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# Impact of Basel Accords in mitigating banking fragility in Africa

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*"Banks properly established and conducted are highly useful to the business of the country, and will doubtless continue to exist ….. so long as they conform to their laws and are found to be safe and beneficial". Martin Van Buren*

**Abstract**

Mitigating bank fragility provokes interest from governments, regulators, economists, and academia because have a “special role” in the development of an economy, hence the search for effective risk management tools. Basel framework provides risk management tools that use capital requirements, supervision and market discipline. However, this study examines the impact of regulatory capital requirements and macroeconomic variables on net interest margin (efficiency), equity to total assets (solvency), liquidity and growth to total assets for Botswana, Kenya, Mauritius, Namibia, Tanzania and Uganda in the periods 1999 to 2014.

Given that the Basel Accords were initially designed for OECD countries; the argument is that they are not suited for African countries because they restrict the development agenda set by governments. However, the trend and regression analysis indicate that regulatory capital ratio has a significant impact on the equity to total assets ratio, liquidity and net interest margin demonstrating their effectiveness in minimising bank fragility. Conversely the results show that regulatory capital ratio does not have an effect on the growth to total assets, indicating that banks should be able to lend out to households and private sector to stimulate economic development. Additionally, the results show that an increase in GDP growth, a declining inflation rate, a falling real interest rate and an appreciating exchange rates have a significant influence on the financial soundness indicators.

**Declaration**

I, Lynda Rosie Kahari declare that the research conducted in completing this dissertation is my own work, except in the instances where is indicated otherwise and acknowledged. This dissertation is submitted in fulfillment of the requirements for the degree of Master of Management in Finance and Investment with the University of Witwatersrand.

Signed ……

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## Glossary

BIS Bank for International Settlement

IRB Internal Rate Based approach

OECD Organisation for Economic Corporation and Development

SSA sub- Sahara Africa

SME Small Medium Enterprises

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# Chapter 1

# Introduction

## 1.1. Problem Statement

It is postulated that compliance to the Basel regulation reduces financial fragility and consequently bank failures. Following the 2007 financial crisis which emanated from the banking system, the banking regulation framework under Basel came under a lot of scrutiny, with critics apportioning some blame to weak regulation (in the form of the Basel Accords) and the ineffective risk management tools that failed to detect weaknesses in the banking system well before the system broke down. Moreover, the cost of financial crises has been recently estimated at fifteen percent (15%) to twenty percent (20%) of GDP (Hoggarth & Saporta, 2002). The huge costs associated with financial system failures have prompted policy makers and regulators to increase regulation and risk management guidelines to minimise financial fragility and bank failures.

In their search for effective regulation and risk management guidelines, policy makers and regulators in both OECD and developing countries have turned to the Basel Accords. Until 2010, the Basel Committee had representation from ten OECD countries known as the G10. The representation has grown to twenty-seven member countries and includes a few countries from the emerging markets. Because of the composition, critics argue that the Accords are more suited to OECD countries. The impact of their adoption by African banking systems is yet to be interrogated and understood.

Banking theories postulate that banks play a crucial economic role of reallocating surplus resources to where they are needed in the economy. In order to carry out this role known as intermediation, banks perform “special” functions such as the collection and retention of customer information, provision of credit to critical sectors of the economy, create mechanisms which give them ability to re-pay depositors on demand, mitigate risks arising from liquidity, price fluctuations, maturity mismatches and bear the

high transaction costs (Saunders & Cornett, 2006). In addition to performing these "special" functions, the main objective for the existence of banks is to maximise shareholder returns. In pursuing this objective, banks bear inherent risk which if not actively managed threaten not only the existence of one institution but can destabilize the entire financial system. It is essential that regulators provide effective risk management guidelines to support the banking systems in pursuing their commercial objective whilst managing associated risks.

## 1.2. Purpose of the study

The study will contribute to the existing literature by studying the consequences of implementing Basel Accords in sub-Sahara Africa (SSA), a scholarship space where most current related literature mainly deals with the developed markets and developing countries from other regions of the world. The study will be of interest to regulators and policy makers who would want to further their understanding; of the appropriateness of Basel Accords for banking systems in Africa in mitigating financial sector risks whilst supporting growth.

## 1.3. Research questions

The scope of the study is confined to the investigation of the impact of Basel Accords on the African banking system. The specific research objectives are aimed at examining:

1. The role of banks in the context of African economies.
2. The main causes of bank fragility and attendant government responses.
3. The impact of the Basel regulatory capital requirements on African Banks.

## 1.4. Significance of the Study

The financial sector in sub-Sahara Africa is largely under-developed in a region with a huge deficit in development. There is limited literature that examines the impact of Basel accords in the region in as-far-as their impact on the role of banks as intermediaries within the ambit of development. Banks have a role in the mobilization of capital and its allocation. Thus, banks play a significant role in the financial system and ensure that businesses and consumers have access to capital primarily through loans and other

credit provisioning instruments. The effect of regulations is to restrict activities that are perceived to expose the banks to risks that might result in their failure. These activities may range from loan concentration, fraud, complex off balance sheet transactions and poor quality assets.

If banks in Africa are exposed to these risks it is logical that complying with the Basel Accords will assist in mitigating the risks of bank failures. The study compliments the existing literature by;

1. Studying the trends in the main financial indicators of a sample of banks from selected jurisdictions for a period before and after the implementation of capital accords.
2. Examines which dependent variables are more susceptible to changes in Basel regulatory capital requirements and the impact.
3. Analyze the variables to gauge the impact of regulatory capital requirements under Basel on bank's intermediation role.

### 1.5. Context to the Basel Accords

The Basel Committee on Banking Supervision came out of the financial crises that ensued the breakdown of the Bretton Woods managed exchange rate system in 1973. In response to the financial crises the central bank governors of the G10 countries established a Committee on Banking Regulations and Supervisory Practices at the end of 1974. The committee became known as the Basel Committee on Banking Supervision. The Committee's mandate is to enhance bank supervision and regulation with the main objective of deepening financial stability.

After the global financial crises of 2007 - 2008, the effectiveness of Basel Accords in maintaining financial stability was put in doubt, because it failed to detect the weaknesses in the system way before the crises erupted. As demonstrated by the global financial crises, a crisis which started off in the US as a subprime mortgage crisis, quickly turned into a global "melt down". The crises revealed that the risks of contagion have grown over the years due to increased global financial integration, a

phenomenon that Stiglitz (2010) argues is not optimal. In contrast to other regions of the world where the financial systems were destabilized, the global financial crises entered the African economies via the trade, credit and aid channels. Consequently, questions were raised on the relevance of the Basel Accords to African Banks. This study attempts to answer the research questions by assessing the impact of the Accords on minimizing bank fragility.

### 1.6. Theoretical framework

There are several theories that underpin financial fragility with intermediation explaining the existence of banks and postulating that intermediaries exist because they are able to reduce transactional costs and information asymmetry. Information asymmetry attempts to explain adverse selection and moral hazard in tandem with Agency theory. Agency theory can be applied in financial contracting and regulation and is crucial in minimizing financial fragility as demonstrated by the role that agencies played in precipitating the global financial crises of 2007-2008.

The concepts of financial fragility goes back as far as the 1930s when Keynes and Fisher developed theories that linked the financing of investments and the spread of shocks in an economy. In recent years some authors including Allen and Gale (2003), Lagunoff & Stacey (2000) have extended the definition of financial fragility as a situation when a financial system is susceptible to a financial crisis. They define it as when a "…. large-scale financial crises, is caused by small, routine economic shocks" (Lagunoff & Stacey, 2000). Gropp & Heider (2010) define the negative distance to default as a good measure of bank fragility.

There are several financial indicators that can be used to measure and predict bank fragility. Bongini et al (1999) recommend the simultaneous use of accounting data, stock market price and credit ratings indicators to assess bank fragility, whilst Estrella et al (2000) and Cole & Gunther (1995) give the view that regulatory capital, net income, poorly performing assets are good predictors of bank failures. On the other hand Demirgüç-Kunt, A., & Detragiache, E. (1997) and Hardy, D., & Pazarbasioglu, C. (1998)

give the following macroeconomic indicators; low GDP growth, high inflation rate, high real interest rates and declining exchange rates as good indicators of bank fragility.

Banking systems by their very nature have been described as financially fragile (Krugman, 2010), because their capital structures are susceptible to shocks and subsequent runs and failures. The fragility of the capital structures arises from the fact that the asset side of banks constitute the loans made to borrowers, a crucial function of intermediation which, extends credit to the economy. The liability side, provides liquidity on demand to depositors. The combination of these activities illustrates that banking is a business of managing risk which is often used as the basis for justifying regulation. A lack of confidence in the banking system can become of source of financial fragility (Diamond, 2007).

### 1.7. Bank fragility and Basel Accords

Because of the negative economic widespread impact associated with bank failures in some cases; policy makers and regulators are confronted with the challenges of designing a well-functioning integrated financial network that has effective “circuit breakers” (Stiglitz, 2010). Basel regulatory capital can be considered a shock absorber that has been put in place to manage the risk of contagion. The focus of regulators on capital requirements as a tool to manage financial soundness stems from the inherent risks associated with bank capital structures. According to Diamond & Rajan (1999) financial fragility is a desirable feature of banks, it is about finding the optimal capital.

In contrast to the views of bank capital structures as being a source of financial fragility, Minsky (1977) argues that financial fragility is an inherent feature of the normal business cycles (characterized by booms and slumps) of economic activity in a market economy and allude to the fact that financial fragility arises from a situation where the allocation of resources moves in ways that are not related to economic fundamentals (Cass & Shell, 1983).

Fragility in the banking system is not only linked to the structure of the bank’s capital structure but to other factors in the form of financial liberalisation (de-regulation),

exchange rates regimes and global economic/financial shocks. Chandrasekhar, (2005) highlights that financial liberalization makes developing countries vulnerable to financial shocks and further dilutes ownership of domestic assets in favor of foreign ownership. Other authors postulate that fixed exchange rates regimes may introduce the problem of moral hazard leading to financial fragility (Eichengreen & Hausmann, 1999). Given that the world economy is more integrated, fragility in the financial system can emanate from a source outside a country's borders. In most instances the causes of bank failure can be traced to poor capital adequacy, low quality of assets, weak management, poor asset liability management and sensitivity to interest rate risks.

Evidence from the well documented financial crises is that financial crises can result in economic recessions, bank failures, sudden and sharp irreversible currency depreciation, hyperinflation, unemployment and even civil unrests which can lead to overthrow of governments. Hence, there is need for policy makers and regulators to promptly respond in the face of financial crises with effective regulation and risk management tools.

There is however, no standard or best practice to resolve financial crises which result in bank failures. Policy makers and regulators have used a wide array of responses to financial crises including regulation, structural reforms, fiscal cost reduction and others (Laeven & Valencia, 2008). In response to these factors, the Basel Accords introduced minimum regulatory capital, supervision, market discipline and global liquidity standards for the banking sector.

### 1.8. Research Methodology

The study uses an empirical analysis and panel regression model to address the research questions. The panel regression model used in the study is adapted from Naceur & Kandil (2013). The study focuses on commercial banks in Botswana, Kenya, Mauritius, Namibia, South Africa, Tanzania and Uganda for the period, 1999 to 2014. The dependent variables denoting bank fragility were selected based on the recommendations of Bongini et al (1999), Estrella et al (2000), Cole and Gunther (1995) and Brownbridge (1998) and the independent variables (regulatory capital ratios and

macroeconomic) were influenced by the works of Demirgüç-Kunt, A., & Detragiache, E. (1997) and Hardy, D., & Pazarbasioglu, C. (1998) and Brownbridge (1998). The panel regression model is captured in the equation;

$$\mathrm{BF}_{it} = \alpha + \beta_1 \mathrm{TCR}_{it} + \beta_2 \mathrm{GDP}_{it} + \beta_3 \mathrm{Inf}_{it} + \beta_4 \mathrm{RIR}_{it} + \beta_5 \mathrm{ExchR}_{it} + \beta_6 \mathrm{dummy}_0 + \beta_7 \mathrm{dummy}_1 + \varepsilon_{it}$$

Where:

| | |
|---|---|
| $\mathrm{BF}_{it}$ | bank fragility (non interest margin, liquidity, equity to total assets, growth to total assets) |
| $\beta_1 \mathrm{TCR}_{it}$ | is total capital ratio of the bank as defined under Basel framework |
| $\beta_2 \mathrm{GDP}_{it}$ | GDP |
| $\beta_3 \mathrm{Inf}_{it}$ | inflation rate |
| $\beta_4 \mathrm{RIR}_{it}$: | real interest rates |
| $\beta_5 \mathrm{ExchR}_{it}$ : | Exchange rate of the country in local currency against US dollars. |
| $\beta_6 \mathrm{dummy}_0$ , $\beta_7 \mathrm{dummy}_1$ | is the dummy variable that equals 1 for each year after the implementation of Basel and 0 before the implementation. |

### 1.9. Data Collection Method

The relevant data for the study are collected from Bankscope data base which has information on public and private banks throughout the world; Financial Stability Institute Survey (2014) a database that gives a list of countries and their status and progress on Basel implementation; Laeven & Valencia (2008) Systemic Banking Crises and the World, a data base that lists the major financial crises per country and also provides the causes of the crises and finally the World Bank data base.

### 1.10. Summary of Study Findings and Limitations of the Study

Results from the study suggest that implementing Basel regulatory capital has a strong positive influence on the net interest margin (efficiency), liquidity and equity to total assets (solvency) indicating its impact in minimising bank fragility. Surprisingly the results also suggest that Basel regulatory capital requirements does not have an effect on the growth to total assets, indicating that banks should be able to lend out to households and private sector to stimulate economic development. Additionally, the results show that rising GDP growth, declining inflation rate, falling interest rate and appreciating exchange rates have a significant influence on the financial soundness of banks.

The limitations of the study are mainly from the limited and incomplete data on the performance indicators ratios on Bankscope, hence the restricted sample selection.

### 1.11. Dissertation outline

The rest of the dissertation outline chapters is arranged as follows: chapter 2 presents the literature review with a special focus on the relationship between regulation, bank capital structures, foreign exchange and financial liberalization on bank fragility and special characteristics of the Basel Accords. Chapter 3 gives the research methodology and explains the dependent and independent variables applied in the study to measure the impact of the Basel regulatory capital requirements on African banks. Chapter 4 presents the results and the interpretation of the trend and regression analysis. Chapter 5 outlines the conclusions drawn from the results and interpretation from previous chapter and addresses the research questions on how the regulatory capital framework has impacted the role of intermediation in Africa. The final section of the dissertation presents the references and appendices.

# Chapter 2

# Literature Review

## 2.1. Introduction

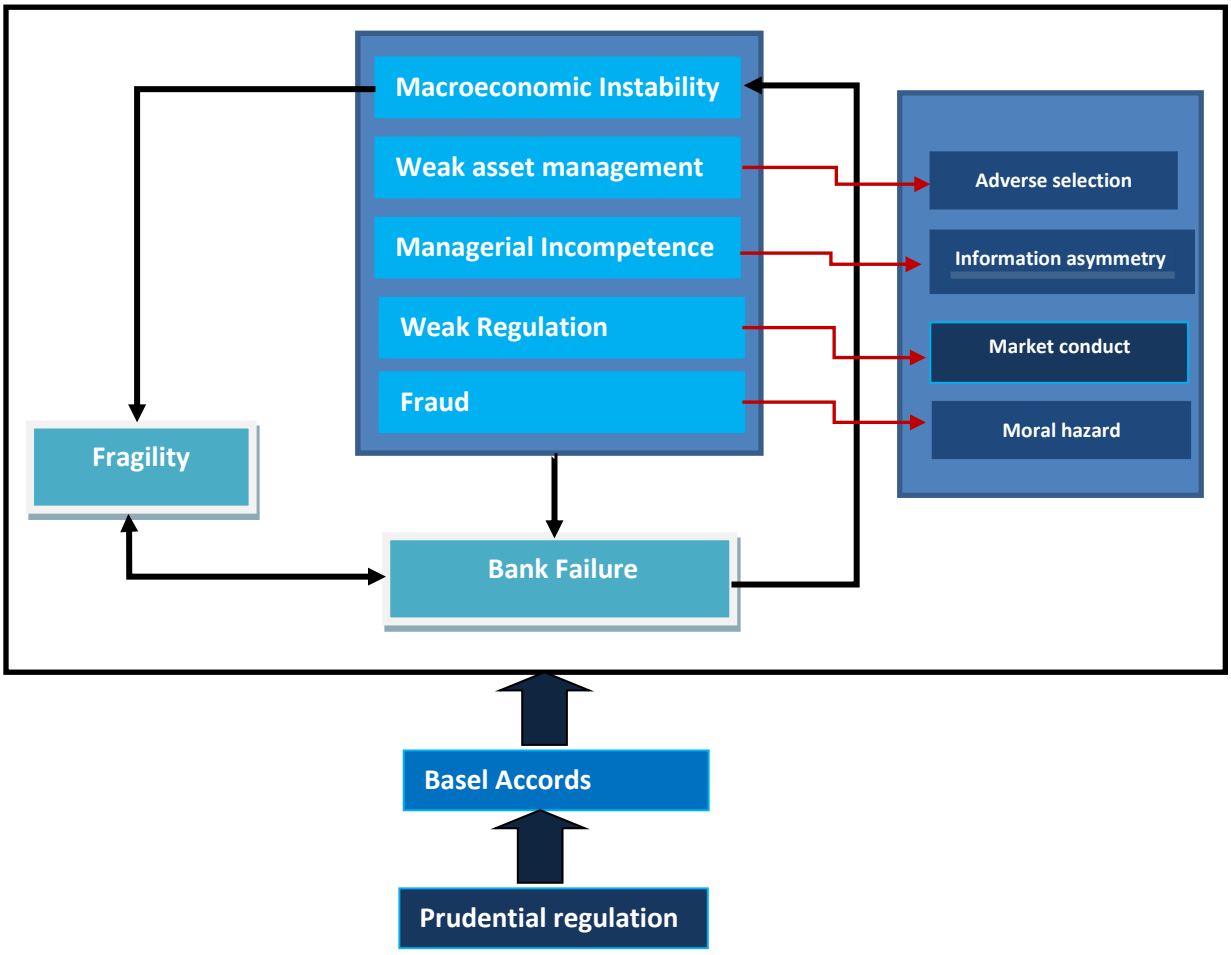
The first section of the chapter outlines the theoretical framework, then investigates the role of financial regulation in banking markets, the relationship between; fragility and financial regulation, bank capital structure and fragility, foreign exchange and fragility, financial liberalization and fragility and finally the impact of the global financial crises on the African banking system.

The second section reviews Basel I, II and III, and examines the shortcomings of the Accords and their application to African banking systems. The third section studies the available literature on the impact of the Basel Accords on bank fragility, reviews the methodologies and summary and research gap.

## 2.2. Theoretical framework

Intermediation, efficient market hypothesis and agency theories attempt to explain the need for regulation as a relevant mechanism in financial systems stability. In a perfect market there would be no need for intermediaries, information will simultaneously be available to all players and there will be no transaction costs, there would be no conflict between an agent and a principal. However, in imperfect markets, intermediaries collate information analyze it and make it available at a price to market participants. Intermediation and agency theory assist in understanding the risks associated with information asymmetry, adverse selection and moral hazard. The theories inform elements in the process of minimizing financial fragility as a basis for the formulation of regulation to manage the risks of information asymmetry and moral hazard.

**Figure 1: Overview of theoretical framework**




## 2.3. The role of financial regulation

Macroeconomic stability plays a crucial role in minimizing systemic risks and financial fragility. Kaufman (1996) postulates that attaining macroeconomic stability is always difficult, making prudential regulation a relevant mechanism in minimizing bank failures because it brings in effective tools of detecting or predicting failures before they happen. Vuckovic (2010) maintains that effective regulation should have the ability to protect market participants and investors as well as preserve financial stability. The shortcomings of theories such as efficient market hypothesis, agency and intermediation build a strong case for the justification of financial regulation because there are no perfect markets.

Stiglitz (2010) suggests that regulation in the form of capital adequacy is relevant to create “circuit breakers” to minimize fragility and the risk of contagion. Vuckovic (2010)) maintains that global financial regulation is necessary and effective in mitigating the risk of bank failures. Weak regulation is blamed for the problems of moral hazard and information asymmetry which ultimately led to the global financial “melt down” of 2007.

Rodríguez, (2003), Barth et al (2013), and Das et al (2003) contend that the quality of the financial regulation and the ease of implementation is very important. They assert that compliance to financial regulation has become a long, heavy and politicized matter, thus the need for financial regulation that is robust and incorporates not only capital adequacy standards but other standards in the form of supervision, market discipline and regulatory governance.

Regulatory compliance can be deemed good if it mandates accurate information disclosures, empower private sector control and provide incentives that promote private sector corporate control for enhancing bank stability. In a similar vein, Tadesse (2006) finds that the likelihood of banking crises decreases in countries with regulatory frameworks that prescribe extensive bank disclosures and strict auditing. On the other hand Africa faces a myriad of challenges in its economic development agenda. Africa struggles with sound macroeconomic policies, governance, legal and regulatory frameworks, legislation and regulation that has the resources, independence and capability to enforce. (Laderkarl & Zervos, 2004).

Regulation can have unintended consequences; such as driving consumers to the less regulated markets of informal lenders (loan sharks) Boyfield (2009). Furthermore, Jones (2000) explains regulatory arbitrage, as a situation when banks move into the less regulated markets offering innovative products to the high risk segments which may offer temporary high returns, but without adjusting their regulatory capital requirements to reflect the economic risk. This presents a challenge to regulation because it undermines the relevance of capital accords and Basel risk management tools in mitigating bank failure.

### 2.4. Indicators of fragility and its causes

In the process of minimising fragility, it is important to understand what the key indicators of assessing bank fragility. Bongini et al (2002) maintain that the main indicators that can be used to assess fragility from available public information are; credit ratings, stock market data and balance sheet information (capital adequacy, asset quality, earnings and liquidity). In addition, they included the indirect cost of deposit insurance of a bank and assert that there is a direct correlation between insurance with bank risk. Gropp et al (2004) add the prices of securities to complement the balance sheet data to assess fragility. Their argument is that market prices may incorporate all available information into one price and their findings shows that the distance to default and the subordinated debt spread are useful indicators to assess fragility. Capital adequacy and leverage ratios have also been used in separate studies to evaluate fragility and predict bank failures.

Cole & Gunther (1995) and Thomson (1991) highlight that capital adequacy, poor quality assets, net income, liquidity and solvency are a good measure of bank fragility. Cole & Gunther (1995) further argue that liquidity, large certificate deposits and asset size are not good indicators of fragility whilst Gropp & Heider (2010) show that bond spread can be a good indicator of financial fragility.

Brownbridge, (1998) gives the main causes of bank distress in Africa as nonperforming loans arising from concentration of ownership, undercapitalisation of banks, lending to risky borrowers at high interest rates and macroeconomic instability. Withal, Heffernan, (2003) suggests that financial fragility may be a result of weak asset management, managerial problems, the role of the regulator, poor product knowledge and too big to fail.

Demirgüç-Kunt & Detragiache (1997) and Hardy & Pazarbasioglu (1998) suggest that financial fragility occurs when the macroeconomic environment is characterized by low GDP growth rates, high inflation rates, and high real interest rates, declining exchange rates, high credit exposure, high capital outflows and poor law enforcement.

In the case of the global financial crises, the main causes of fragility emanated from imprudent lending, sub-prime mortgages, off balance sheet activities, rating agencies,

weak risk management tools, lending concentration, insufficient governance, lack of diversification and lack of transparency (Jickling, (2010) and Ragalevsky & Ricardi (2009).

In their data base for systemic bank crises Laeven & Valencia (2008) explain that there is no one way or best practises in dealing with bank fragility and systemic bank crises. Government response in dealing with systemic banking crises has varied across countries and has included; extensive liquidity support, nationalisation of banks, guarantees, asset purchases, deposit suspensions and bank holidays.

### 2.5. Relationship between fragility and financial regulation

Fragility can be categorized at a national and institutional level. Country level fragility is determined by various factors including GDP growth rates, real exchange rates, real interest rate, inflation rates, fiscal policy, credit growth and financial depth whilst bank fragility is determined by factors such as size of the bank, ownership, liquidity and asset growth. According to Barth et al (2013) regulation that requires accurate information disclosures can enhance financial stability. Whilst poor regulation that influences credit standards and rules may deepen the problem of financial fragility (Basu, 2003).

Banking crisis in one institution is more damaging to the economy because of risks of contagion that can lead to widespread bank failures in the economy and across borders and eventually growing into a full blown global financial crises. The fear of systemic risk is the huge cost associated with bank failures. Hence proponents of financial regulation such as economists, the BIS and policy makers need to contain systemic risk as the basis for justifying regulation.

Whilst regulation has demonstrated that it can work in minimizing fragility, the financial crises of 2007 exposed the flaws in the existing regulation. Despite regulatory compliance the world economies experienced a global financial crisis.

### 2.6. Bank capital structure and fragility

There is a wide array of literature that illustrates that bank capital structures are by their nature fragile and susceptible to runs and failures (Diamond & Dybvig, 1983), Saunders

& Cornett, 2006, Diamond & Rajan1999). The asset side of banks constitute the loans made to borrowers, a crucial function of intermediation which, extends credit to the economy. The liability side, provides liquidity on demand to depositors, hence banks have to always match the maturities of its assets a function which has inherent risk. Bank capital structures are inherently fragile because of the problem of mismatch of maturities, deposits withdrawal are on demand and the liquidity needs of depositors is not always known (Diamond & Dybvig, 1983).

Based on Modigliani and Miller (1958)'s theory, which states that in a perfect capital market, a firm's capital structure is irrelevant. In imperfect capital markets, the value of a firm is strongly correlated to its financing mix. Because of their intermediary role, banks would most likely keep as little as possible of their capital so as to maximize their returns, making their capital structure fragile and susceptible to failures. Regulatory capital requirements have been created to provide a level playing field and to protect depositors 'money in the event of bank failures.

Diamond & Rajan (1999) and Gambacorta & Mistrulli (2004) argue that holding high capital reduces the bank's liquidity but it gives the banks the ability to withstand situations of uncertainty and distress. A view that is disputed by Blum (1999) who argues that regulatory capital may lead banks into taking excessive risk and might not motivate them to stay in business in the event that they are not making profits.

However, Diamond & Rajan (1999) argue that financial fragility is a desirable feature of banks, banks have to simply find the optimal capital structure wherein they can maximise shareholder returns. Bank capital is meant to be a barrier against periods of macroeconomic volatility, hence raising the levels of capital a bank holds should assist banks in stabilising the banking system, thus reducing the incidence of huge costs of bank failures (BIS, 2004).

### 2.7. Exchange rate and fragility

Whilst financial fragility is determined by a wide host of variables, foreign exchange rates play a significant role in African countries. This is because countries in sub – Sahara Africa still use pegged and fixed exchange rate regimes. The aforementioned foreign exchange rate regimes are filled with moral hazard. Eichengreen & Housman's (1999) theories on exchange rates and financial fragility suggest that pegged exchange rates offer indirect insurance against exchange risk, thus encouraging reckless lending. Chang & Velasco (2000) report similar results in a world were banks play a well-defined role, the different types of exchange regimes bring different degrees of financial fragility.

### 2.8. Financial Liberalisation and fragility

Demirgüç-Kunt & Detragiache (1998) argue that financial liberalisation may increase the likelihood of financial fragility especially in the absence of strong institutional environments. African countries are known to have weak institutional frameworks characterised by inefficient government and bureaucrats, corruption, poor law enforcement, poor property rights et al, hence understanding the impact of liberalisation is important in studying the causes of financial fragility. Basu (2003) suggest that financial liberalization increases competition which in turn may reduce the profitability of banks and disincentivize banks from maintaining financial stability. Conversely, Shehzad & Haan (2009) argue that financial liberalisation can decrease the probability of systemic crises in the banking sector.

### 2.9. Impact of the global financial crises of 2007 -2008

Global crises can transfer financial fragility and crisis into other economies as witnessed by the global financial crises of 2007-2008. The initial view was that Africa is not deeply integrated into the global financial system, its financial markets are largely underdeveloped, foreign borrowing by banks is largely regulated, limited diversification of stock (Kasendeke et al 2009), hence the impact of the crises was expected to be minimal. However, empirical evidence shows that the crises was transmitted into Africa via the trade, credit and aid flow channels. The impact of the global financial crises led to a fall in commodity prices which is the main source of foreign exchange reserves for African countries. This lead to a fall in foreign exchange reserves a situation which was

exacerbated in countries that rely on importing food and fuel. During the crises years, sub-Sahara Africa experienced increases in food and fuel prices, which decreased their foreign exchange reserves and made it difficult for them to pay for imports and to sustain growth (Allen & Giovannetti, 2011).

Thus, the global financial crises of 2007 was more acutely transmitted into sub-Sahara Africa through the trade channel and less through the financial system. It can be inferred that maybe the African banks were able to withstand the crises, firstly with assistance of multilateral institutions programmes for some banks but most because of the high regulatory capital they held. Secondly, they had not participated in risky financial derivatives that were the primary cause of the crisis.

### 2.10. Basel Accords, impact and shortcomings

The main objectives of the Basel Accords are: to promote a financially sound global banking system; to deepen competition in the financial markets and to provide a comprehensive framework for managing risk.

#### Basel I

The Basel Capital Accord (Basel I) came into effect in 1988. It was divided into four pillars namely the constituents of capital, risk weights, target standard ratios and the implementation framework.

The constituents of capital were designed to minimize credit risk and required that international banks hold a regulatory minimum capital of eight percent (8%) of their risk weighted assets (RWA). The reserve capital is divided into Tier 1 which is the core capital and includes owner's equity and retained earnings. Tier 2 covers supplementary capital; general loan-loss provisions, undisclosed reserves, asset revaluation reserves, hybrid debt/equity instruments, subordinated term debt (5+ year's maturity) (BIS, 2011).

The second pillar addressed the risk weights and assets on the balance sheet were grouped into five risk weights. The risk weights grouped under zero percent (0%) are

considered riskless and include assets such as cash held by a bank. The second group considered to be of low risk assets carries twenty percent (20%) risk weight and is comprised of assets such as multilateral development bank debt. The moderate risk assets carrying a fifty percent (50%) weighting includes residential mortgages, whilst the fourth group carrying a hundred percent (100%) weighting constitutes equity assets held by a bank, Eurobonds and bank's claims on private sector. The fifth category addressed the risk weights of domestic entities and can be grouped into zero percent (0%), ten percent (10%), twenty percent (20%), and fifty percent (50%) and is determined by the central bank.

The third pillar speaks to a target standard ratio and combines the first and second pillar. It defines the global standards where Tier 1 and Tier 2 must cover eight percent (8%) of a bank's risk-weighted assets. Thus, capital is expressed as total tier capital ratio ≥ 8% and tier 1 capital ratio ≥ 4% (tier 1 capital should cover four percent (4%) of a bank's risk-weighted assets).

The fourth pillar in Basel 1, helped to set the implementation framework of the Accords and was referred to as the transitional and implementing agreement. It addressed the role of the central banks in implementing and monitoring of the Accords.

**Basel II**

Basel II was designed as a response to the banking crises of the 1990s. It enhanced the minimum regulatory capital required and added two pillars that defined the supervisory and market discipline roles. Under the minimum regulatory capital pillar, the total capital required should not be lower than eight percent (8%). Moreover, pillar one outlines the methodology to calculate required capital to mitigate against credit, operational and market risk.

The methodology used to calculate capital reserves under credit risk are the standardized and the Internal Rating Based (IRB) approach. The standardized method adds the market based rating agencies approach to the risk weights defined in Basel I.

Claims on sovereigns, central banks, corporates and banks are rated as illustrated in the table below.

**Table 2: Sovereign and corporate claims**

| Credit assessment | AAA to AAA- | A+ to A- | BBB+ to BBB- | BB+ to BB- | B- | Unrated |
|---|---|---|---|---|---|---|
| Risk weight | O% | 20% | 50% | 100% | 150% | 100% |

Short-term bank debt with less than three months' maturities is weighted at below a sovereign bond such that BB+ debt is given a fifty percent (50%). Home mortgages carry a risk weight of thirty-five percent (35%), whilst corporate mortgages have a hundred percent (100%) weighting.

The Internal Rating Based approach has the foundation and the advanced approach. It incentivizes banks to develop their own internal systems to measure risk. If they raise their risk weighted reserves by six percent (6%), the Committee can lower their capital requirements hence increasing the opportunity to make more profit. The advanced Internal Rating Based approach is very complex and tends to be used by very large banks that already have complex risk models.

Basel II prescribes the approach in calculating the required minimum capital to minimize operational risk as the Basic Indicator, the Standardized and the Advanced Measurement approach. The Basic Indicator Approach requires that a bank should hold capital equivalent to fifteen percent (15%) of the average gross income earned by a bank over a period of three years. Regulators may calibrate the fifteen percent (15%) according to their risk assessment per each bank. The Standardized Approach, defines the amount of cash a bank must hold in order to minimise operational risk based on the lines of business it has. The Advance Measurement approach is built to bring in a component of market discipline and self-monitoring by the banks. It allows the banks to calculate their own capital reserve to manage operational risk. Based on Basel II, market risk capital reserves can be calculated by the use of the Value at Risk (VaR)

method. Under the VaR methodology banks are allowed to formulate their own calculations to determine the reserves required to mitigate against interest rate risk on fixed assets. On the other hand banks that are not able to use VaR can use an alternate method which assigns interest rate weights to fixed assets.

The second pillar under Basel II addresses the supervisory role and calls for the supervisory authorities to review the methods used to calculate the capital reserves to manage the aforementioned risks and also to manage the problems of maturity mismatches. The supervisors are required to take action where it's deemed that a bank's approach falls short of the standards.

The third pillar introduced market discipline in the form of required disclosures and transparency. The BIS stipulates that a bank's disclosures should be aligned with how senior management and the board of directors evaluate and oversee the risks of the bank.

**Basel III**

Basel III was developed to enhance bank regulation, bank supervision and risk management. (Basel Committee on Banking Supervision, 2010). It was a response to the 2007 global financial crisis and the need to address the weaknesses emanating from Basel II. The changes were mainly aimed at improving micro prudential regulation at a bank level and macro prudential regulation in building more resilient banks and minimizing system wide risks triggered by pro-cyclicality and interconnectedness of financial institutions.

In addition to strengthening the capital requirements, Basel III introduced the leverage and liquidity coverage ratio so as to improve the banking sector's ability to withstand economic shocks.

## 2.11. Impact of the Basel accords

Several authors have empirically tested the relationship between the regulatory capital requirements and credit supply, regulatory capital and minimizing bank failure. There are theories that underpin the relationship which stipulate that if banks are not able to meet the minimum regulatory capital requirements, they will reduce the credit supply to private sector and households. A view that is shared by Beck & Cull (2013) when they argue that holding high capital may reduce the credit supply to the private sector and households hence curtailing economic development

In contrast Diamond & Rajan (1999) in their theory stipulate that whilst holding high levels of capital decreases the liquidity of a bank, it enables the bank to withstand stress and survive crises. A view that is shared by Gambacorta & Mistrulli (2004) when they suggest that a well capitalised banks can withstand shocks coming from monetary policies and GDP variations. They can withstand these shocks because they can easily access non–deposit funds, thus one cannot assess the impact of capital regulation without examining the effects of GDP.

VanHoose (2007) build a theoretical argument that the short term effects of complying to regulatory capital is the likelihood of fall in total lending, an increase in marketing loan rates and a move away from lending to holding alternative assets. High capital holdings offer protection to depositors from losses in the event of a systemic bank failures.

Cumming & Nel (2005) in their study of banks in South Africa show that capital accords may lead to a decrease in credit supply to the private sector and increase the costs of loans. Their study further revealed that there was a decline in the risky assets such as mortgages and unsecured lending to private sector. However the restriction of mortgages interferes with the government housing policy which is a fundamental variable in the development agenda of the government. South Africa has already experienced service delivery protests due to the lack of delivery of houses and other services to masses by the government.

Similarly Chiuri et al (2002) analyzed developing countries and found that the minimum regulatory capital requirements does indeed negatively impact credit supply in developing countries. Their findings show that banks in developing countries will find it

much simpler to adhere to regulatory capital by reducing the extent of their exposure than going to financial markets to raise capital. Capital markets in Africa are still very shallow and hence it's difficult to raise capital. It is in developing country where credit is mostly needed to support development.

Griffith-Jones et al (2003) agree with the observation that capital accords may lead to a reduction in the supply of credit and an increase in the cost of lending to developing countries. The reduction in lending to developing countries may have detrimental effect on developing countries, because developing countries heavily rely on the borrowed funds form the high income countries.

In their study conducted in the US, Rossi (1999) and Sagner (2010) found that the implementation of Basel II resulted in the reduction in lending and increased cost of bank capital, cost of implementation and distorted the competitive environment.

Conversely, Barajas et al (2004) in their study done in Latin America show that there was no overall decline in the credit supply after the implementation of Basel. However, the growth of loans became more sensitive to some risk factors and credit supply became more susceptible to procyclicality.

### 2.12. Shortcomings of the Basel Accords in the context of Africa

The main criticism of the Basel Accords from the emerging economies is that their interests are not well represented in the Committee and that the Committee does not take into consideration the specialness of their markets.

Consequently the high risk weights attached to long term emerging market debt encourages hot money transactions leading to a massive drain of foreign funds. Additionally, the weights overestimated the risks of commercial and sovereign loans to emerging markets and significantly reduced the loan-deposit ratios in emerging countries (Abdel-Baki, 2012)

However the Accords are much more than regulatory capital requirements, thus Africa finds itself faced with new challenges in complying with the supervision, risk

management tools and the market discipline requirements. Given that Africa has weak regulatory and legislative framework, it is even more challenging to comply. Gottschalk (2008) alluded that key challenges faced by banks in Africa are: lack of technical skills and expertise to validate models and monitor their use; participation of foreign banks; competition; procyclicality; collaboration between home and host supervisors and credit portfolio concentration and credit to SMEs.

Systemic risk can arise from the adoption of the IRB approach, as this is likely to increase procyclicality, thus increasing the probability of crises. They argue that banks in developing countries are likely to face increased competition from internationally active banks who are compliant with the Basel IRB approach and who have finely tuned their capital requirements. The Accords might result in consolidation and acquisitions of smaller banks (Griffith-Jones & Spratt, 2003).

The use of the bank's internal risk management system brings the issue of pro-cyclicality[1].The push to use risk weights to accurately reflect the probability for default is inherently pro-cyclical in that during an upswing the probability for default will decrease and the motive to lend will go up vice versa. In an economic down swing the risk of default will increase leading to a credit crunch that will directly affect the highly rated borrowers (Griffith-Jones & Spratt, 2001).

Another source of pro-cyclicality is the risk weights which are heavily dependent on the credit ratings from external credit agencies. Blum & Hellwigg, (1995) illustrate that agency ratings always lag behind markets, assessing historic performance hence aggravating pro-cyclicality. They also argue that risk grades are largely biased towards short term lending and short term lending is very sensitive to macroeconomic shocks and can therefore further worsen economic crises.

Access to financial services including deposits, credit and payments is still very low in Sub-Sahara Africa. The financial sector can play a crucial role in the economic growth and poverty reduction in sub-Saharan Africa by providing credit and other financial

[1]Procyclicality can magnify the effect of economic cycles hence increase the frequency and magnitude of economic crises

products and services to enterprises, especially small and medium ones (Mlachila et al). The penetration level of banking products and services is very low at five percent (5%) and cash is “king” as it is still the major financial instrument. African banks earn a much higher net interest margin; have high non-performing loans to total loans ratio and have high overhead costs compared to those in high income countries and in other regions (Beck and Cull, 2013).

### 2.13. Relationship between bank fragility and regulatory capital ratio and macroeconomic variables

This section reviews the literature and establishes the relationship between the variables. Regulatory capital requirements and economic growth have a positive and significant impact on efficiency (Poshakwale & Qian, 2011). Chiuri et al (2002) indicate that an increase in regulatory capital requirements leads to a decrease in growth of assets. However, Blum, (1999) indicate that regulatory capital requirements does not stop banks from lending to higher risk segments or taking higher risks.

Currency depreciation increases the likelihood of nonperforming loans denominated in domestic currency (Naceur & Kandil (2013). For the periods post Basel regulatory capital requirements implementation there is a significant and positive increase in the growth of banks’ equity.

High inflation can increase the likelihood of high non-performing loans or the probability for making “windfall” profits (Brownbridge, 1998).

Negative macroeconomic shocks have a significant and negative impact on liquidity and bank financial soundness (Arena, M. (2008). Bank capitalization and credit expansion in Latin America increased after Basel regulatory capital implementation indicating a significant and positive impact (Barajas et al 2004). Cole & Gunther (2005) show that low capital, weak assets, and net income, have a significant impact on the timing of bank failure whilst bank liquidity, investment securities and large certificates of deposit do not have a significant impact on bank failure. To stimulate growth in loan volumes, government can reduce interest rates especially in situations of economic downturns (Berka & Zimmerman (2001).

## 2.14. Research gap and summary

There is a wide array of literature on the impact of Basel regulatory capital. Findings presented in the literature vary from region to region and focuses largely on the impact of regulatory capital requirements on credit supply and cost of loans. This study attempts to complement the existing literature by assessing the impact of regulatory capital on bank efficiency, solvency, liquidity and the growth of assets.

# Chapter 3

## Research methodology

### 3.1. Introduction

The purpose of the study is to examine the impact of adopting the regulatory capital requirements from the Basel framework for African banks by addressing the research questions mentioned in chapter one. This chapter describes and explains the, sample countries and banks, period under study, data sources, research methodology, dependent and independent variables, and the rationale for the selection of the variables.

### 3.2. Selection of the sample

The selection of the sample is highlighted in table 6. Banks were selected on the basis of the availability of data for the period 1999 to 2014 in Bankscope. The date of implementation of the capital adequacy requirements differs across the countries: Botswana, 2013; Kenya, 2013; Mauritius, 2008; Namibia, 2010; South Africa, 2010; Tanzania, 2014 and Uganda, 2004 (Financial Stability Institute Survey, 2015).

**Table 2: Number of banks in the sample**

| Country | Sample period | Basel Implementation | Number of banks | Size in total assets (% to commercial total bank assets) |
|---|---|---|---|---|
| Botswana | 2000-2014 | 2013 | 5 | 90% |
| Kenya | 2000-2014 | 2013 | 10 | 70% |
| Mauritius | 2002-2014 | 2008 | 9 | 58% |
| Namibia | 2004-2014 | 2010 | 4 | 97% |
| South Africa | 2004-2014 | 2010 | 4 | 80% |
| Tanzania | 2006-2014 | 2014 | 14 | 70% |
| Uganda | 1999-2014 | 2004 | 9 | 84% |

Source: FSI survey, 2014 and Bankscope

### 3.3. Data sources

The data was collected from Bankscope, Laeven & Valencia (2008) Systemic Banking Crises, Financial Stability Survey, 2015 and the World Bank and IMF data base.

### 3.4. Research design and econometric model

The methodology used in this study is adapted from Naceur & Kandil (2013). In order to examine the impact of the Basel capital framework on bank indicators the author gathered panel data of banks' financial ratios in seven countries forming the sample. Whilst Naceur & Kandil (2013) focused on real change in total assets, net loans over total assets and bank's holding of sovereign securities over total assets, this study examines net interest margin, liquidity, equity to total assets and growth to total assets. The selection of the indicators was largely influenced by the literature reviewed which suggested these are key indicators for measuring fragility. The methodology is divided into three parts:

**Part I Empirical analysis**

An analysis is carried out using empirical data on key financial soundness indicators as defined by the World Bank; financial depth, financial accessibility, financial efficiency, regulatory compliance, competitiveness, stability and profitability (Beck et al, 2009). The analysis compares the financial soundness indicators for sub- Sahara Africa against the performance of the other five regions; East Asia & Pacific (developing only), Europe & Central Asia (developing only), Latin America & Caribbean (developing only), Middle East & North Africa (developing only) and Sub-Saharan Africa (developing only).

**Part II Trend analysis**

A trend analysis is carried out on the panel data from the five financial ratios (dependent variables) for the sample countries. The financial ratios were grouped into two

categories; pre and post Basel regulatory capital implementation. The averages for each category was calculated and then plotted into a graph to show the trends for the period before and after the regulatory capital implementation.

**Part III Regression model**

To test the impact of the regulatory capital requirements, a panel regression model was constructed and used. The panel regression model has the dependent variables: net interest margin, liquidity, equity to total assets, growth to total assets. The independent variables comprise of the total capital ratios, GDP, inflation rate, real interest rate and exchange rates.

The regression model used is:

$$\mathrm{BF}_{it} = \alpha + \beta_1 \mathrm{TCR}_{it} + \beta_2 \mathrm{GDP}_{it} + \beta_3 \mathrm{Inf}_{it} + \beta_4 \mathrm{RIR}_{it} + \beta_5 \mathrm{ExchR}_{it} + \beta_6 \mathrm{dummy}_0 + \beta_7 \mathrm{dummy}_1 + \varepsilon_{it}$$

The model defines bank fragility as the dependent variable. The model is broken down into four equations with each control variable captured into an equation.

**Equation 1**

$$\mathrm{NIMR}_{it} = \alpha + \beta_1 \mathrm{TCR}_{it} + \beta_2 \mathrm{GDP}_{it} + \beta_3 \mathrm{Inf}_{it} + \beta_4 \mathrm{RIR}_{it} + \beta_5 \mathrm{ExchR}_{it} + \beta_6 \mathrm{dummy}_0 + \beta_7 \mathrm{dummy}_1 + \varepsilon_{it}$$

**Equation 2**

$$\mathrm{LR}_{it} = \alpha + \beta_1 \mathrm{TCR}_{it} + \beta_2 \mathrm{GDP}_{it} + \beta_3 \mathrm{Inf}_{it} + \beta_4 \mathrm{RIR}_{it} + \beta_5 \mathrm{ExchR}_{it} + \beta_6 \mathrm{dummy}_0 + \beta_7 \mathrm{dummy}_1 + \varepsilon_{it}$$

**Equation 3**

$$\mathrm{ETAR}_{it} = \alpha + \beta_1 \mathrm{TCR}_{it} + \beta_2 \mathrm{GDP}_{it} + \beta_3 \mathrm{Inf}_{it} + \beta_4 \mathrm{RIR}_{it} + \beta_5 \mathrm{ExchR}_{it} + \beta_6 \mathrm{dummy}_0 + \beta_7 \mathrm{dummy}_1 + \varepsilon_{it}$$

**Equation 4**

$$\mathrm{GTA}_{it} = \alpha + \beta_1 \mathrm{TCR}_{it} + \beta_2 \mathrm{GDP}_{it} + \beta_3 \mathrm{Inf}_{it} + \beta_4 \mathrm{RIR}_{it} + \beta_5 \mathrm{ExchR}_{it} + \beta_6 \mathrm{dummy}_0 + \beta_7 \mathrm{dummy}_1 + \varepsilon_{it}$$

Where:

| | |
|---|---|
| $\mathrm{BF}_{it}$ | bank fragility |
| $\beta_1 Post - Basel - P.Bit$ | |
| $\beta_1 \mathrm{TCR}_{it}$ | is total capital ratio of the bank |
| $\beta_2 \mathrm{GDP}_{it}$ | GDP of the country |
| $\beta_3 \mathrm{Inf}_{it}$ | the country inflation rate |
| $\beta_4 \mathrm{RIR}_{it}$ | country real interest rates |
| $\beta_5 \mathrm{ExchR}_{it}$ | Exchange rate of the country in local currency against US dollars. |
| $\beta_6 \mathrm{dummy}_0$ , $\beta_7 \mathrm{dummy}_1$ | Dummy variable that equals 1 for each year after the implementation of Basel and 0 before the implementation. |
| $\mathrm{NIMR}_{it}$ | is the net interest margin ratio for the bank |
| $\mathrm{LR}_{it}$ | is the liquidity ratio of the bank |
| $\mathrm{ETAR}_{it} =$ | equity to total assets ratio of the bank |
| $\mathrm{GTA}_{it}$ | growth to total assets of the bank |
| $\varepsilon_{it}$ | is the error term |

### 3.5. Data description

**Net interest margin ratios (NIMR)**

This is a measure on the efficiency of the bank and influences the bank's ability to pay out interest to its depositors in relation to the amount of interest they earned on their assets. A high net interest margin indicates cheaper funding or high margins. It is calculated by diving net interest revenue over total earnings.

**Liquidity ratio (LR)**

It influences the bank's ability to pay its short term liabilities obligations and is measured by dividing liquid assets over customer and short term borrowings. The higher the ratio the more its ability to meets it's short term obligations. It can also be used to predict the likelihood of bank failures.

**Equity to total assets (ETAR)**

It gives the amount of protection the bank can afford via the equity invested and gives an indication on the solvency position of the bank. It tests the soundness of the bank's capital structure. A high equity to total assets ration shows that a company has a strong long-term solvency position.

**Growth to Total Assets (GTA)**

Total assets are depicted in the accounting equation which states that assets = liabilities + shareholder's equity.

On the other hand the independent variable used in this study is the regulatory capital ratios as represented by total capital ratio, GDP, inflation and real interest rates.

**Explanation of the independent variable**

The independent variables where selected because they have been identified as major causes of bank fragility by Brownbrige (2014), Estrella et al Park, 2000 Laeven & Valencia (2008).

**Total capital ratio (TCR)**

The capital ratio is very closely related to the likelihood of bank failures and has been a widely used tool in assessing a bank's soundness. It measures a banks' capital in relation to its risks. It gauges the ability of a bank to meets it funding liabilities timorously, hence influences the probability of bank failure. If the ratio is high it indicates that a bank can withstand sudden deposit withdrawals. Total capital ratio is more robust and is calculated by dividing the sum of tier1 and tier 2 capital over total risk weighted assets.

**GDP growth (GDP)**

A falling GDP reflects a decline in the market value of all the goods and services produced in a country signaling economic downturns. GDP can be used as a predictor of bank failures.

**Inflation rate (Inf)**

High inflation presents challenges in loan appraisal processes, the future value of loan security becomes unpredictable. The greater the probability of loan default the greater the probability of a bank failure.

**Real Interest rate (RIR)**

Real interest rates influence the price of loans hence customer demand for bank loans. It also impacts the bank's ability to loan out money at a profitable rate.

**Exchange rates (Exchange R)**

Depreciating exchange rates can be a source of fragility, where in the value of the assets falls, deteriorating the bank's asset portfolio.

**Table 3: Relationship between bank fragility and regulatory capital ratio and macroeconomic variables**

| Independent variables | Expected relationship |
|---|---|
| Total capital ratio increase | Positive |
| GDP increase | Positive |
| Decrease in inflation rate | Positive |
| Falling real interest rate increase | Positive |
| Exchange rates appreciation | Positive |

Source: Lynda Kahari (2016)

### 3.6. Statistical package

The regression model was run in a statistical package known as Gretl (Gnu Regression, Econometrics and Time-series Library). It is an open-source statistical package that is mainly used for econometrics.

### 3.7. Data analysis

The author collected cross stacked panel data of the financial indicators per bank in each country from Bankscope. To minimize the problem of missing data, the sample selected was from the areas with the most populated data. Periods with insufficient data was eliminated. The data was imported into Gretl where the regression model was run using fixed effects. Fixed effects was selected after the Hausman test showed that the results under random effects were inconsistent and insignificant. The data was tested for correlation so as to minimize the problem of spurious results and the correlation coefficient showed that they were insignificant. In addition the model was tested for significance using the F statistic.

### 3.8. Summary

The research methodology attempts to answer the research questions using empirical, trend and regression analysis and focuses on the behaviour of bank fragility against rising GDP, decreasing inflation rate, falling interest rates and appreciating exchange rates. The results of the analysis is presented in the next chapter.

# Chapter 4

## Results and Analysis

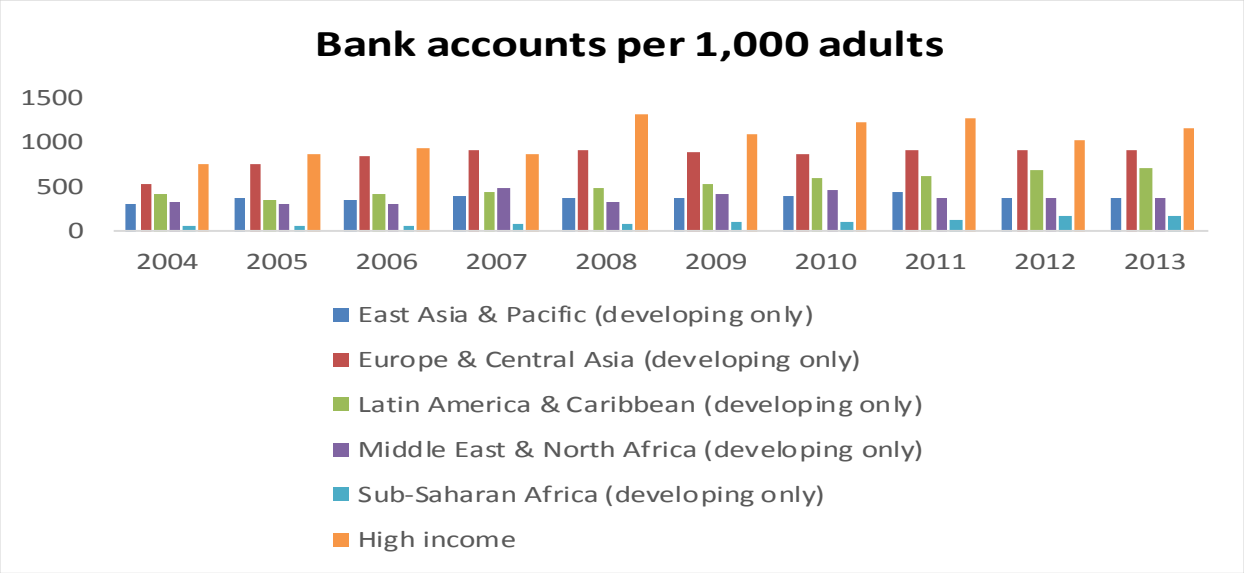
### 4.1. Introduction

The results and interpretation section is divided into three; the first section attempts to address the research question, what is the role of banks in the African bank context? And the second section answer the research question, what are the main causes of bank fragility? Finally, the third section attempts to answer the question, what is the impact of adopting the Basel regulatory capital requirements on African banks?

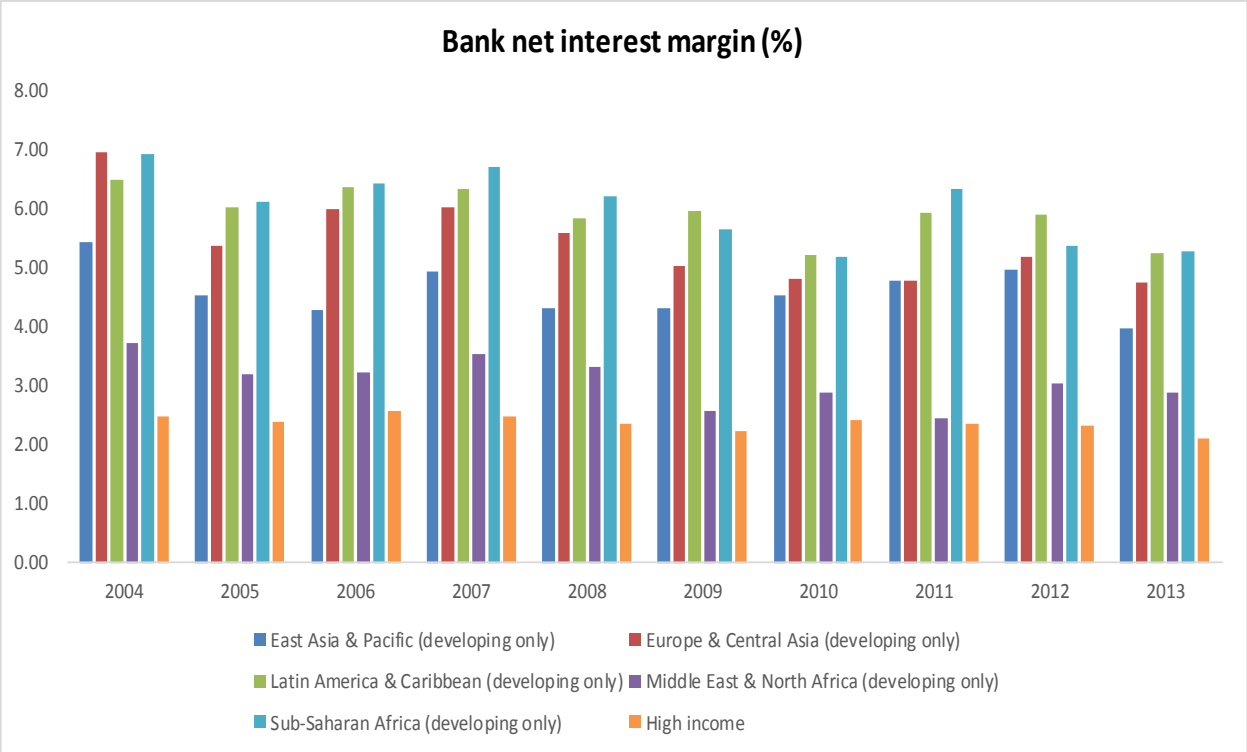
### 4.2. The role of banks in the African banking system

Research question one – what is the role of banks in the African context is answered under the literature review and from the empirical analysis done on the financial soundness indicators.

**Figure 2: Africa financial soundness indicators**




Source: World Bank Global Financial Development data base, 2015

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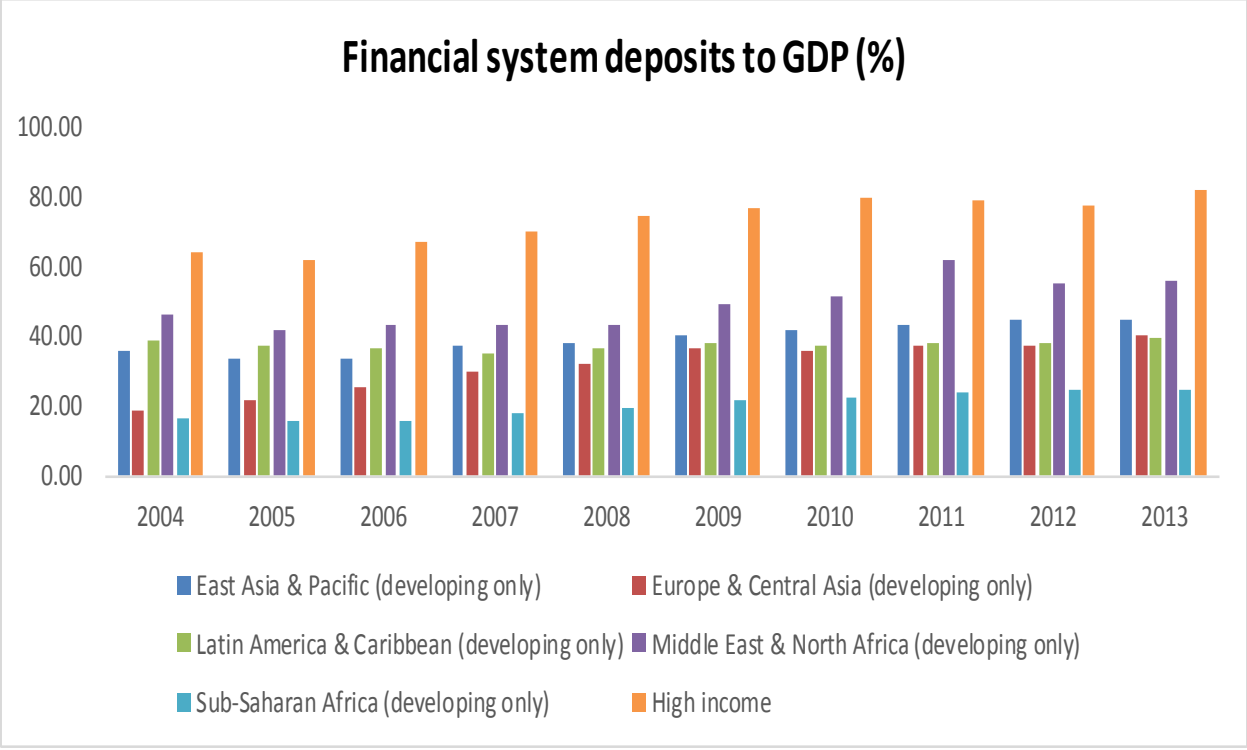


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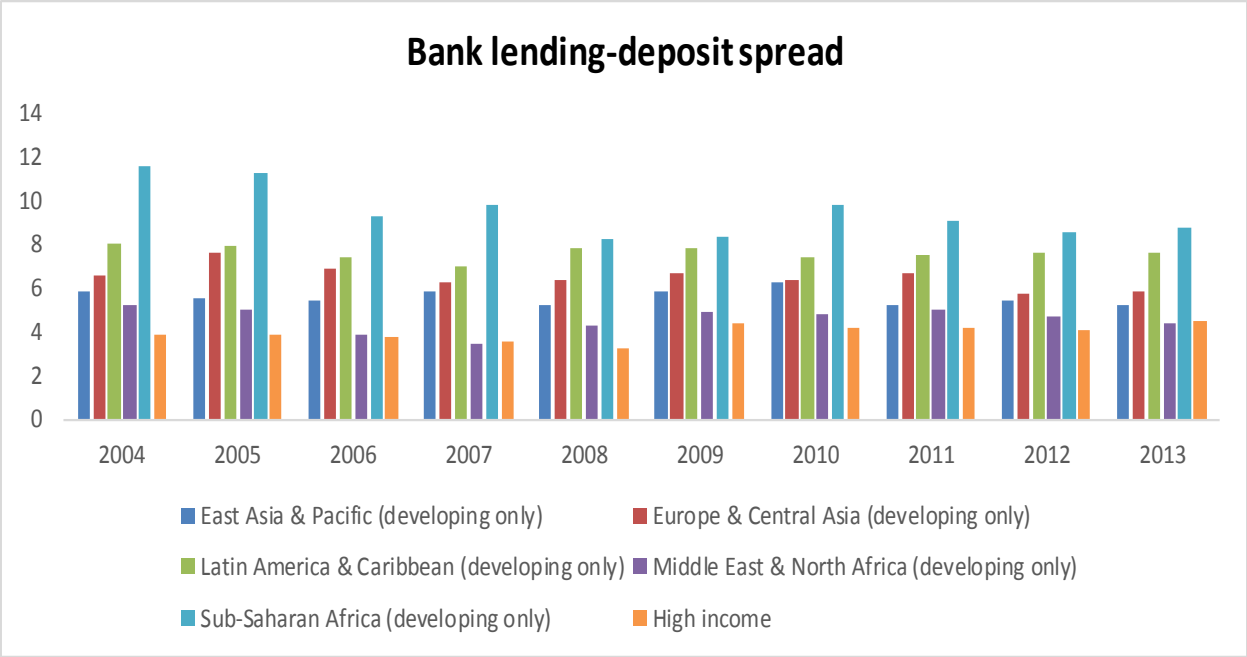



Source: World Bank Global Financial Development data base, 2015

According to the stylized facts financial system is one of the most regulated sectors in most economies and banks are the most important intermediary among debt market institutions. The number of accounts per 1000 adults is the lowest amongst all the regions showing that a majority of the population in sub-Sahara Africa is under banked or not banked at all. Banks hold the smallest financial deposits to GDP % compared to other regions. Cost to income ratio is high and in some instances almost at par with banks in high income and other regions. Banks enjoy high net interest margin and high lending deposit spread.

### 4.3. Causes of bank fragility

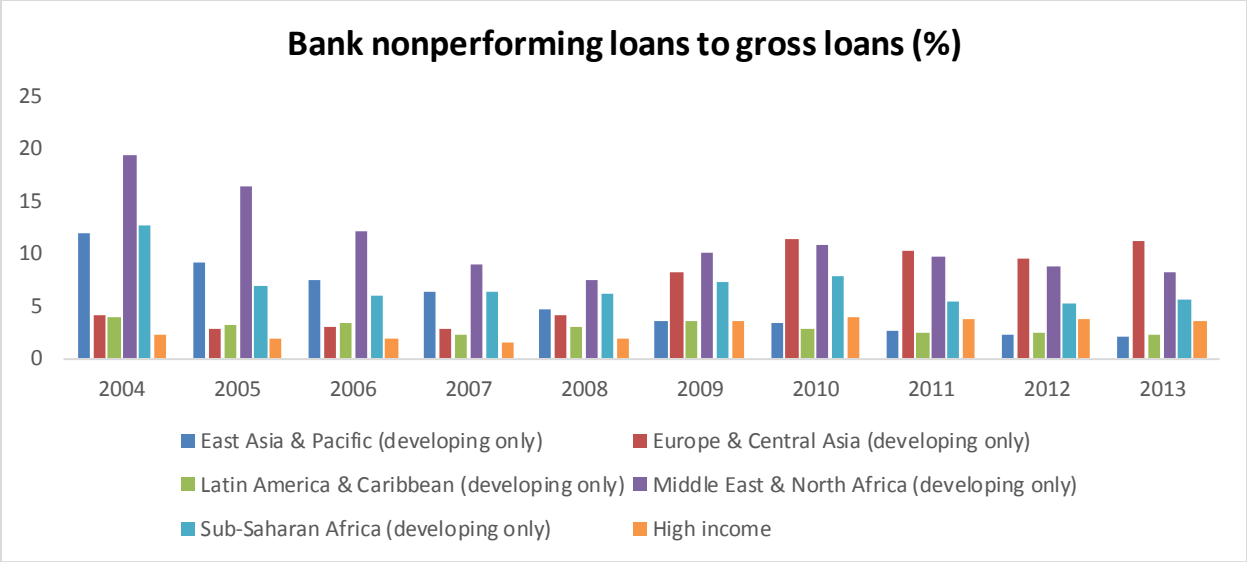
The second research question, on what are the causes of bank fragility and attendant government response is addressed in the literature review and the empirical analysis. Based on the literature reviewed the main causes of bank fragility emanate from both endogenous and exogenous factors. Exogenous sources of bank fragility emanate from macroeconomic instability; fall in GDP growth, high inflation rates, rising real interest rates, declining exchange rates, financial liberalization, weak law enforcement

institutions, negative trade shocks, weak regulation and ineffective banking supervision and increased competition.

Internal factors that determine bank fragility can be traced to incompetent management, poor credit standards rules, increased lending to high risk borrowers, insider lending and excessive risk emanating from high regulatory capital requirements, excessive credit expansion, low profits, and poor product knowledge on new offerings, low liquidity and bank capital structures.

Empirical evidence given in the graphs below shows that banks in sub-Sahara Africa enjoy high net interest margin, high lending deposit spread and hold high non-performing loans and high regulatory capital to risk weighted assets. However, the financial system deposit to GDP is the lowest among other regions. Banks enjoy high profits and are deemed stable. Concentration risk is high and banks are considered competitive based on the Boone indicator.

**Figure 3: Africa financial soundness indicators**

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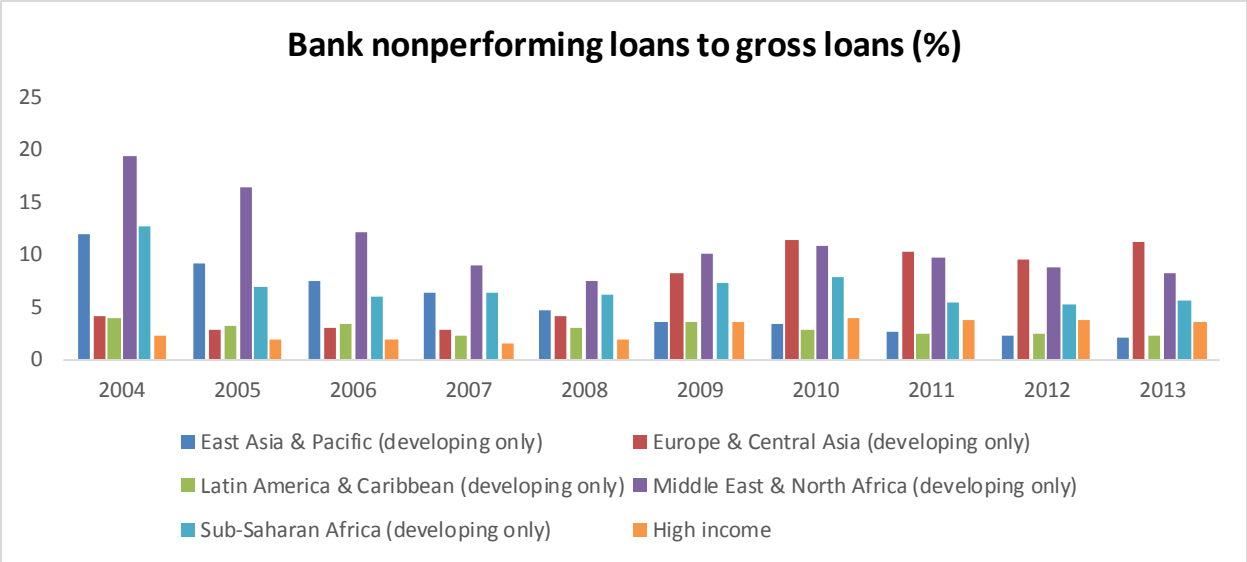


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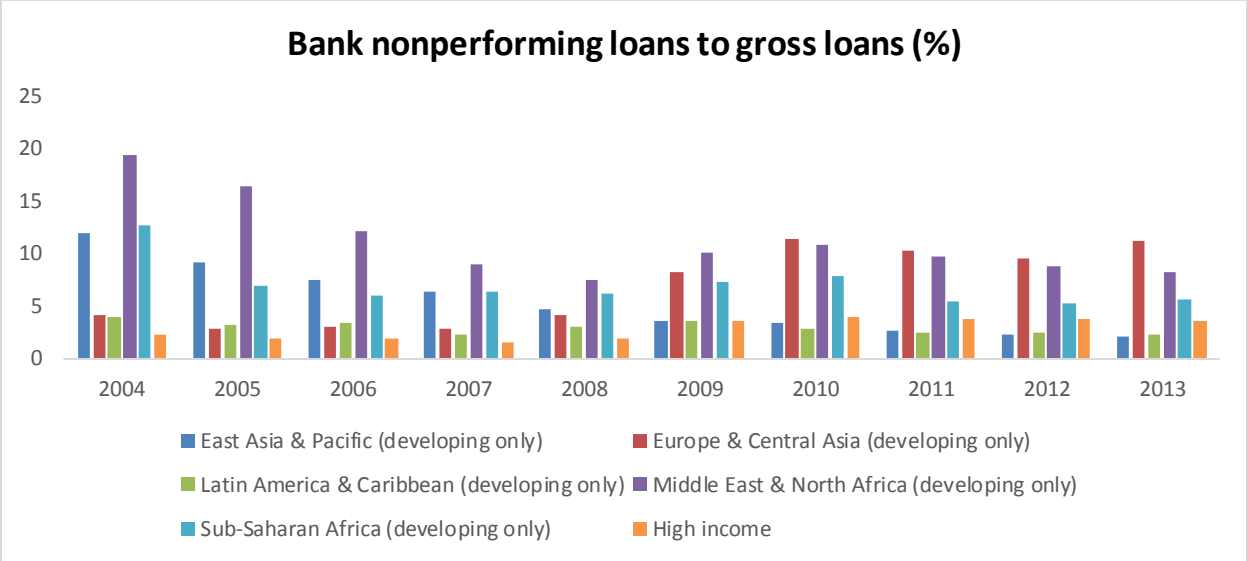


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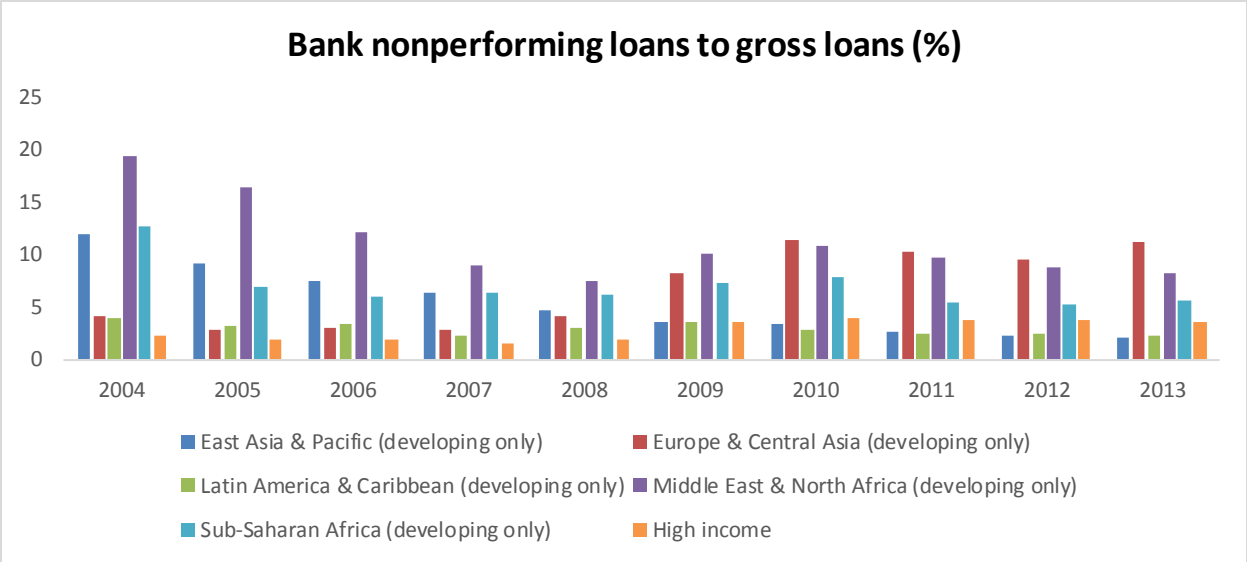


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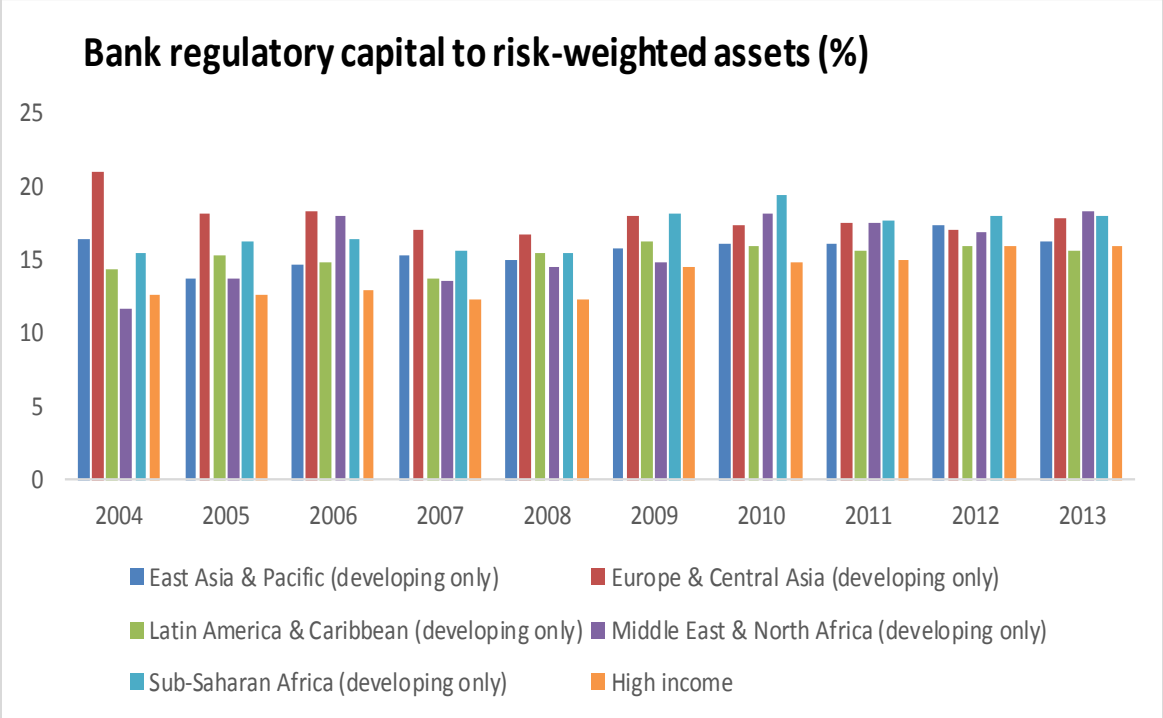


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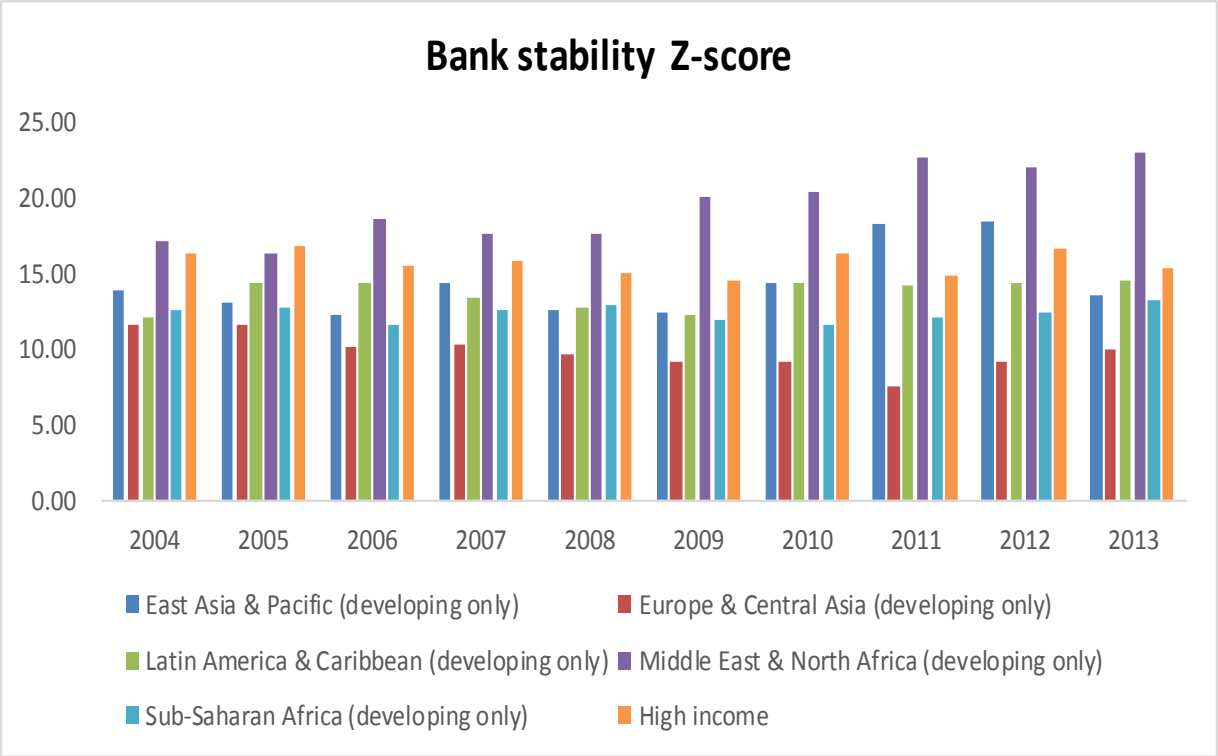


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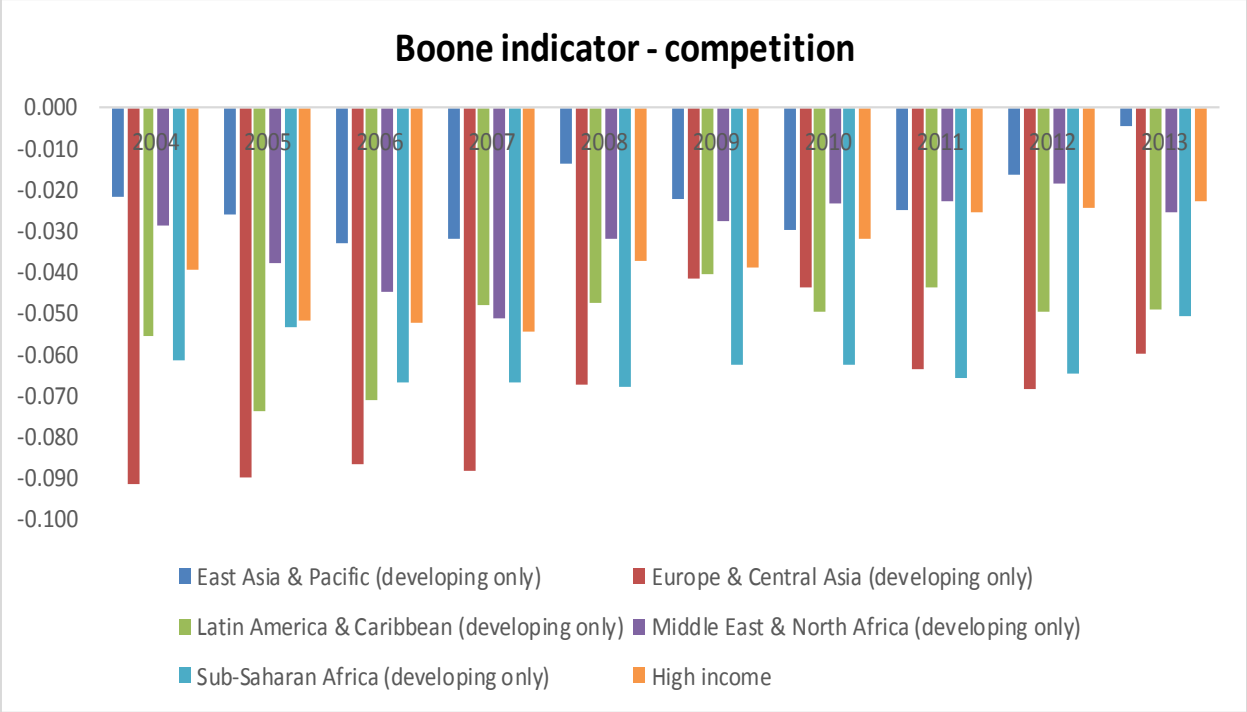


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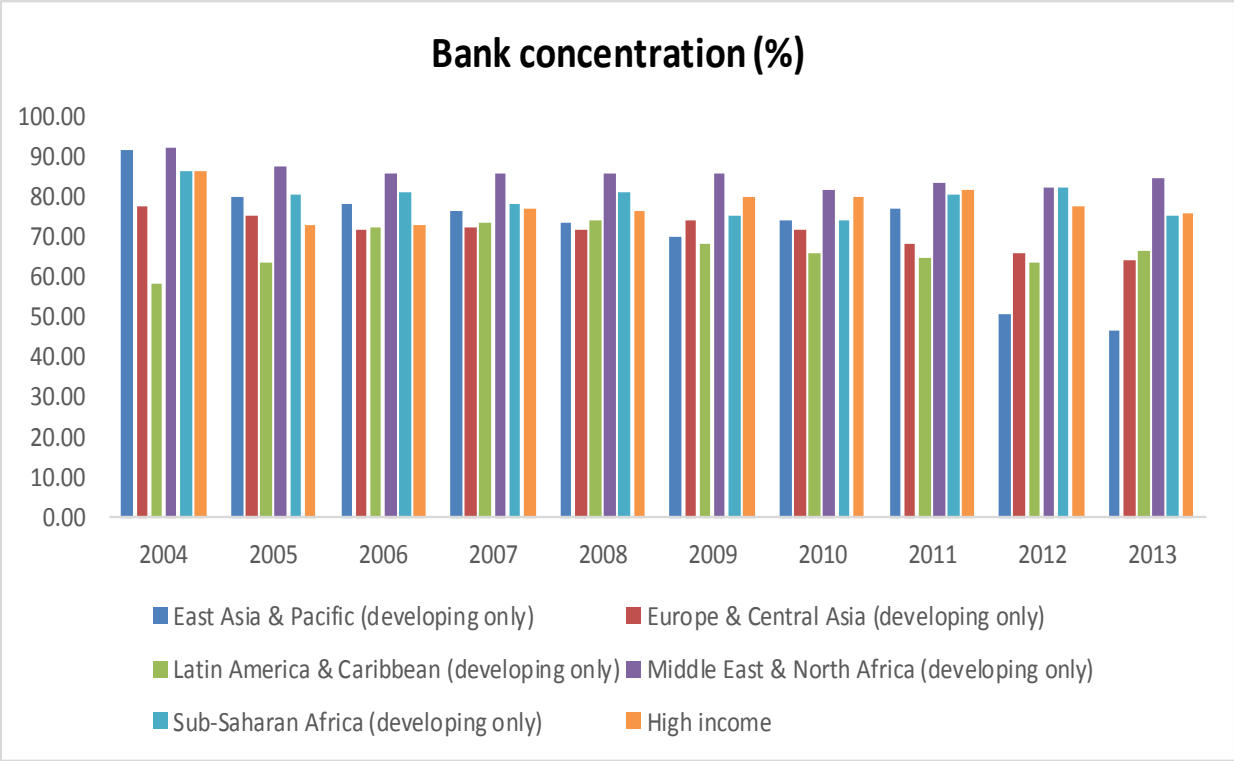


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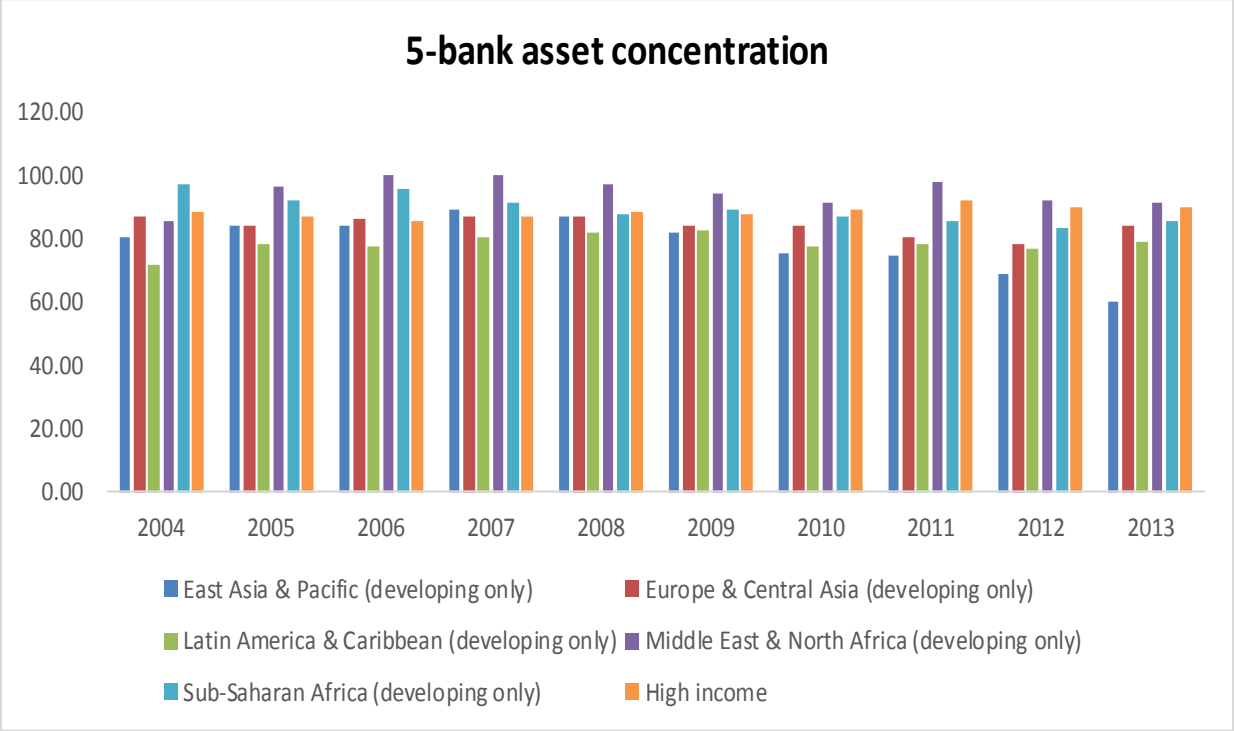


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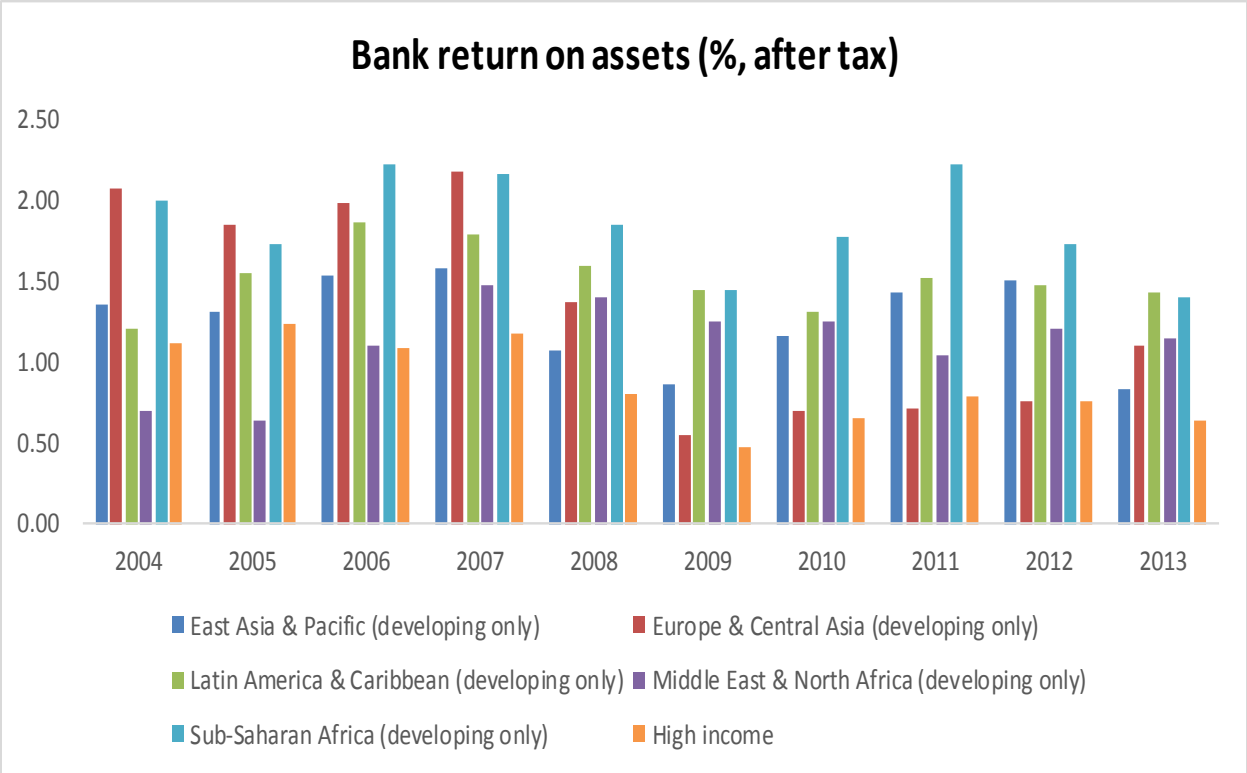


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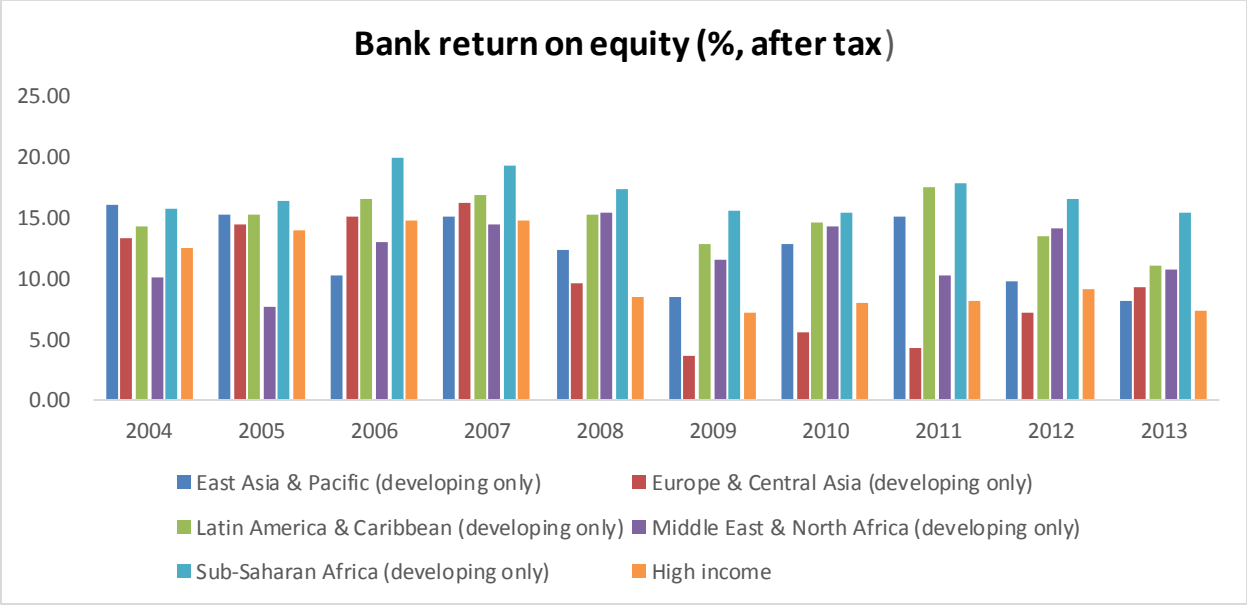
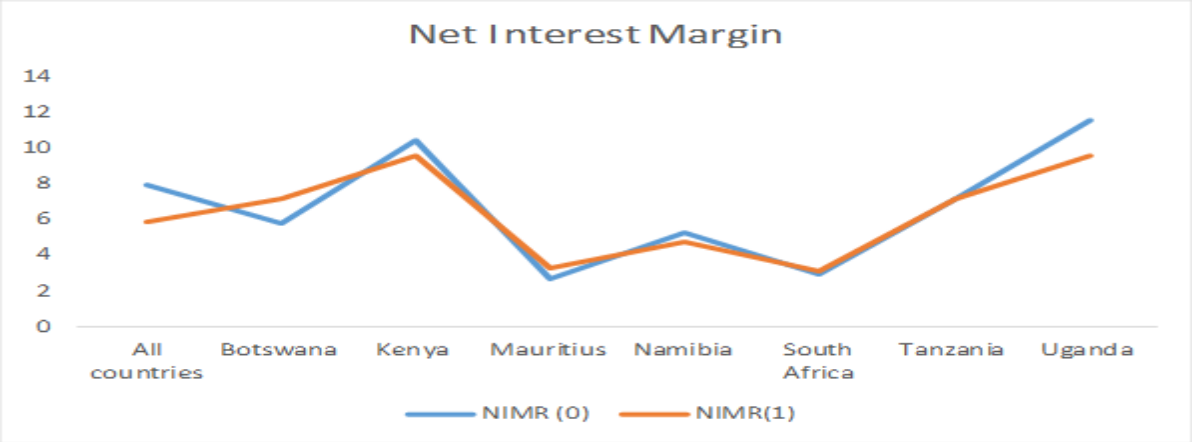



Source: World Bank Global Financial Development data base, 2015

### 4.4. Impact of adopting the Basel regulatory capital requirements for African banks

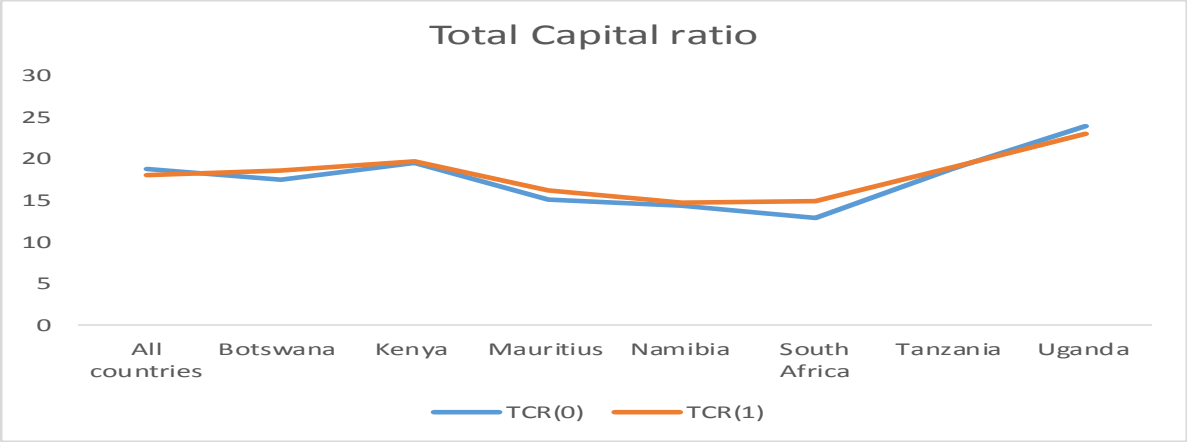
Responses for research question three on the impact of the Basel regulatory capital requirements on African Banks is derived from the trend and regression results. The blue line in the graphs below annotated as (0) represents the period pre- Basel and the orange line annotated as (1) represents the period post-Basel.

**Table 4: The effect of Basel regulatory capital on net interest margin**



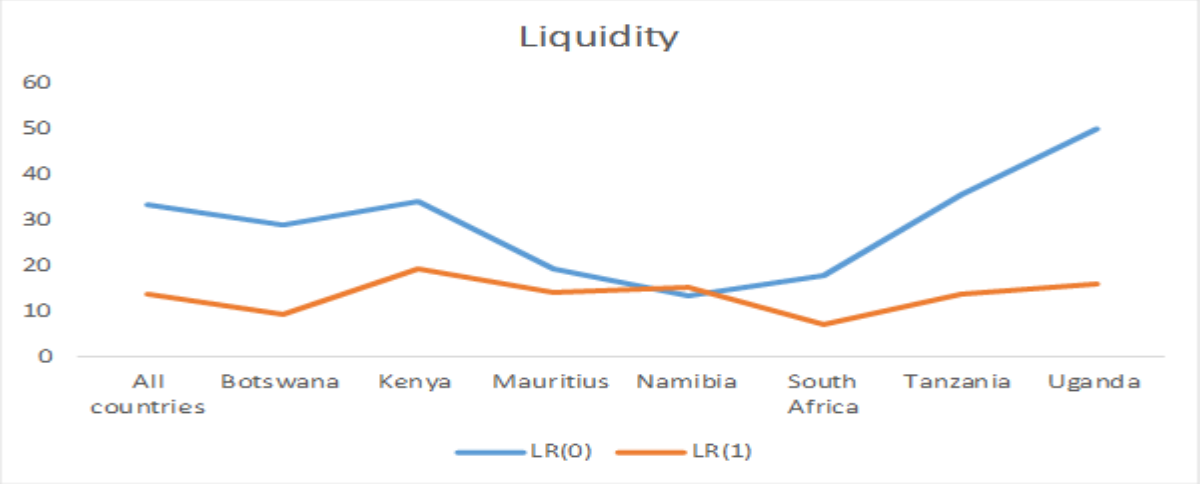

The net interest margin ratio decreased in the period post implementation of Basel in the samples for all countries, Kenya, Namibia and Uganda, whilst it increased for the samples for Botswana, Mauritius and South Africa.

**Table 5: The effect of Basel regulatory capital total capital ratio**



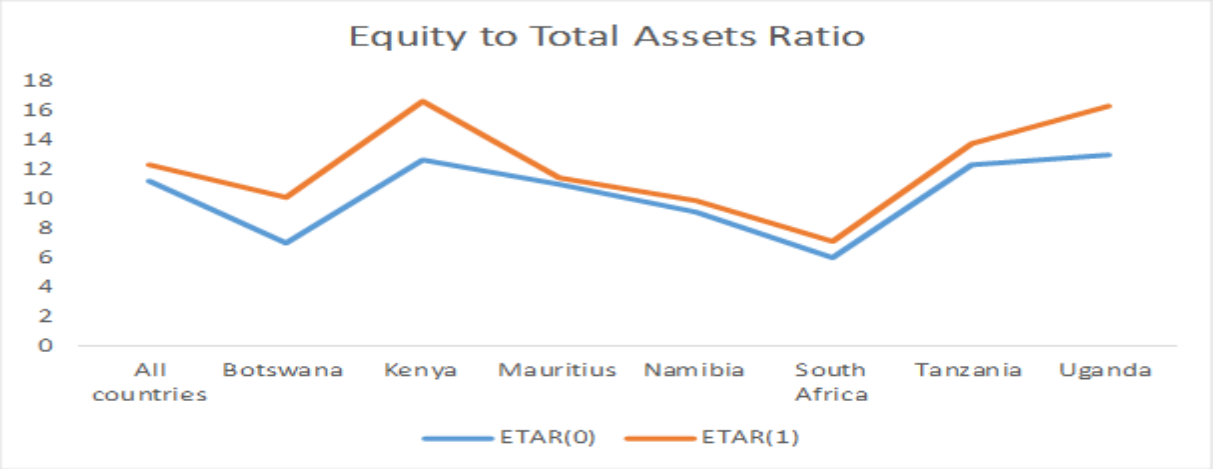

Total regulated capital ratio increased marginally for the sample for Botswana, Mauritius, Namibia and South Africa post Basel regulation implementation. On the other hand, it fell slightly for the sample for all countries, Tanzania and Uganda in line with the views that Africa already holds high levels of capital.

**Table 6: The effect of Basel regulatory capital on liquidity**



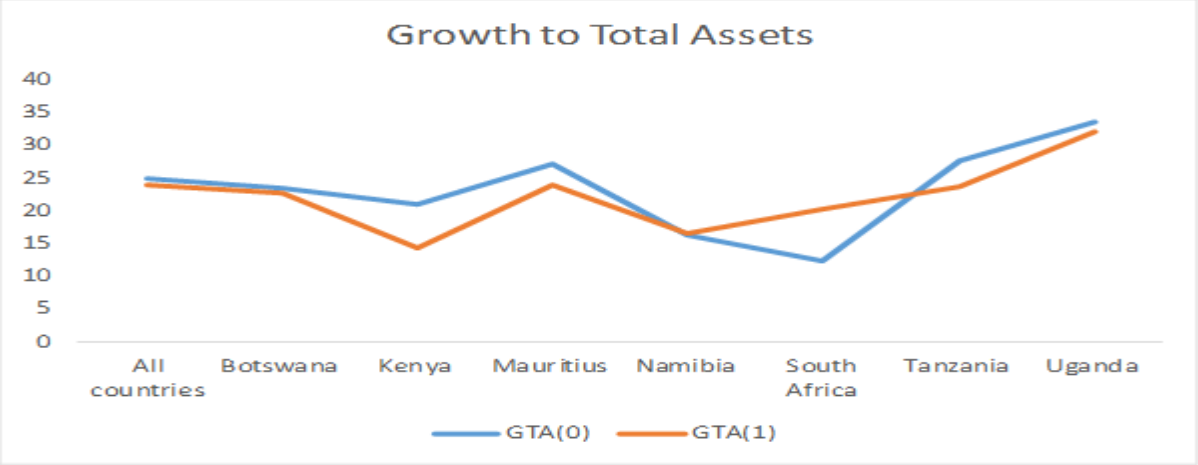

In the period post the implementation of Basel regulation the liquidity ratio dropped significantly for the samples for all countries, Botswana, Kenya, Mauritius, South Africa, Tanzania and Uganda, whilst Namibia increased slightly.

**Table 7: The effect of Basel regulatory capital on equity to total assets ratio**



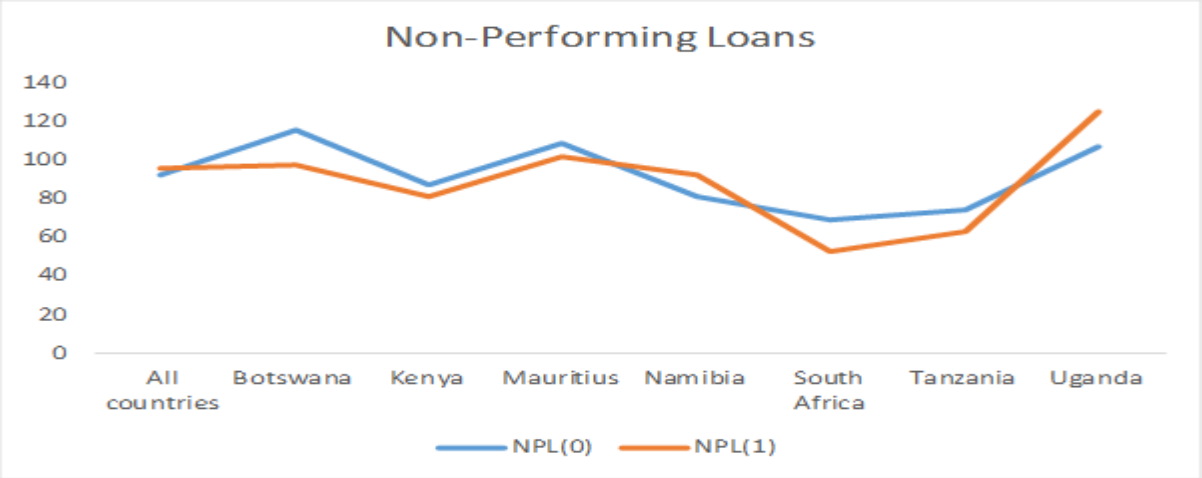

Following the implementation of the Basel regulation, the equity to total assets ratio (solvency) increased for the sample for all countries, Botswana, Kenya, Mauritius, Namibia, Tanzania and Uganda.

**Table 8: The effect of Basel regulatory capital on growth to total assets**




The growth to total assets ratio after the implementation of Basel regulation shows a mix, it dropped for the samples for Kenya, Mauritius, Tanzania and Uganda, whilst it remained almost the same for the samples for all countries, Botswana and Namibia. On the other hand, South Africa experienced an increase in the growth of assets.

**Table 9: The effect of Basel regulatory capital on non-performing loans**




Post the Basel implementation the performance for non-performing loans decreased for the samples for Botswana, Kenya, Mauritius, South Africa and Tanzania, whilst it increased for Namibia and Uganda.

The regression results given below are summarized in table 10, 11, 12 and 13.

### 4.5. The impact of implementing Basel regulatory capital on bank efficiency

The results show a mixed bag with regulatory capital giving a positive and significant coefficient at 1% significance level for Namibia and for all countries and 10% significance level for Mauritius indicating an increase in the net interest margin.

The dummy variable in the sample for Botswana shows a significant and positive coefficient at 10% which conveys a favorable improvement in the net interest margin of banks in the periods post Basel implementation.

South Africa has a positive and significant GDP coefficient at 1% indicating an increase in the net interest margin for banks. Uganda and all countries sample have a positive and significant coefficient on the real interest rates at 1% and 5% respectively signaling an increase in net interest margin as a result of an increase in interest rates. Currency appreciation as given by the positive and significant exchange rate coefficient for all countries and South Africa at 1% level indicates an increase in the net interest margin.

The model presents a mix of findings with regulatory capital having a significant impact in fifty percent of the sample and macroeconomic factors of GDP, interest rates and exchange rates showing significant influence in South Africa, Uganda and all countries.

### 4.5.1. The impact of implementing Basel regulatory capital on bank liquidity

Regulatory capital has a positive and significant coefficient for the samples for all countries, Kenya, Mauritius, Tanzania and Uganda at 1% indicating an increase in the liquidity of the banks. The dummy variable for the sample for Kenya, Uganda and all countries shows a negative and significant coefficient at 10% (Kenya), 5% (Uganda) and 1% (all countries) which indicates a decline in liquidity post regulatory capital implementation.

Interest rate increase in Uganda indicates an increase in the liquidity for banks. Exchange rates have a significant impact in Mauritius and all countries samples at 5% and 1% level respectively showing an increase in the liquidity.

The insignificance of regulatory capital in these two samples could be a result of the size of the sample which is small at four and five banks respectively. The regulatory capital and macroeconomic variables are more significant in a larger sample as shown in the sample for all countries, Kenya, Mauritius, Tanzania and Uganda.

### 4.5.2. The impact of implementing Basel regulatory capital on bank solvency

The effect of regulatory capital as given by the positive and significant coefficient of 1% for the sample for Kenya, Mauritius, Namibia, Tanzania, Uganda, all countries and South Africa at 5% indicates that an increase in the regulatory capital leads to an increase in the equity to total assets ratio.

Periods following the regulatory capital requirements implementation show a positive and significant coefficient for samples in Botswana and all countries at 1% and 5% respectively indicating an increase in the equity to total assets ratio post Basel implementation. Exchange rate appreciation for the sample for all countries at 5% significance level indicates an increase in the solvency ratio.

The model applies across the entire sample with the exception of Botswana.

### 4.5.3. The impact of implementing Basel regulatory capital on bank growth to total assets

Regulatory capital has no significance influence on the growth to total assets across the entire sample. However evidence from the trend analysis shows that there was a decline in the growth of total assets post regulatory capital requirements implementation in the samples for Kenya, Mauritius, Tanzania and Uganda.

GDP has a positive and significant coefficient for the sample for South Africa and all countries at 1% and 10% respectively indicating a growth in the growth to total assets ratio. A declining inflation rate for Namibia as shown by the negative and significant coefficient at 5% indicates an increase in the growth to total assets ratio. An appreciating exchange rate at 5% significance level for the sample for all countries shows an increase in the growth to total assets ratio.

## 4.6. Summary

Regulatory capital requirements have a positive and significant influence on bank's net interest margin, liquidity and equity to total assets ratio. This view is confirmed by the evidence coming from the trend analysis for net interest margin and equity to total assets ratio. Evidence from the empirical analysis indicates that African banks hold high liquid assets.

Macroeconomic variables play significant and influential role in determining financial fragility and soundness of banks and should not be ignored when reviewing ways to minimize bank crises.

## Table 10: The impact of implementing Basel regulatory capital on bank efficiency

| | All countries | Botswana | Kenya | Mauritius | Namibia | South Africa | Tanzania | Uganda |
|---|---|---|---|---|---|---|---|---|
| **Constant** | 2.93057*** | 13.4919*** | 17.3281 | 2.44957 | 2.91912*** | 2.49652 | 7.55309*** | 13.1848*** |
| | (0.843324) | (2.67103) | (11.4356) | (3.21428) | (1.04353) | (1.23284) | (2.28719) | (3.03209) |
| **Regulatory Capital** | 0.0921552*** | -0.207632** | -0.0669983 | 0.0351726* | 0.159364*** | 0.0841328 | -0.0126221 | 0.0279066 |
| | (0.0283304) | (0.0917867) | (0.0976386) | (0.0203840) | (0.0522255) | (0.0663005) | (0.0266204) | (0.0269481) |
| **Post-Basel P.B** | -1.67259*** | 2.00063* | -0.577198 | 0.599005 | -0.40762 | -0.312847 | 0.409877 | -1.85281 |
| | (.452559) | (1.06202) | (2.36968) | (0.742884) | (0.256832) | (0.279104) | (0.945844) | (1.27477) |
| **GDP** | 0.0624049 | 0.0360847 | 0.0189200 | 0.0237942 | -7.9818e-05 | 0.129415*** | 0.0962510 | -0.229343* |
| | (0.0776100) | (0.062789) | (0.380481) | (0.101802) | (0.000125185) | (0.0472979) | (0.228119) | (0.134863) |
| **Inflation rate** | 0.168110*** | -0.0017397 | 0.0610639 | -0.00735290 | 0.0239925 | -0.00606136 | -0.00631687 | 0.0327068 |
| | (0.0496431) | (0.0448458) | (0.225058) | (0.0723538) | (0.0580687) | (0.0318390) | (0.0804458) | (0.0676288) |
| **Interest rate** | 0.0934036*** | -0.0017397 | 0.0356554 | 0.00620667 | 0.0130967 | -0.0677015 | -0.0373737 | 0.0691268** |
| | (0.0331783) | (0.0448458) | (0.188229) | (0.0854767) | (0.0357941) | (0.120632) | (0.0862154) | (0.0341700) |
| **Exchange rate (LCU/USD)** | 0.00116652*** | -0.38577 | -0.0833806 | -0.0150486 | -00.0258052 | 0.206810*** | -0.000508541 | -0.000962102 |
| | (0.000260555) | (0.262221) | (0.141477) | (0.0857559) | (0.105466) | (0.0752064) | (0.00167491) | (0.00160577) |
| **F-statistic** | 7.175994 | 1.863474 | 0.262934 | 1.532280 | 2.637248 | 1.628645 | 0.104919 | 3.939831 |
| **R-squared** | 0.149341 | 0.184257 | 0.012796 | 0.100500 | 0.338973 | 0.240515 | 0.006186 | 0.186875 |
| **Number of banks** | 55 | 5 | 10 | 9 | 4 | 4 | 14 | 9 |
| **Number of observations** | 671 | 75 | 150 | 104 | 44 | 44 | 126 | 128 |

**Source:** Lynda Kahari 2016

P-values are illustrated in parentheses *, ** and *** giving the level of significance at 10%, 5% and 1% respectively.

## Table 11: The impact of implementing Basel regulatory capital on bank liquidity

| | All countries | Botswana | Kenya | Mauritius | Namibia | South Africa | Tanzania | Uganda |
|---|---|---|---|---|---|---|---|---|
| **Constant** | 10.4103*** | 4.88028 | 117.513*** | -68.7208* | 13.2586 | 4.28305 | 93.7111*** | 15.9574 |
| | (2.92389) | (25.4098) | (22.5725) | (35.2207) | (12.2141) | (20.5909) | (16.5137) | (21.4185) |
| **Regulatory Capital** | 1.34753*** | 1.07349 | 1.24609*** | 0.978891*** | -0.451866 | 0.333652 | 1.15797*** | 1.24732*** |
| | (0.0982245) | (0.873178) | (0.192727) | (0.223359) | (0.611281) | (1.10735) | (0.192201) | (0.190360) |
| **Post-Base P.B** | -10.2997*** | -11.1179 | -8.54320* | 5.39185 | 2.82792 | -0.941833 | -0.137975 | -19.8373** |
| | (1.56907) | (10.1031) | (4.67746) | (8.14021) | (3.00612) | (4.66159) | (6.82906) | (9.00493) |
| **GDP** | -0.692206** | -0.538813 | -1.66422** | 0.810418 | -0.00108024 | 0.929618 | 0.984958 | -0.969495 |
| | (0.269082) | (0.597319) | (0.751025) | (1.11550) | (0.00146524) | (0.789969) | (1.64703) | (0.952662) |
| **Inflation rate** | -0.299204* | -0.622001 | 0.0604949 | 0.839123 | 0.694329 | -0.0960240 | -0.714342 | -0.522480 |
| | (0.172118) | (1.62203) | (0.371543) | (0.792822) | (0.679672) | (0.531774) | (0.580824) | (0.477726) |
| **Interest rate** | 0.0789383 | 0.278986 | 0.0604949 | 0.196745 | -0.138199 | -1.01725 | -0.0827396 | 0.455717* |
| | (0.115033) | (0.426623) | (0.371543) | (0.936617) | (0.418957) | (2.01480) | (0.622481) | (0.241375) |
| **Exchange rate (LCU/USD)** | 0.00464703*** | 1.75495 | -1.23001*** | 2.09148** | 0.422454 | 1.49622 | -0.0564512*** | 0.00468011 |
| | (0.000903369) | (2.49454) | (0.279258) | (0.939677) | (1.23444) | (1.25610) | (0.0120930) | (0.0113431) |
| **F-statistic** | 22.36580 | 0.663348 | 15.58007 | 4.327336 | 1.028584 | 0.592918 | 12.88822 | 12.66912 |
| **R-squared** | 0.353661 | 0.074422 | 0.434399 | 0.239853 | 0.166668 | 0.103372 | 0.433285 | 0.424967 |
| **Number of banks** | 55 | 5 | 10 | 9 | 4 | 4 | 14 | 9 |
| **Number of observations** | 671 | 75 | 150 | 104 | 44 | 44 | 126 | 128 |

Source: Lynda Kahari 2016

P-values are illustrated in parentheses *, ** and *** giving the level of significance at 10%, 5% and 1% respectively.

## Table 12: The impact of implementing Basel regulatory capital on bank solvency

| | All countries | Botswana | Kenya | Mauritius | Namibia | South Africa | Tanzania | Uganda |
|---|---|---|---|---|---|---|---|---|
| **Constant** | 1.93807** | 13.0446*** | 0.446550 | 7.96096 | -2.86314 | 1.62089 | 7.71135 | -1.39426 |
| | (0.914090) | (3.34842) | (9.22187) | (8.82413) | (2.82129) | (2.43385) | (6.56796) | (5.75342) |
| **Regulatory Capital** | 0.415555*** | 0.0801794 | 0.270575*** | 0.731070*** | 0.688093*** | 0.269831** | 0.397145*** | 0.420307*** |
| | (0.0307077) | (0.115065) | (0.0787376) | (0.0559601) | (0.141197) | (0.130889) | (0.0764439) | (0.0511343) |
| **Post-Basel P.B** | 1.59416*** | 2.66221** | 2.64355 | -0.448827 | 0.644271 | 0.146825 | 0.888869 | 2.21209 |
| | (0.490535) | (1.33136) | (1.91095) | (2.03943) | (0.694371) | (0.551002) | (2.71611) | (2.41890) |
| **GDP** | 0.0125568 | 0.0607527 | 0.112674 | -0.0524640 | 0.000133959 | 0.0563247 | -0.481064 | 0.109355 |
| | (0.0841225) | (0.0787128) | (0.306827) | (0.279475) | (0.000338451) | (0.0933746) | (0.655072) | (0.255903) |
| **Inflation rate** | 0.0996696* | 0.00410855*** | 0.0611055 | -0.0901127 | 0.0367508 | -0.0421065 | -0.232907 | 0.113410 |
| | (0.0538089) | (0.056219) | (0.181491) | (0.198632) | (0.156995) | (0.0628559) | (0.231010) | (0.128326) |
| **Interest rate** | 0.0184011 | 0.00410855 | 0.00991532 | 0.00983750 | 0.101628 | -0.107532 | -0.148374 | -0.0416100 |
| | (0.0359624) | (0.056219) | (0.151792) | (0.234658) | (0.0967731) | (0.238150) | (0.247579) | (0.0648379) |
| **Exchange rate (LCU/USD)** | 0.000609282** | -0.453178 | 0.0723033 | -0.247469 | 0.184635 | 0.196718 | 0.00220124 | 0.00189024 |
| | (0.000282419) | (0.328723) | (0.114089) | (0.235425) | (0.285137) | (0.148471) | (0.00480972) | (0.00304696) |
| **F-statistic** | 16.25048 | 3.546849 | 2.371619 | 25.64374 | 4.084477 | 4.548609 | 4.489118 | 12.14158 |
| **R-squared** | 0.284470 | 0.300661 | 0.104673 | 0.651550 | 0.442650 | 0.469342 | 0.210300 | 0.414609 |
| **Number of banks** | 55 | 5 | 10 | 9 | 4 | 4 | 14 | 9 |
| **Number of observations** | 671 | 75 | 150 | 104 | 44 | 44 | 126 | 128 |

Source: Lynda Kahari 2016

P-values are illustrated in parentheses *, ** and *** giving the level of significance at 10%, 5% and 1% respectively.

## Table 13: The impact of implementing Basel regulatory capital on bank growth to total assets

| | All countries | Botswana | Kenya | Mauritius | Namibia | South Africa | Tanzania | Uganda |
|---|---|---|---|---|---|---|---|---|
| **Constant** | 25.5583*** | 65.0325* | 16.7901 | 0.449979 | 32.2677*** | -13.5246 | 112.731*** | 51.3773 |
| | (5.78136) | (37.6291) | (19.1420) | (76.3251) | (11.0313) | (22.1616) | (21.9548) | (74.2265) |
| **Regulatory Capital** | -0.315649 | -0.123875 | -0.318314 | -0.0686285 | -0.831751 | -0.894866 | -0.347905 | -0.796661 |
| | (0.194218) | (1.29308) | (0.248818) | (0.484032) | (0.552086) | (1.19182) | (0.255530) | (0.659699) |
| **Post-Base P.B** | -11.6056*** | 3.11482 | 3.35666 | -8.40426 | -3.23305 | 2.99379 | -7.45495 | -12.9124 |
| | (3.10250) | (14.9616) | (6.03879) | (17.6403) | (2.71501) | (5.01718) | (9.07919) | (31.2069) |
| **GDP** | 1.00755* | 0.941509 | 1.46700 | 0.798517 | -0.00180435 | 4.06980*** | 0.684839 | 2.32075 |
| | (0.532052) | (0.884563) | (0.969603) | (2.41735) | (0.00132335) | (0.850227) | (2.18972) | (3.30148) |
| **Inflation rate** | -0.0971592 | 0.280569 | 1.40266** | -1.10502 | -1.33017** | 0.754570 | -0.321885 | -0.847638 |
| | (0.340326) | (2.40205) | (0.573529) | (1.71809) | (0.613855) | (0.572338) | (0.772201) | (1.65558) |
| **Interest rate** | -0.190360 | -0.0625525 | 0.274732 | 0.916347 | -0.293595 | 1.47259 | 0.899297 | -0.761449 |
| | (0.227452) | (0.631782) | (0.479677) | (2.02970) | (0.378386) | (2.16849) | (0.827584) | (0.836493) |
| **Exchange rate (LCU/USD)** | 0.00358060** | -7.44752** | 3.35666 | 0.646482 | 0.743434 | 1.50204 | -0.0597331*** | -9.46589e-05 |
| | (0.00178622) | 3.69414) | (6.03879) | (2.03633) | (1.1149) | (1.35191) | (0.0160775) | (0.0393097) |
| **F-statistic** | 2.412174 | 1.141144 | 2.525215 | 1.107181 | 1.340444 | 7.724763 | 4.272090 | 0.900187 |
| **R-squared** | 0.055725 | 0.121513 | 0.110702 | 0.074701 | 0.206753 | 0.600326 | 0.202189 | 0.049891 |
| **Number of banks** | 55 | 5 | 10 | 9 | 4 | 4 | 14 | 9 |
| **Number of observations** | 671 | 75 | 150 | 104 | 44 | 44 | 126 | 128 |

Source: Lynda Kahari 2016

P-values are illustrated in parentheses *, ** and *** giving the level of significance at 10%, 5% and 1% respectively

# Chapter 5

## Conclusions and Recommendations

### 5.1. Introduction

Bank fragility and financial crises have always generated a lot of interest amongst economists, policy makers, enterprises and academics because of the “special” role played by banks in an economy and the devastating effects that the world has experienced in the aftermath of global financial crises. There is a general quest for risk management tools and policies that can minimise the occurrence and impact of financial crises.

This chapter is arranged into concluding remarks, recommendations, future research and summary.

### 5.2. Concluding remarks

The study concludes that Basel regulatory capital has a significant and positive influence on the intermediation role performed by banks in Africa whilst minimising fragility by enhancing bank solvency and liquidity. Banks already enjoy high net interest margin even in period’s prior implementation of regulatory capital and the impact of regulatory capital is marginal.

Interesting results from the regression show that implementation of regulatory capital does not have any significant influence on the growth of total assets. The study suggests that the growth to total assets is determined by macroeconomic variables; GDP growth, increasing interest rates, appreciating exchange rates and decreasing inflation. However, non-performing loans show that there was a general decline in nonperforming loans in the periods after the implementation of regulatory capital.

Trend analysis research suggests that African banks have always held high capital, hence the introduction of regulatory capital has minimal impact on the capital holdings.

Observation from the literature review suggests that African banks have been slow to adopting the Basel Accords with most countries still attempting to implement Basel I and Basel II, and have not even embarked on Basel III.

### 5.3. Recommendations

From a regulator and bank perspective the results indicate the need to understand determines of financial fragility and the risk management tools available for use and their appropriateness to support financial stability.

On macroeconomic policies, the results suggest that GDP growth, declining inflation, increasing real interest rates and appreciating exchange rates have a significant impact on minimising bank fragility. Results from the literature review suggest that Africa has to strengthen its legal institutions in terms of property rights, law enforcement, protection, political institutions to ensure effective adoption of Basel framework and minimising bank fragility.

A decline in nonperforming loans post Basel regulatory capital implementation suggests that the Basel framework improves the quality of assets that banks hold. For governments attempting to stimulate economic development with the support of bank credit expansion programmes, reducing interest rates may stimulate the growth of credit supply.

From a bank perspective the empirical analysis suggests that the banks have limited intermediation role. To deepen their role in intermediation banks in Africa may have to expand their product propositions and open up cheaper channels that enable depositors and borrowers to transact at lower costs.

### 5.4. Future research

There are vast areas of research and relationships that need to be investigated with regards to the accords and their impact on the banking system. There is an opportunity to study regulatory arbitrage emanating from the implementation of regulatory capital framework in Africa by examining where the population that is denied loans from the banks because of high risk weights applied from the regulatory framework go to for credit.

### 5.5. Summary

Financial fragility is not only a result of weak internal controls and low capital adequacy but can be attributed to a combination of elements such as macroeconomic policies, exogenous shocks and global markets shocks. The Accords are more suited to elements that the banks themselves are in control of and not those that are imposed on it by outside forces. The research concludes that the Accords as a risk mitigation set of tools in the form of capital requirements does put banks in stronger position to withstand shocks that emanate from the banking systems i.e. contain contagion from failure in one institution and these accords seem not reduce the profitability of banks significantly that banks should not comply.

Because the African banks do not engage in speculative activities to the extent that banks in developed countries do, some of the pillars and prescripts would not apply to African Banks and crisis emanating from such activities on the continent are limited. However, the researcher believes that it is rather safe than sorry, and build a banking system which takes into cognisance lessons of experience will safe guard against internally generated crisis. Policy makers should always be aware that policies that they enunciate should ensure that they protect the financial system lest its failure has dire consequences for the society.

## Literature References

**Table 19: Review of the literature**

| Author | Region | Findings |
|---|---|---|
| Allen, F., & Gale, D. M. (2003). | Global | They define financial fragility as a situation which arises "when small shocks have disproportionately large effects". The results from the model confirm that small shocks to the demand for liquidity may lead to either high volatility in asset-prices or bank defaults or both. |
| Altman, (1968) | | The paper demonstrates the pros and cons of the Z-score model (1968) paper and the ZETA (1977) credit risk model. The ZETA score shows an improvement over the weaknesses of the Z-score. |
| Arena, M. (2008). | Global | The results show that systemic shocks emanating from both macroeconomic and liquidity have a significant impact on bank stability and triggered the crises in weak banks. It's not only bank-level fundamentals that have significant effect on the likelihood of bank collapse but macroeconomic variables as well. |
| Barker, D., & Holdsworth, D. (1993). | Europe Union | They developed a rating model that can be used to evaluate banking systems from different countries as well as individual banks. Their findings revealed that in the European Union countries during the period 2009 - 2013, 8 banking systems were in weak rating category, 11 banking systems were in moderate rating category and 9 banking systems were in strong rating category. |
| Barajas, A., Chami, R., Cosimano, T., & Martínez-Pería, M. S. (2004). | Latin America | Bank capitalization and lending activities in Latin America increased after Basel. There was no overall credit decline. Loan growth became more sensitive to some risk factors. Basel II might cause greater procyclicality of credit. |

| | | |
|---|---|---|
| Basu, S. (2003). | | The analysis suggest that the causes of bank failures largely emanate from poor credit standard requirements. Given that the environments that banks operate are filled with uncertainty, the bank has to provide for the means of recouping loans in the event of defaults. Hence there is always an element of fragility in the banking system arising from the uncertainty of loan repayments. In addition the paper shows that liberalisation of the financial system increases competition, which in turn means banks have to carry high credit risk which might lead to a bank collapse if the borrowers default. |
| Beck, T., & Cull, R. (2013). | Africa | African banking systems are shallow but stable. African banks are well capitalized and over-liquid, but do not lend much to the private sector than banks in non-African developing countries. African enterprises and households are less likely to use financial services than their peers in other developing countries. The paper also describes a number of financial innovations across the continent that can help overcome different barriers to financial inclusion and have helped to expand the bankable and the banked population. |
| Blum, J., & Hellwig, M. (1995). | Global | Their findings show that capital adequacy regulation for banks may lead to macroeconomic volatility. Economic shocks may lead to a fall in the aggregate demand thus decreasing the ability of firms to service their debts to the banks. A decrease in firms servicing their banks loans reduces the bank equity. Coupled with capital adequacy requirements, this will reduce reduces bank lending and investment in the market. |
| Bongini, P., | East Asia | They examine the performance of three indicators of |

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| Claessens, C., & Ferri, G. (1999). | | bank fragility that can be calculated from available public information: accounting data, stock market prices, and credit ratings. Their evidence states that where information processing is quite costly, as in most developing countries, it is important to use simultaneously a number of indicators to assess bank fragility and that foreign holding in bank portfolios reduces bank distress. |
| Bossone, B. (1999). | Global | The specialness of banks is attributed to their demand deposit liabilities and to their running the economy's payment system. The specialness of banks is not going to change because of e-money |
| Boyfield's, (2009) | UK | Argues that consumers are turning to the less regulated markets of loan sharks to borrow money as regulation is squeezing them out of the regulated market of banks. Activities in the loan shark is on the increase as consumers find it hard to access credit.<br>He further highlights the issues arising from the regulatory rules on leasing to SMEs as the same rules that apply to big corporations. |
| Brownbridge, M. (2015). | Sub-Sahara Africa | African banks hold a large amount of liquid assets as a percentage of their liabilities demonstrating that their role as financial intermediaries is very small. African banks earn a much higher net interest margin; have high non-performing loans to total loans ratio and have high overhead costs. Banks in the region have widely adopted Basel I Raising the minimum capital requirements and holding high capital is necessary for African banks as it will assist the banks in minimizing the risks posed by volatile economies. Capital requirements are not the only fundamental component |

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| | | of the regulatory framework an effective banking supervision is also required. |
| Brownbridge, M. (1998, March). | Sub-Sahara Africa | The main cause of bank failures for local banks in Africa are; macroeconomic instability, liquidity support and prudential regulation, lending to high risk borrowers and insider lending. |
| Blum, J. (1999). | | The findings reveal that capital adequacy rules may lead to an increase in the bank's riskiness. The model shows that an attempt by the regulators to reduce insolvency by bringing in capital regulation may result in a decline of bank profits, hence if a bank's future profits are low there is no incentive for the bank to avoid default. In addition the model shows that the amount of equity and deposits does not directly impact the likelihood of default. Thus capital regulation may have unintended consequences. |
| Cass, D., & Shell, K. (1983). | | They state that uncertainty caused by external events does not matter in the Arrow-Debreu model. It however matters in a Pareto optimal model. |
| Chandrasekhar, C. P. (2005). | | Financial liberalization changes the structure of the financial system and the individual financial firms to mimic that of the developed countries such as the US and UK. Financial liberalization makes developing countries vulnerable to crises and deflationary environments that could lead to foreign investors acquiring domestic assets at low prices. |
| Chang, R., & Velasco, A. (2000). | | The results show that the exchange and monetary regimes have different impacts on the financial fragility bank, hence the choice of the exchange regime may determine the extent of the fragility. The results show evidence of self-fulfilling runs |

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| Cole, R. A., & Gunther, J. W. (1995). | Global | Indicators such as capital, troubled assets, and net income, are related significantly to the timing of bank failure. Variables such as bank liquidity, investment securities and large certificates of deposit - are not important determinants of bank failure. The survival time of failing banks is not related to bank asset size. |
| Cumming, S., & Nel, H. (2005). | South Africa | The banks were able to achieve the regulatory capital by raising additional capital hence addressing the major concern of the Accords are that regulatory capital requirements would decrease the overall bank lending leading into an economic contractions. The banks moved to lower risk assets demonstrating that the risk weighted approach had achieved a more stable banking system. Findings show that regulatory capital requirements decrease credit supply to the private sector and increase the likelihood of high costs for loans. |
| Chiuri, M. C., Ferri, G., & | Emerging | It shows that minimum regulatory capital requirements negatively impact the supply of credit especially in developing countries where its credit is most needed. It advocates for those responsible for global regulation to revise the capital regulation taking into consideration the problems faced by developing countries in complying to these regulations. |
| Das, U. S., Quintyn, M., & Chennard, K. (2003). | | It demonstrates that the quality of regulatory governance in form of best practices as adopted by the regulators is important to ensure a sound financial system. However, other factors such as Macro-economic, banking system structure, and the quality of political institutions and public sector governance is influential in determining financial |

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| | | soundness. |
| Demirgüç-Kunt, A., & Detragiache, E. (1997). | Global | The results suggest that crises tend to erupt when the macroeconomic environment is weak, particularly when growth is low and inflation is high. High real interest rates are clearly associated with systemic banking sector problems, and there is some evidence that vulnerability to balance of payments crises has played a role. Countries with an explicit deposit insurance scheme<br>were particularly at risk, as were countries with weak law enforcement |
| Demirgüç-Kunt, A., & Detragiache, E. (1998). | | Their study finds that financial liberalization can increase the likelihood of banking crises especially in countries with weak institutional environment. Thus the strengthening of institutional framework and environment needs to be developed very early into the liberalization process. |
| Diamond, D. W. (2007). | | According to Diamond, the model depends on the fact that banks gather deposits so as to give their investors liquid assets. However, demand deposits only operate well under circumstances where there is confidence in the bank, in the event that confidence falls and there is a run on the bank, the bank becomes fragile. |
| Diamond, D. W., & Dybvig, P. H. (1983). | | Whilst the model is based on one bank it is useful in explaining banking. Bank runs in the model result in negative economic impact. However, the model show that the provision of deposit insurance can result in an improvement in the quality of contracts. |
| Diamond, D. W., & Rajan, R. G. (1999). | Global | The main source of liquidity for banks comes from the deposits. Deposits make a bank structure fragile because they have to be paid out upon demand .Banks |

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| | | can raise additional capital from external sources. Holding high levels of capital decreases the liquidity of a bank but enables the bank to withstand stress and survive crises. It points to overlooked side-effects of policies such as regulatory capital requirements and deposit insurance. |
| Eichengreen, B., & Hausmann, R. (1999). | | They examine the relationship between fragility and exchange rates, more so the problems of moral hazard emanating from the use of pegged exchange rate, the problem of using the domestic currency to borrow domestically and internationally. They offer a number of solutions to mitigate against these problems name; dollarization and emulating the Australian approach. |
| Estrella, A., Park, S., & Peristiani, S. (2000). | Global | The regulatory capital ratios can be used to predict bank failures. Capital, leverage and capital to gross revenue ratios are simple and less costly than more complex risk weighted ratios. They can predict over a two year period horizon. |
| Gropp, R., Vesala, J. M., & Vulpes, G. (2004). | US | The study shows that the most important determinants of bank capital structure is the “unobserved time-invariant bank fixed-effects”. Deposit insurance has a very small role in the bank capital structures. |
| Griffith-Jones, S., Segoviano, M. A., & Spratt, S. (2003). | Developing | Basel Accords may lead to a decrease in the supply of lending and an increase in the cost of lending to developing countries. The reduction in lending to developing countries can have dire consequences as they rely heavily on the funds for development agenda. Systemic risk can arise from the adoption of the IRB approach, as this is likely to increase procyclicality, thus increasing the probability of crises. Banks in developing countries are likely to face increased competition from |

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| | | internationally active banks who are compliant with the Basel IRB approach and who have finely tuned their capital requirements. Accords might result in consolidation and acquisitions of smaller banks. |
| Griffith-Jones, S., & Spratt, S. (2001). | Developing | Raise the concerns that the Basel risk based weights are not "fair" for developing countries because they incentivise the developing countries to seek OECD membership.<br>The (20%) risk-weights attached to short-term loans for emerging markets created "a bias in their favour whilst credit to non-OECD banks with over one year maturity was discouraged by a far higher<br>(100%) risk weight." This later contributed towards the Asian crisis of 1997/8 |
| Gottschalk Institute of Development Studies, UK<br>31 May 2008 F | Sub-Sahara Africa | The findings from the interview illustrate the key challenges faced by banks in SSA being the lack of technical skills and expertise to validate models and monitor their use; participation of foreign banks; competition; procyclicality; collaboration between home and host supervisors and credit portfolio concentration and credit to SMEs. |
| Gropp, R., & Heider, F. (2010). | | The results show that the negative distance to default is a good indicator of a bank fragility compared to equity based prices. Bond spread can be used as an indicator of fragility, it is however important to note that this might be difficult to calculate. In addition the paper recommends regulators to use equity market data as additional information for gauging bank fragility. |
| Hardy, D., & Pazarbasioglu, C. (1998). | | The empirical results suggest that a contemporaneous decrease in real GDP growth; inflation, credit expansion, capital inflows, rising real interest rates, |

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| | | decline in exchange rates, declining capital output ratio, negative trade shock may lead to bank distress. |
| Heffernan, S. *(2003). 14.* | | Causes of bank failures: are weak asset management; managerial problems; fraud; role of regulators; too big to fail; lack of experience with relatively new financial products; 'cluster': bank failures tend to cluster around a few years |
| Hoggarth, G., Reis, R., & Saporta, V. (2002). | Global | Output losses incurred during crises in developed countries are as high, if not higher, on average, than those in emerging-market economies. Output losses during crisis periods in developed countries also appear to be significantly larger; 10–15% – than in neighbouring countries that did not at the time experience severe banking problems. In emerging markets, banking crises appear to be costlier only when accompanied by a currency crisis. |
| Kane, E. J., & Rice, T. (2001). | | According to the paper, the average time an African banking system spends to come out of a crises increases with the level of corruption. They show that depositors in Africa pay high costs which arise from the need for banks to mitigate against losses and the regulation that banks have to comply with. The main source of bank stress is from provided losses which might arise from the information asymmetry and effectiveness of supervision in reducing bank solvency. |
| Kasekende, L., Ndikumana, L., & Rajhi, T. (2009). | Africa | Africa is not heavily integrated in the global financial system, its financial markets is still underdeveloped, foreign borrowings by banks is still regulated, limited diversification of stocks. The crises resulted in fall in demand and price of commodities, reduction in capital flows, and reduction in aid, capital outflows, and losses |

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| | | in stock markets. |
| Keister, T. (2015). | | The model shows that in instances where there is aggregate risk in the economy, some of the risk can be carried by the state, the expectation to be bailed out might in the event of a financial crises disincentives intermediaries in carry out their role effectively. Probability of investors pulling out when faced with a crises is high. |
| Kaufman, G. G. (1996). | Global | He argues that the optimum way to minimise systemic risk in the bank system is sound macroeconomic policies that "achieve stability and avoid price bubbles that leave banks highly vulnerable to failure." Given that it is difficult to maintain sound macroeconomic conditions, prudential regulation becomes important role in minimising bank failures. Regulation can introduce effective system of structured early intervention and resolution. |
| Jickling, M 2010 | | Discusses the causes of the financial crises of 2007 as; imprudent lending, housing bubble, global imbalances, securitisation, rating agencies, lack of transparency, off balance sheet, finance, market to market accounting, excessive leveraging |
| Jones, D. (2000). | Global | Highlights the challenges that are faced by the regulators in the form of regulatory arbitrage. Key findings; regulatory capital arbitrage will quietly decrease the prescribed capital standards and this can go undetected as the existing Basel supervisory tools are not able to measure it. There is a close linkage between deposit insurance and capital regulation. Deposit insurance is designed to overcome the asymmetry of information in the banking system. |

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| Gambacorta, L., & Mistrulli, P. E. (2004). | Italy | He finds that well capitalised banks can withstand shocks coming from monetary policies and GDP and are less procyclical. They can withstand these shocks because they can easily tap into non –deposit funds. He concludes that when assessing regulation on bank capital it is important to evaluate macroeconomic factors as well. |
| Ladekarl, J., & Zervos, S. (2004). | Africa | This study hypothesizes that the determination of whether a country is investable or not is influenced by a number of factors, especially related to size, quality of "housekeeping" (macro-policies, political economy, local financial markets, corporate governance, etc.) and efficiency of "plumbing" (legal and regulatory framework, custody, clearing and settlement, taxes, etc.). |
| Laeven, L., & Valencia, F. (2008). | Global | Systemic Banking Crises data base prepared by Laeven and Valencia (2008) provides data on banking crises for a large population of countries from 1970 to 2007 and the policy resolutions. The data base builds on the work by Caprio, Klingebiel, Laeven, and Noguera (2005) banking crisis database, and is the detailed database on banking. It has recorded one hundred twenty four episodes of banking crises between 1970 and 2007. |
| Lagunoff, R., & Schreft, S. L. (2001). | | They present a model in which agents' "financial positions are linked through the diversified portfolios they hold and the payment commitments that emerge from credit market activity". The model demonstrates the impact of shocks to the economy and how they can result in default by entrepreneurs on their payment commitments. Hence, subjecting some investors to |

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| | | massive losses on their portfolios and because portfolios are connected, defaults can easily spread through the financial system, “allowing the shocks to have an impact far beyond their place of origin”. |
| Moosa, I. A. (2010). | | The Accord is criticized for: (i) allowing the use of bank internal models to determine capital charges, (ii) for boosting procyclicality; reliance on rating agencies, one-size-fits-all approach. He argues that financial integration may not be relevant given what happened in the financial crises of 2007. |
| Naceur and Kandil (2013) | | Their finding show that regardless of the introduction of regulatory capital, there was a growth in credit supply and assets. Credit expansion seems to be influenced by macroeconomic variables such as real growth, exchange rates, and cost of borrowing. |
| Ragalevsky, S. V., & Ricardi, S. J. (2009). | US | The FDIC Office of the Inspector General gives the main cause of bank failures as inadequate governance, weak risk management and the lack of diversification (risk) or lending concentration. There are four stages in the life of a distressed bank; stage 1- the bank has incompetent management and no strategy, accords and standards; stage 2- the bank experiences growth based on poor lending standards, oversights; stage 3 – deterioration and finally the bank failure |
| Rodríguez, L. J. (2003). | Global | Bank regulations have become very complex, opaque, and with a multitude of rules tailored to cater to every possible constituency. The process by which these rules are adopted has become increasingly burdensome, lengthy, and politicized. Subordinated debt—that is, uninsured debt junior to all other claim is |

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| | | one of the most effective market mechanisms for relaying information about a bank's risk profile. The Basel committee should put greater emphasis on market discipline, innovation, and competition among regulatory regimes. Those factors will assist to promote the safety and soundness of the international financial system in a superior way. |
| Sagner, J. S. (2010). | US | Concludes that Basel II resulted in decrease in lending, reduced economic activity, increased cost of bank capital, high costs of implementation and distortions in competition. |
| Shehzad, C. T., & De Haan, J. (2009, January). | | The results show that financial liberalisation decreases the probability of systemic crises. |
| Scholtens, B., & Van Wensveen, D. (2000). | Global | Financial intermediaries operate under market emanating from information asymmetry. Whilst they will be able to decrease transaction and information costs, intermediaries are still faced with the agency problems and with moral hazard and adverse selection. |
| Stiglitz, Joseph (May 2010). | | The study highlights the problems presented by global integration, hence the conclusion that more integration might not be important for global economies. |
| Tadesse, S. (2006). | Global | The study adds to the literature by highlighting that more disclosure and stricter external auditing standards are highly related to banking system stability. The results demonstrates that greater disclosures can bring about real output losses as a result of instability. He further emphasizes the significance of ensuring the |

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| | | credibility of the reporting. |
| Thomson, J. B, 1991. | Global | Concludes a bank failure is related to its solvency, capital adequacy, asset quality, management quality and the liquidity of the portfolio. Macroeconomic factors appear to have an impact on bank failure, and have a long term horizon i.e. four years before the bank failure. Finally, the proxy on the performance closure constraint indicates the probability that the bank will not only become insolvent but will be shut down. |
| Williamson, S. D. (1986). | | The study identifies a relationship between equilibrium credit rationing and financial intermediation. It shows intermediation as the dominant factor in borrowing and lending between individuals." Equilibrium interest rates and the aggregate quantity of loans<br>respond quite differently to changes in taste and technology parameters, depending on whether or not there is rationing in equilibrium." |
| VanHoose, D. (2007). | Global | The immediate effects of restricting capital standards is the likelihood of a decrease in total lending, an increases in market loan rates and a move away from lending to holding alternative assets. Conclusions indicates that risk-based capital requirements can build high capital holdings to protect depositors and deposit insurers from losses in the event of isolated or widespread bank failures. |
| Vučković, S. (2010). | Global | Reviews regulation after the financial crises of 2007/08 and argues that weak financial regulation was the major cause of the crises. Weak regulation resulted in problems of moral hazard and information asymmetry. Her concluding remarks are regulation should be aimed |

at encouraging competition; protecting investors and participants; maintaining financial stability and assist in attaining macroeconomic stability

## The Effect of Regulatory Capital: End of Period Average Ratios

### Table 20: The effect of regulatory capital: End of period average ratios

| | End of period average ratios | | | | | |
|---|---|---|---|---|---|---|
| | **Net interest margin** | **Total capital** | **Liquidity** | **Equity to total assets** | **Growth to total assets** | **Non-performing loans** |
| Panel A: Bank behaviour before Basel | | | | | | |
| All countries | 7.90 | 18.86 | 33.15 | 11.23 | 24.89 | 92.05 |
| Botswana (2000 to 2009) | 5.78 | 17.45 | 28.67 | 6.98 | 23.33 | 115.72 |
| Kenya (2000 -2012 | 10.43 | 19.52 | 34.04 | 12.64 | 20.98 | 86.54 |
| Mauritius (2000- 2009) | 2.66 | 15.06 | 19.03 | 11.00 | 27.02 | 108.36 |
| Namibia (2000 – 2009) | 5.24 | 14.47 | 13.35 | 9.12 | 16.18 | 81.16 |
| South Africa (2000 – 2009 | 2.96 | 12.86 | 17.62 | 5.98 | 12.25 | 69.24 |
| Tanzania (2000 – 2013) | 7.12 | 18.73 | 35.33 | 12.24 | 27.61 | 73.69 |
| Uganda (2000 – 2007) | 11.56 | 23.91 | 49.65 | 12.97 | 33.40 | 106.94 |
| Panel B: Bank behaviour after Basel | | | | | | |
| All countries | 5.84 | 18.07 | 13.69 | 12.28 | 23.75 | 95.36 |
| Botswana (2013 to 2014) | 7.17 | 18.72 | 9.36 | 10.08 | 22.52 | 97.28 |
| Kenya (2013 -2014) | 9.53 | 19.74 | 19.26 | 16.61 | 14.21 | 80.51 |
| Mauritius (2008- 2014) | 3.26 | 16.22 | 13.97 | 11.35 | 23.82 | 101.31 |
| Namibia (2010 – 2014) | 4.76 | 14.73 | 15.01 | 9.90 | 16.42 | 92.21 |
| South Africa (2010 – 2014) | 3.08 | 14.99 | 7.17 | 7.13 | 20.20 | 52.72 |
| Tanzania (2014 – 2014) | 7.12 | 19.05 | 13.48 | 13.68 | 23.57 | 63.18 |
| Uganda (2004 – 2014) | | 22.99 | 15.87 | | 31.95 | 125.25 |

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| | 9.57 | | | 16.32 | | |

## Statistics

**Figure 17: All countries: Correlation Matrix**

| | ETAR | NPL | LR | NMIR | TCR |
|---|---|---|---|---|---|
| ETAR | 1 | | | | |
| NPL | 0.2066 | 1 | | | |
| LR | 0.2286 | 0.0918 | 1 | | |
| NIMR | -0.0039 | 0.0079 | 0.0096 | 1 | |
| TCR | 0.5056 | 0.1210 | 0.5277 | -0.0045 | 1 |

**Figure 18: All countries: Correlation Matrix**

| | Exchange R | Interest R | Inflation | GDP | GTA |
|---|---|---|---|---|---|
| Exchange R | 1 | | | | |
| Interest R | 0.2176 | 1 | | | |
| Inflation | 0.1025 | -0.3586 | 1 | | |
| GDP | 0.3977 | 0.0869 | 0.0247 | 1 | |
| GTA | 0.0853 | -0.0136 | 0.0460 | 0.1179 | 1 |
| ETAR | 0.2568 | 0.1009 | 0.0429 | 0.0839 | -0.0339 |
| NPL | 0.0377 | 0.0745 | -0.0093 | 0.102 | 0.0291 |
| LR | 0.2934 | 0.1747 | -0.0021 | 0.0545 | 0.1083 |
| NIMR | 0.0483 | -0.0248 | 0.0474 | 0.0446 | -0.0172 |
| TCR | 0.3190 | 0.1934 | -0.0008 | 0.1041 | -0.0322 |

**Figure 26: All countries Summary Statistics**

| Variable | Mean | Median | Minimum | Maximum |
|---|---|---|---|---|
| TCR | 18.6561 | 16.7000 | 7.70000 | 58.0000 |
| NIMR | 14.9127 | 6.62000 | 0.920000 | 5062.00 |
| LR | 30.7576 | 25.4300 | -0.0800000 | 110.090 |
| NPL | 92.8966 | 71.6800 | -38.8600 | 920.220 |
| ETAR | 11.4991 | 10.7900 | -17.6900 | 77.2800 |
| GTA | 22.0350 | 16.9600 | -35.5000 | 648.800 |
| GDP | 5.12131 | 5.33000 | -7.65000 | 12.2700 |
| Infl | 7.88158 | 7.03000 | -0.290000 | 26.2400 |
| IntR | 7.76165 | 6.87000 | -8.01000 | 23.0000 |
| ExchR | 672.053 | 77.3500 | 4.69000 | 2599.79 |
| dummy | 0.254844 | 0.00000 | 0.00000 | 1.00000 |

| Variable | Std. Dev. | C.V. | Skewness | Ex. kurtosis |
|---|---|---|---|---|
| TCR | 7.01744 | 0.376147 | 1.91863 | 4.42980 |
| NIMR | 195.199 | 13.0895 | 25.8188 | 665.073 |
| LR | 20.4598 | 0.665195 | 1.10825 | 0.586599 |
| NPL | 78.6518 | 0.846660 | 3.71778 | 23.8708 |
| ETAR | 6.07920 | 0.528666 | 2.14482 | 23.0988 |
| GTA | 33.4698 | 1.51894 | 10.3520 | 182.799 |
| GDP | 2.63217 | 0.513963 | -0.838238 | 3.24125 |
| Infl | 4.27607 | 0.542540 | 1.38872 | 3.65935 |
| IntR | 6.39580 | 0.824026 | 0.114502 | 0.000303638 |
| ExchR | 849.152 | 1.26352 | 0.779906 | -0.966536 |
| dummy | 0.436098 | 1.71124 | 1.12516 | -0.734023 |

| Variable | 5% Perc. | 95% Perc. | IQ range | Missing obs. |
|---|---|---|---|---|
| TCR | 11.7000 | 33.0640 | 6.45000 | 0 |
| NIMR | 2.12600 | 14.2240 | 4.63000 | 0 |
| LR | 7.82200 | 74.8320 | 24.9800 | 0 |
| NPL | 25.0940 | 248.404 | 55.4300 | 0 |
| ETAR | 5.26000 | 21.2100 | 5.95000 | 0 |
| GTA | -6.49400 | 63.5320 | 21.9600 | 0 |
| GDP | 0.550000 | 8.71800 | 3.21000 | 0 |
| Infl | 2.28000 | 14.4500 | 4.86000 | 0 |
| IntR | -0.980000 | 18.3500 | 7.42000 | 0 |
| ExchR | 6.14000 | 2177.56 | 1544.62 | 0 |
| dummy | 0.00000 | 1.00000 | 1.00000 | 0 |

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