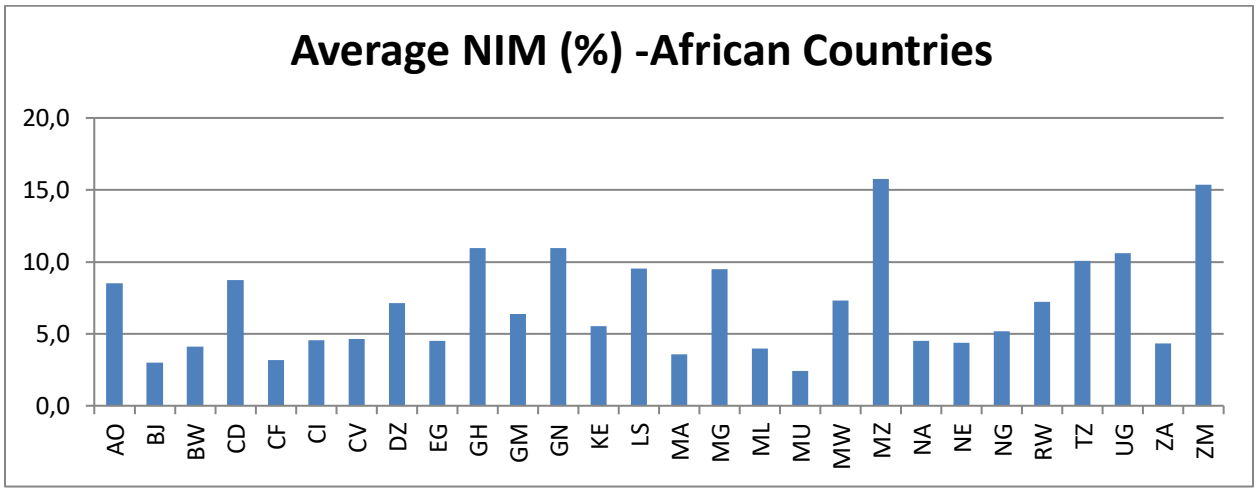
Figure 4.8b: Average bank ROAA in other developing countries



Source: Author's computation, using BankFocus Data

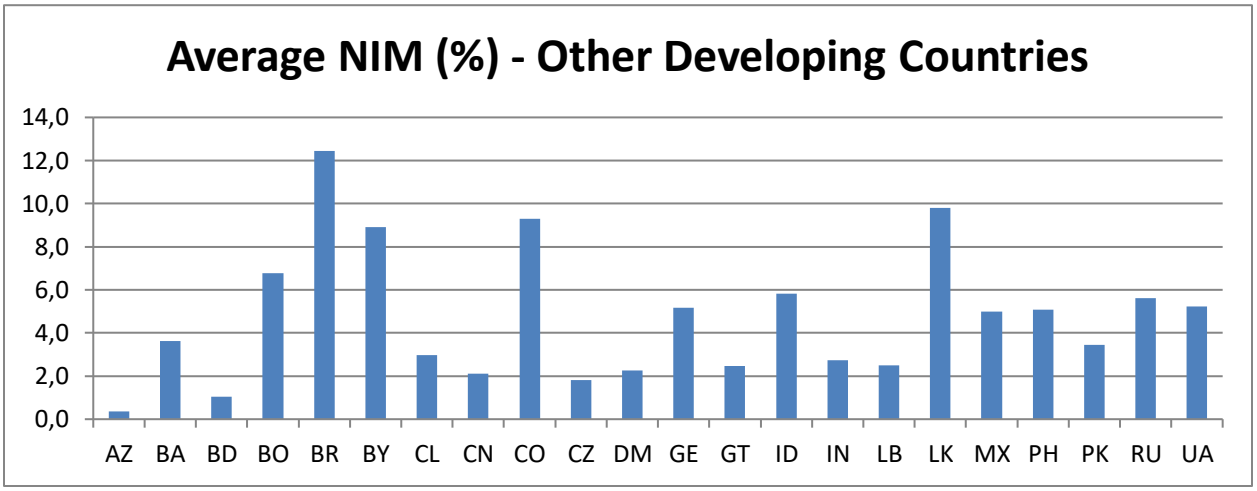
Figures 4.9a and 4.9b show that banks operating in Africa have higher Net interest margin (NIM), with an average of 7%, for 2018 while those of banks operating in other developing have a lower average NIM of 4.9% for the same period. In the sample consisting of African banks, Mauritius has the lowest average NIM of 2.4 % while Mozambique has the highest average NIM of 15.7%. In the sample comprised of other developing country banks, Azerbaijan has the lowest average NIM of 0.3% whereas Brazil has the highest average NIM of 12.4%.

Figure 4.9a: Average bank NIM in African countries



Source: Author's computation, using BankFocus Data

Figure 4.9b: Average bank NIM in other developing countries



Source: Author's computation, using BankFocus Data

4.3.3. Aggregated Presentation of Results: African Vs Other developing Countries Banks

Table 4.4: Aggregated statistics of African banks compared to other developing countries banks

		Mean (%)	Standard Deviation (%)	Coefficient of Variation	Skewness	Kurtosis	Minimum	Maximum
ROAA	**African**	1.52	4.47	2.93	-0.15	11.80	-22.14	24.39
	Non -African	-0.06	2.83	-50.96	-4.02	27.18	-20.88	4.83
NIM	**African**	6.95	5.02	0.72	2.32	8.91	-3.69	32.66
	Non -African	4.91	5.64	1.15	5.51	42.62	-0.98	51.17
AQ	**African**	88.14	14.53	0.16	-2.63	7.56	24.68	99.99
	Non -African	88.81	16.66	0.19	-2.73	7.65	18.00	99.73
T1Cap	**African**	17.18	23.47	1.37	-6.14	56.91	-198.56	54.53
	Non -African	10.09	16.02	1.59	-5.72	49.66	-125.08	58.98
Liq	**African**	37.43	20.84	0.56	1.73	5.30	4.37	140.09
	Non -African	25.29	34.98	1.38	5.31	34.59	0.53	289.18
S	**African**	6.95	1.98	0.29	0.66	-0.19	3.22	11.90
	Non -African	7.51	2.09	0.28	0.25	-0.28	2.74	13.24
GDP	**African**	3.86	2.65	0.69	-0.39	-1.02	-1.20	8.60
	Non -African	4.35	2.19	0.50	0.04	-1.47	0.30	7.90
Inf	**African**	7.89	7.01	0.89	1.12	-0.07	-0.30	29.30
	Non -African	3.65	1.90	0.52	2.16	6.12	1.40	11.00

RIR	**African**	5.41	7.73	1.43	0.76	4.79	-10.51	44.75
	Non -African	4.78	8.00	1.68	3.01	9.20	-2.57	35.00
ExchR	**African**	3.59%	13.90%	3.88	307.82%	830.41%	-5.19%	52.44%
	Non -African	3.65%	5.48%	1.50	52.18%	-2.96%	-7.26%	15.63%

Source: Bankfocus

In summary, as shown Table 4.4, African banks exhibit better financial performance (measured as ROAA and NIM), higher capital adequacy and asset quality with lower dispersions around the means.

4.4. Results of Regression Analysis

Regression analysis is carried out in two different models; each model has subsections A and B. In models 1 A and B, asset quality and capital ratio were respectively regressed on return on average asset (ROAA), while in models 2 A and B, asset quality and capital ratio were respectively regressed on net interest margin (NIM).

For robustness, check analyses were further carried out in segments to examine the effects of both asset quality and capital ratio on banks' profitability on both relatively high and low capitalised banks, respectively (see Table 4.5 to Table 4.8). Furthermore, to check the effects of these variables on bank's profitability, we added a dummy variable for African banks in the model. This is to find out if these profit determinants exhibit different effects on African banks and other developing countries.

4.4.1. The Effect of Bank's Asset Quality on Return on Average Assets

Table 4.5: Model 1A: Effect of Bank's asset quality on Bank's profit (ROAA)

		Constant	AQ	Liq	S	GDP	Inf	RIR	Dummy	Obs (N)	F-Value (Prob)	Adj. R^2
All Sampled Banks	Coefficient	-7.294	0.080	0.012	0.079	-0.193	0.085	-0.048	1.110	235	7.987	0.173
	t-statistic	-4.468	5.054	1.324	0.625	-1.970	1.712	-1.431	2.146		(0.000)	
	p-value	0.000	0.000	0.187	0.533	0.050	0.088	0.154	0.033			
High Capitalisation Banks	Coefficient	-6.753	0.089	0.006	-0.163	-0.167	0.106	-0.110	1.998	120	3.589	0.132
	t-statistic	-2.307	3.045	0.523	-0.730	-0.939	1.271	-1.395	1.866		(0.002)	
	p-value	0.023	0.003	0.602	0.467	0.350	0.206	0.166	0.065			
Low Capitalisation Banks	Coefficient	-8.002	0.074	0.027	0.202	-0.107	-0.024	-0.010	0.408	115	4.886	0.193
	t-statistic	-4.629	4.714	1.311	1.481	-0.850	-0.366	-0.308	0.633		(0.000)	
	p-value	0.000	0.000	0.193	0.142	0.397	0.715	0.759	0.528			

Model: $\mathrm{ROAA_i} = \alpha + \beta_1 \mathrm{AQ_i} + \beta_2 \mathrm{Liq_i} + \beta_3 \mathrm{S_i} + \beta_4 \mathrm{GDP_i} + \beta_5 \mathrm{Inf_i} + \beta_6 \mathrm{RIR_i} + \beta_7 \mathrm{Dummy} + \epsilon$

For all the banks in the sample, as shown in Table 4.5, bank asset quality has a positive impact on return on average assets (ROAA) at 1% significance level and these are congruent with the findings of Grier (2007) and Flamini *et al.* (2009). Moreover, African banks (using the African banks dummy) exhibit higher ROAA than other developing countries' banks at a 5% level of significance. This is finding suggests that a bank's domicile has a significant effect on financial performance.

Furthermore, for banks that have relatively high capital adequacy ratios, asset quality has a positive effect on ROAA at a 1% level of significance. At 10% significance level, African banks have a higher ROAA than other developing countries' banks. For banks that have relatively low capital adequacy ratios, asset quality has a positive effect on ROAA at a 1% level of significance. The positive and significant coefficient for asset quality is observed to be higher for highly capitalised banks compared with lowly capitalised which indicates that asset quality has greater effect on ROAA for highly capitalised banks. The dummy variable for the bank domiciles (African or other developing countries) has no

significant effect for banks with relatively low capital adequacy ratios suggesting that for banks with low capitalisation there is no significant effect on ROAA.

4.4.2. The Effect of Bank Capital Adequacy on Return on Average Assets

Table 4.6: Model 1B: Effect of Bank's Bank Capital Adequacy on Bank's profit (ROAA)

		Constant	T1Cap	Liq	S	GDP	Inf	RIR	Dummy	Obs (N)	F-Value (Prob)	Adj. R^2
All Sampled Banks	Coefficient	-1.967	0.042	0.008	0.257	-0.147	0.045	-0.036	1.087	235	5.880	0.127
	t-statistic	-1.624	3.518	0.876	2.068	-1.463	0.899	-1.035	2.034			
	p-value	0.106	0.001	0.382	0.040	0.145	0.370	0.302	0.043			
High Capitalisation Banks	Coefficient	-4.001	0.111	0.002	0.273	-0.051	0.041	-0.078	1.740	120	3.470	0.127
	t-statistic	-1.662	2.921	0.184	1.223	-0.285	0.495	-0.982	1.612		(0.002)	
	p-value	0.099	0.004	0.855	0.224	0.776	0.621	0.328	0.110			
Low Capitalisation Banks	Coefficient	-2.300	0.022	0.017	0.329	-0.117	-0.060	-0.008	0.667	115	2.051	0.060
	t-statistic	-1.708	2.014	0.784	2.293	-0.861	-0.861	-0.235	0.958		(0.055)	
	p-value	0.091	0.047	0.435	0.024	0.391	0.391	0.815	0.340			

Model: $\mathrm{ROAA_i} = \alpha + \beta_1 \mathrm{T1Cap_i} + \beta_2 \mathrm{Liq_i} + \beta_3 \mathrm{S_i} + \beta_4 \mathrm{GDP_i} + \beta_5 \mathrm{Inf_i} + \beta_6 \mathrm{RIR_i} + \beta_7 \mathrm{Dummy} + \epsilon$

For all the banks in the sample, as illustrated in Table 4.6 and consistent with the findings of Naceur (2003) and Poudel (2012), bank Tier 1 capital adequacy has a positive impact on return on average assets (ROAA) at 1% significance level. Athanasoglou *et al.* (2005) postulate that banks that are highly capitalised are more sound and have the flexibility and ability to absorb unexpected losses while pursuing effective profit maximisation. The bank size has a positive impact on ROAA at 5% level of significance. African banks exhibit higher ROAA levels at a 5% level of significance.

Moreover, for banks that have relatively high capital adequacy ratios, bank Tier 1 capital adequacy has a positive effect on ROAA at a 1% level of significance. For banks that have relatively low capital adequacy ratios, bank Tier 1 capital adequacy has a positive effect on ROAA at 5% level of significance. In addition, bank size has a positive effect on

ROAA for banks, though not significant for high capitalised banks. The African Dummy variable is not significant for both high and low capitalisation banks indicating that a bank's domicile has no significant effect on profitability.

4.4.3. The Effect of Bank Asset Quality on Net Interest Margin

Table 4.7: Model 2A: Effect of Bank Asset Quality on Bank's profit (NIM)

		Constant	AQ	Liq	S	GDP	Inf	RIR	Dummy	Obs (N)	F-Value (Prob)	Adj. R^2
All Sampled Banks	Coefficient	11.758	0.009	-0.013	-0.928	-0.257	0.077	0.108	1.168	235	8.168	0.177
	t-statistic	5.194	0.397	-1.102	-5.303	-1.887	1.109	2.301	1.628		(0.000)	
	p-value	0.000	0.692	0.272	0.000	0.060	0.269	0.022	0.105			
High Capitalisation Banks	Coefficient	14.635	-0.043	-0.008	-0.799	0.054	0.002	-0.001	1.931	120	3.153	0.112
	t-statistic	4.700	-1.381	-0.665	-3.370	0.284	0.023	-0.008	1.695		(0.004)	
	p-value	0.000	0.170	0.507	0.001	0.777	0.982	0.993	0.093			
Low Capitalisation Banks	Coefficient	10.090	0.045	-0.050	-0.881	-0.550	0.073	0.150	1.522	115	5.242	0.207
	t-statistic	2.870	1.414	-1.201	-3.174	-2.152	0.555	2.332	1.161		(0.000)	
	p-value	0.005	0.160	0.232	0.002	0.034	0.580	0.022	0.248			

Model: $\mathrm{NIM_i} = \alpha + \beta_1 \mathrm{AQ_i} + \beta_2 \mathrm{Liq_i} + \beta_3 \mathrm{S_i} + \beta_4 \mathrm{GDP_i} + \beta_5 \mathrm{Inf_i} + \beta_6 \mathrm{RIR_i} + \beta_7 \mathrm{Dummy} + \epsilon$

For all sampled banks, as shown in Table 4.7, asset quality has no significant effect on banks' net interest margin. From this table it is also found that African banks have relatively higher net interest margin, especially among banks with high capital ratio. More so, the real interest rate has positive impact on bank's net interest margin at a 5% level of significance both for all sampled banks and low capitalised banks.

4.4.4. The Effect of Bank Capital Adequacy on Net Interest Margin

Table 4.8: Model 2B: Effect of Bank Capital Adequacy on Bank's profit (NIM)

		Constant	T1Cap	Liq	S	GDP	Inf	RIR	Dummy	Obs (N)	F-Value (Prob)	Adj. R^2
All Sampled Banks	Coefficient	11.975	0.042	-0.020	-0.906	-0.240	0.081	0.117	0.936	235	9.403	0.201
	t-statistic	7.434	2.658	-1.622	-5.475	-1.788	1.209	2.529	1.318		(0.000)	
	p-value	0.000	0.008	0.106	0.000	0.075	0.228	0.012	0.189			
High Capitalisation Banks	Coefficient	6.556	0.158	-0.020	-0.605	0.114	-0.003	0.021	1.492	120	5.775	0.219
	t-statistic	2.739	4.184	-1.683	-2.724	0.640	-0.041	0.267	1.390		(0.000)	
	p-value	0.007	0.000	0.095	0.008	0.524	0.968	0.790	0.167			
Low Capitalisation Banks	Coefficient	13.610	0.029	-0.059	-0.820	-0.563	0.067	0.152	1.750	115	5.225	0.206
	t-statistic	5.357	1.380	-1.409	-3.026	-2.200	0.511	2.370	1.332		(0.000)	
	p-value	0.000	0.171	0.162	0.003	0.030	0.610	0.020	0.186			

Model: $\mathrm{NIM_i} = \alpha + \beta_1 \mathrm{T1Cap_i} + \beta_2 \mathrm{Liq_i} + \beta_3 \mathrm{S_i} + \beta_4 \mathrm{GDP_i} + \beta_5 \mathrm{Inf_i} + \beta_6 \mathrm{RIR_i} + \beta_7 \mathrm{Dummy} + \epsilon$

Unlike asset quality, bank Tier 1 capital adequacy has a positive impact on NIM at a 1% level of significance as shown in Table 4.8. These findings are consistent with the research findings of Ozili (2015). Also, the real interest rate has a positive impact at a 5% level of significance.

For banks that have relatively high capital adequacy ratios, bank Tier 1 capital adequacy has a positive impact on NIM at a 1% level of significance, but no significant effect on banks with relatively low capital ratio. The positive and significant coefficient for capital adequacy is observed to be higher and significant for highly capitalised banks compared with lowly capitalised; which indicates that asset quality has greater effect on NIM for highly capitalised banks. The real interest rate also has a positive impact on NIM at a 5% level of significance for relatively low capital adequacy level banks in the sample.

4.5. Summary

In this chapter we focused on the effects of asset quality, capitalisation and domiciles of banks on return on average assets (ROAA) and net interest margin (NIM). The analysis further divided the samples into two groups comprising banks with relatively high

capitalisations and those with relatively low capitalisations. We found that asset quality and the level of Tier 1 capital have positive effects on bank ROAA for all the sampled banks, and relatively high and low capitalisation banks.

Furthermore, we also found that Tier 1 capital has a positive effect on NIM for all sampled banks and relatively high capitalisation banks. The findings also show that African banks have higher ROAA for the whole sample and relatively high capitalisation group. However, there were no consistent findings on the impact of bank domicile on NIM.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

Bank intermediation theory states that banks act as intermediaries that take depositors' (entities with excess liquidity) funds and lend them to borrowers (entities lacking liquidity). Banks are better suited to allocate funds because of their ability to reduce frictions arising from issues pertaining to borrowers such as asymmetric information. The financial intermediation function has had broader global macroeconomic effects that have led to the globally financial regulation set out for banks through the Basel Accords (I, II, III and even IV). The Basel accords have recommended, amongst other things, increased capitalisation and asset quality in banking.

Using regression analysis, this study compared the effects of asset quality and bank capitalisation on the banks profitability, measured as return on average assets and net interest margin. In addition, the study divided the sample into two groups consisting of banks with relatively high and low capitalisation levels to determine whether there are inconsistencies in banks performance (profitability) with the two groups. An attempt was also made to determine whether there are differences between African and other developing countries' banks, and this was achieved by having a dummy to denote African banks. This chapter presents the concluding remarks, and recommendations for policy and future research.

5.2. Concluding Remarks

This study concludes, firstly, that asset quality has a significant positive impact on bank profitability as measured by return on average assets (ROAA), and this congruent with the findings of Salike & Ao (2017). This positive relationship is consistent and significant when we analysed all the sampled banks, as well as the relatively high and low capitalised

banks. Moreover, we found that African banks have significantly higher ROAA measures except in instances where the banks have relatively low levels of capitalisation. In the African context, Owoputi *et al.* (2014), Maredza (2014) and Onuonga (2014) also argued that banks with high capital adequacy ratios are more profitable. Another finding is that bank capitalisation also has a significant positive relationship on ROAA. This relationship is consistent and significant for all the sampled banks and for the two capitalisation level groups (high and low capitalisation). However, there is no consistent and significant difference in bank capitalisation levels between African and other developing countries' banks. Therefore, we cannot conclude that African banks are, in most cases, highly capitalised compared to other developing countries' banks.

Secondly, this study concludes that asset quality does not have a significant effect on net interest margin (NIM) as a measure of banks' profitability. For banks that have relatively high capitalisation levels, African banks tend to have higher NIM. Another finding is that bank capitalisation is a significant determinant of bank profitability as measured by NIM (except in relatively low capitalisation banks), especially for banks that are relatively highly capitalised.

5.3. Policy Implications of the Research

The first key inference that can be made from this study is that increasing banks' capital adequacy will have a positive impact on profitability. From the perspective of bank regulators, increasing banks' profitability is a desirable outcome as macro-prudential sustainability is ensured. While it is important to achieve improved profitability, however, policy makers should strive for a balanced regulatory approach where banks' profitability is not given preference over the broader socioeconomic environment. Higher bank capital adequacy levels could lead to reduced banks' willingness and ability to lend which, in turn, could lead to reduced economic growth and bank disintermediation where borrowers seek alternative sources of capital.

The second inference is that improving asset quality leads to higher profitability. In the context of developing countries, asset quality will need to be nurtured as borrowers currently pose higher levels of credit counterparty risk for banks. A more compelling regulatory approach is to provide banks with a standardised and inclusive framework to improve asset quality; not by financially excluding low quality borrowers but by nurturing and improving the quality of individual borrowers. Again, financial exclusion could lead to alternative financing sources being sought by low quality borrowers, thus, leading to bank disintermediation which will have a negative impact on the relevance of banks as preferred lenders in developing countries.

5.4. Recommendation for Further Research

The dichotomy in banking regulation for developed versus developing countries continues to be a major concern amongst leaders and supervisory bodies in the developing world. Regulatory authorities in developing countries require a more relevant regulatory standard for their needs. Therefore, further research should be conducted on best practices to improve individual borrower quality in the context of developing markets so as to ensure banks' appetite to lend more while simultaneously increasing bank capital adequacy levels to ensure improved bank profitability and sustainability.

Therefore, we recommend that similar research be conducted on a panel form to cover different regulatory windows and find out how banks profitability were affected when banks were trying to abide by high capital ratios and asset quality as required by the Basel capital accord.

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