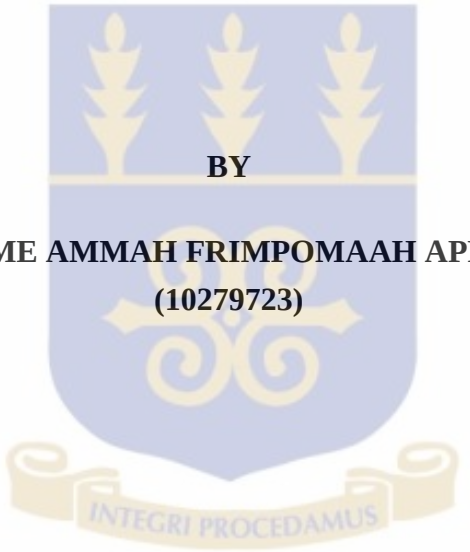
UNIVERSITY OF GHANA

COLLEGE OF HUMANITIES

CREDIT RISK OF BANKS IN AFRICA: DETERMINANTS AND IMPACT OF CREDIT RISK ON BANKS' LENDING RATE AND BANK STABILITY.



BY

MAAME AMMAH FRIMPOMAAH APPIAH

(10279723)

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MPHIL FINANCE DEGREE.

JULY, 2015

DECLARATION

I hereby declare that, this study is my original work and that it has not been submitted for award in the University of Ghana or any other tertiary institution.

I bear sole responsibility for any shortcomings.

…… ……

MAAME AMMAH FRIMPOMAAH APPIAH DATE

(10279723)

CERTIFICATION

This is to certify that this thesis has been supervised with the laid down principles of the University

…….. …….

DR. ELIKPLIMI K. AGBLOYOR DATE

(Supervisor)

…….. ……

PROF. ANTHONY Q. Q. ABOAGYE DATE

(Co-Supervisor)

DEDICATION

This work is dedicated to:

God Most High.

My beloved parents (Mr. and Mrs. Appiah), Mr. Evans Kyerematenng Fosu (Jnr) and my sponsor Mr. Yaw Asare Berkoh for their encouragement and support.

ACKNOWLEDGEMENT

I thank the Almighty God for all His wisdom, strength, and mercies throughout the period of this study.

I would like to express my sincere appreciation to my supervisors Dr. Elikplimi K. Agbloyor and Prof. Anthony Q. Q. Aboagye for their guidance and constructive criticisms which shaped and enriched the quality of this study.

TABLE OF CONTENTS

LIST OF TABLES

TABLE **PAGE**

LIST OF FIGURES

FIGURE **PAGE**

LIST OF ABBREVIATIONS

APA	American Psychology Association
BIS	Banks for International Settlement
CR	Credit Risk
GDP	Gross Domestic Product
GIPSI	Greece, Ireland, Portugal, Spain and Italy
GNI	Gross National Income
IMF	International Monetary Fund
LR	Lending rate
LLP	Loan Loss Provision
MENA	Middle East and North American Countries
NPL	Non Performing Loans
PW	Prais Winstein
ROA	Return on Assets
US	United States of America
WDI	World Development Indicators

ABSTRACT

Purpose – This research is to identify the determinants of credit risk of banks in Africa and examine the impact of credit risk on banks' lending rates and banks' stability.

Design/methodology/approach – This study considers 197 banks across 29 countries in Africa over the period 2008-2012. Africa was divided into three income brackets according to the 2010 World Bank classification. A large sample of 197 banks was used in order to have enough banks in each income bracket. Sampling was done focussing on the banks and not countries. Multiple regressions were specified and estimated using the Prais -Winstein estimation technique. This estimation technique was adopted due to the heteroscedatic and serially correlated errors of the traditional generalized least squares technique.

Findings – The results of the study suggests that the predictive power of bank specific and macroeconomic variables on credit risk differs among the income brackets within which the bank operates. Credit risk was also found to have an impact on lending rates only in the low income bracket and has an impact on bank stability only in the low middle income bracket. Credit risk however has no impact on banks' average lending rate and banks stability in the upper middle income bracket.

Originality/value – This study, to the best of the knowledge of the author, is the first to consider credit risk in banks and its impact on lending rate and stability in Africa by considering the three income brackets separately. This is important since Africa is not a homogenous unit and countries within the continent have different levels of income and development. Policy makers and bank managers therefore should consider this study so as not to go in for inapplicable policies and regulations towards credit risk, lending rates and stability of banks.

Keywords: Credit risk, Lending rates, Bank stability, Africa, Income bracket.

CHAPTER ONE

INTRODUCTION

1.0 Chapter Introduction

This chapter gives a brief overview of the subject matter of this study; Credit risk of banks in Africa. In this chapter, the author states the research problem and the objectives of the study. The significance of the study to policy, practice and academic literature are outlined in this chapter. The scope and limitations with which the study is to be carried out is also described. The structure and chapter decomposition of the study is also outlined.

1.1 Background of the study

Financial institutions are profit seeking institutions that serve as financial intermediaries between borrowers and lenders in an economy (Breuer, 2006). The level of growth and development in any economy is positively affected by the operations of financial institutions. This positive impact has been highlighted in the literature (Beck and Dermirguc -Kunt, 2009; Athanasouglou, Brissimus and Delis, 2005). Schumpeter (1911) indicated that roles performed by such institutions are savings mobilization, risk management, project evaluation, monitoring of management and facilitation of transactions. Marcelin and Mathur (2014) indicated in their study that the financial intermediation role of financial institutions specifically banks ensure that funds are channeled into productive and lucrative ventures. This role is very essential in developing economies where funds are relatively scarce.

Banks as well as other financial institutions, in playing their intermediation role deal with various forms of risk. Amidu and Hinson (2006) indicate that, risks are inevitable in the operations of banks, and as such effective risk management should form part of their daily

business. Tsorhe, Aboagye and Kyereboah- Coleman (2011) described banks as being in the business of managing risks.

The risks that banks face cover a broad spectrum. These risks have been divided into three categories by Greunig and Bratanovic (2003); operational, environmental and financial. Operational risk is the risk embodied in the policies, processes and procedures the bank goes through in its daily business endeavours. Environmental risk encompasses the risk that exists in the environment of the bank, which is a product of macroeconomic concerns, regulatory factors, payment system and financial sector infrastructure. The environmental risks also include events that the bank has no control over that could lead to failure of the bank. Financial risk that a bank is exposed to comes in the form of credit risk, interest rate fluctuations, currency or exchange rate risk, market price risk and solvency risk. These financial risks are either speculative or pure. The speculative forms of risk could either benefit or harm the bank depending on the bank's position (Greunig and Bratanovic, 2003). Pure risk that banks face on the other hand is always detrimental to the bank. These pure forms of financial risk, specifically credit risk has been studied to give early signs of banking and eventually financial crisis (Reinhart and Rogoff, 2010; Beck, Demirguc – Kunt and Levine, R. 2009 and Amediku et al, 2006).

Credit risk (CR) is risk that banks face in the form of nonperforming loans (Castro, 2013; Louzis, Vouldis and Metaxas, 2012). Banks play their intermediation role of funds mobilization as they take deposits and lend these deposits in the form of consumer, business and mortgage loans (Louzis et al, 2012). When banks are exposed to CR in the form of nonperforming loans (NPL) and borrowers do not pay off their loans, the banks are unable to meet the liquidity needs of their depositors as expected. The bank is to make provision for

possible loan losses and in some cases write off the loans (Blose, 2001). CR might therefore affect liquidity and bank operations adversely. CR or NPL is not a problem of the past, it has persisted and remains a major problem for banks, other lending institutions and the stability of the whole financial system in all economies (Alhassan, Kyereboah-Coleman and Andoh, 2014; Sorge, 2004).

Breuer (2006) in his study indicates that banking problems are of much concern in developing economies. This is because these banks play an important role in channeling savings into investments. Therefore, economic activity in a developing country or context could be jeopardized if bank problems persist. In Africa, where most economies are developing any form of bank problem is an issue of concern. This study seeks first to find the factors, systematic and unsystematic, that explain CR in Africa. The author has the expectation that, the determinants and impact of CR are likely to be different based on income levels. Therefore the countries (essentially the banks) are categorized into income groups or brackets Africa based on the 2010 World Bank Classification. The study goes further to find out if CR of these banks has an impact on their average lending rates and stability.

1.2 Research Problem

CR has remained a focus of research over the years (Schueman, Treutler, Weiner and Peseran, 2003). The ill performance of loans could be due to factors on the side of both parties involved and the economic environment within which they operate. There have therefore been studies on CR or loan indebtedness from the angle of lenders and the borrowers. Lascelles and Mendelson, (2012) and Roslan and Karim (2009) in their studies highlight the factors that lead to default of loans from the view of the borrower in developing countries. In the same vein,

Schicks (2014) conducted a study on the borrower related factors of bad loans in microfinance institutions in Ghana. The borrower related factors include the business activity the borrower engages in, amount borrowed, the gender of the borrower and the maturity period.

More studies have been conducted on loan quality from the lenders perspective. This has been the case because the banks are the "victims". Banks are adversely affected when loans are not able to accrue the principal and or interest of the loans given out (Chaibi and Ftiti, 2015; Louzis et al., 2012; Festic, Kaukler, and Repina, 2011; Breuer, 2006).This study will consider CR from this perspective. Studies on the determinants of CR have been mostly done in developed economies (Chaibi and Ftiti, 2015; Mileris, 2012) and few in selected developing economies (Fofack, 2005). The findings in previous studies in developed and developing economies show that, bank problem in the form of bad loans, is not similar in these two types of economies. This suggests that level of income and development has an impact on CR of banks.

This study focuses on CR of banks developing economies in Africa, this is necessary since developing economies have bank dominated financial sectors. This study contributes to literature by adding up to the few works done on CR in developing economies; African countries. African countries are mostly developing however, the level of development differ by income levels. This study seeks to find out, if within Africa there are some differences in the issue of credit risk in the three income brackets. The income brackets within which the African countries fall are low income, lower middle income and upper middle income bracket.

The literature on CR and asset quality has broadly divided the determinants of CR into systematic and unsystematic factors. There have been studies that have focused solely on the

unsystematic factors that cause CR. Such studies include Marcelin and Mathur (2014), Podpiera and Weil (2008), Ahmad and Ariff (2007) and Berger and De Young (1997). These factors explain the credit risk that is unique to a bank or a particular lending institution. Findings from such studies are especially of importance to managers of these institutions as they structure their risk management policies (Tsorhe et al, 2011). These studies however, do not consider how the macroeconomic factors may affect the CR of banks.Other empirical studies have focused also on the macroeconomic environment. These studies have identified macroeconomic environment as the most significant factor that explains CR (Castro, 2013: Festic et al, 2011). These factors pose systemic CR for banks in an economy and an individual bank in an economy is by default exposed to this form of risk. The findings from such studies indicate how changes in economic indicators impact the CR of banks and it is of relevance to managers of banks as well as the government.

Athanasoglou, Brissimus and Delis (2005) indicated that in explaining the occurrence of nonperformance of loans in banks, bank level and macroeconomic variables are both relevant. A new strand of literature exists in which few researchers have combined both the bank specific and macroeconomic determinants to see how they jointly affect CR (Louzis et al, 2012; Athanasoglu et al, 2005; Fofack, 2005; Bikker and Metzemekers, 2002). The current study seeks to add to literature by considering bank level variables and the macroeconomic environment as determinants of CR in 197 banks in 29 African countries. The author considers banks in the three income brackets separately. This is because the author has the expectation that as differences in income levels and development has led to differences in CR in developing and developed economies in existing literature; it could lead to some differences in CR in the three different income brackets within Africa.

CR of banks has detrimental impact on economies (Greenidge and Grosvenor, 2010; Reinhart and Rogoff, 2010; Berge and Boye, 2007). Banks that report high NPL in their balance sheet alter their lending procedures and even their lending operations (Bouvatier and Lepetit, 2012b; Nkusu, 2011). This is because high NPL suggests that lending becomes riskier and much more caution must be taken by the banks. This could cause such banks to increase the average interest that they charge on loans (Allen, 1988). This study also seeks to find out if CR has an impact on the lending rates of banks in the three income brackets in Africa.

Schueman et al. (2003) asserted that CR is what makes banks unstable. Africa's financial sector is dominated by banks therefore any factor that could cause the banking sector to be unstable could cause the financial sector to be in jeopardy. This study therefore tries to find out if CR has an impact on banks stability. This study, therefore investigates the impact of CR on the banks' average lending rate that they charge on the loans and stability of banks in Africa.

The author concludes from the literature reviewed that studies that consider the bank level as well as macroeconomic determinants are few. The few that consider the systematic and the unsystematic factors are done either in a specific country (Louzis et al. 2012) or few countries (Chaibi and Ftiti, 2015). Secondly the studies on the causes of CR are mostly done in developed economies whilst very few that have been done in developing context specifically Africa. There is no study (to the best of the author's knowledge) that considers CR in the different income levels within Africa. This study seeks to fill these gaps by studying bank level and macroeconomic determinants of credit risk in 197 banks in 29 African countries (three income brackets) and also goes further to find the impact of CR on lending rates and stability of banks.

1.3 Objectives of the study

The purpose of this study is to find the determinants and impact of CR on banks' lending rates and stability in Africa. The specific objectives are;

1. To find the macroeconomic and bank-specific determinants of CR in the various income brackets in Africa.
2. To identify the impact that CR has on banks' lending rates and stability in the various income brackets in Africa.

1.4 Research Questions

1. What are the systematic and unsystematic determinants of CR in the various income brackets in Africa?

2. Does CR have an impact on banks in the various income brackets in Africa in terms of their lending rates and stability?

1.5 Significance of research

The significance of this research could be considered in three folds: future research, practice and policy.

Research: This research goes a step beyond current studies on CR by studying its determinants and impacts on lending rates and stability of banks in Africa over a period of time. This contributes to literature and could pave the way for future studies on CR in Africa along different divisional blocks and different contexts.

Practice: This study will serve as guidelines for managers and decision makers in these banks and other lending financial institutions concerning the issues of CR and find appropriate solutions to them. New entrants of the financial sector would probably refer to this research when deciding on their loan portfolio administration and management.

Policy: The Central Bank who is at the apex of all banks and acts as the governing body of banks in the financial sector and policymakers in developing economies could use this study as a reference. They would be much informed on how decisions at the macroeconomic level affects loan quality in financial institutions and further make policies to protect these banks from bad loans.

1.6 Scope and Limitation of Study

1.6.1 Scope

This work considers 197 banks in Africa over a period between 2008 and 2012.The goal of this research is to consider CR of banks in Africa. Therefore, studying all banks in Africa would have given more representative results. However, due to data availability a representative sample of 197 banks in 29 countries in Africa is used. This sample however is large enough and each income bracket has a considerable number of banks. The sample included 76 banks in the low income bracket, 65 in the low middle bracket and 56 banks in the upper middle income bracket.

The study will focus only on banks in Africa and does not consider all the other financial institutions that give out credit facilities such as Microfinance institutions and Savings and Loan companies in Africa that are also prone to CR. Aggregate level data will be used therefore the study does not consider the categories of loans: consumer, business and

mortgage separately. The banks are divided into three categories to reflect the income bracket within which it operates. The three categories are based on the 2010 World Bank grouping of African countries according to income levels: low income, lower middle and upper middle.

1.6.2 Limitation

The time dimension of the data was not as long as what would have been desired due to data constraints. The data available also dictated the variables and proxies that were used in the study.

NPL and loan loss provision as a ratio of gross loans have been used in the literature (Beck, Demirguc -Kunt and Merrouche, 2010). In this study, however the ratio of loan loss provision to gross loans will be used as the only proxy for CR. This is appropriate because it measures the exposure of banks to bad loans which is the concern of this paper. NPL measures accumulated bad loans therefore it will not be suitable for this study. LLP is composed of discretionary and non-discretionary portion (Wahlen, 1994). This does not pose such a problem since it is assumed that whether discretionary or non-discretionary the LLP is a reflection of default risk that banks are exposed to. Also LLP measures the CR that a bank is exposed to for a particular period (in this study a year) and not an accumulation of bad loans as it in the case of NPL (Louzis et al.2012). As stated earlier a representative sample instead of the population (all banks in Africa) was used, the results can therefore be generalized and applied to Africa.

1.7 Chapter outline

This study is organized into six chapters.

Chapter one (this chapter) serves as an introduction to the research. It includes the research background, problem statement, research objectives, research questions, research significance, research scope and limitation and the organization of research.

Chapter two is an overview chapter that gives insight on the banking sector of the various income brackets in Africa.

Chapter three is a review of relevant literature on CR. It includes the definitions and measures of CR (NPL), the CR and banking crisis nexus and a synthesis of results of previous studies on CR, lending rates and bank stability.

Chapter four presents methodology. This entails the population, data source, sampling technique, sample size, data collection, data processing and model specification for data analysis.

Chapter five is the results and discussion of results as well as the evaluation of the research objectives in line with the findings.

Chapter six captures conclusion, summary and recommendation. The key findings of the study will be discussed to highlight its significance to future research, policy and practice.

References will be presented in American Psychology Association (APA) style in order to acknowledge the academic papers that were reviewed for the study. An appendix including all supplementary materials that were used will be presented after the references.

1.8 Conclusion

This study considers the determining factors of CR of banks in the three different income brackets in Africa. It also seeks to find the impact of CR on the average lending rates banks charge on loans and the stability of the banks. In this chapter a general overview of determinants of CR and its impact has been given. The objectives to be met by the study have also been clearly outlined. This informs the reader exactly to expect in this study**.**

CHAPTER TWO

OVERVIEW OF BANKS IN THE INCOME BRACKETS OF AFRICA

2.0 Chapter Introduction

This chapter gives an overview of Africa's banking sector. The banks were divided into the income brackets based on the income level of the country within which it operates. The total assets, average return on assets and the average deposits and short term funding to total assets of banks in the income brackets are computed to compare the behaviour of the banks among the three income brackets. The average CR (measured by the LLP/loans ratio), average lending rate (ratio of interest on loans to loans) and average Z-score (measure of banks' stability) are computed to show the trend of loan quality and loan pricing over the 5 year study period.

2.1 African countries included in the study

This study considers 197 banks over the period 2008 and 2012.These banks operate in 29 countries in Africa. Below is the list of the African countries that banks in the sample operate in and the number of the banks in each country (in brackets). This classification was made based on the 2010 World Bank Classification.

Table 1: African Countries in the study

LOW INCOME BRACKET	LOW MIDDLE INCOME BRACKET	UPPER MIDDLE INCOME BRACKET
1.Benin (2)	1.Cameroon (5)	1.Botswana (5)
2.Burkina Faso (2)	2.Cote D'Ivoire (3)	2.Namibia (8)
3.Kenya (22)	3.Egypt (18)	3.South Africa (15)
4.Malawi (3)	4.Ghana (13)	4.Tunisia (7)
5.Mozambique (8)	5.Morroco (4)	5.Algeria (5)
6.Rwanda (2)	6.Nigeria (2)	6.Mauritius (5)
7.Sierra Leone (3)	7.Senegal (4)	7.Angola (11)
8.Tanzania (16)	8.Zambia (9)	
9.Uganda (9)	9.Mauritania (3)	
10.Ethiopia (6)	10.Sudan (2)	
11.Mali (3)	11.Swaziland (2)	

Source: World Bank Classification, 2010.

Table 1 above proves that some countries such as Kenya, Egypt, South Africa and Ghana are more represented in the sample than countries such as Nigeria, Rwanda and Swaziland. This is because the sampling focused on the banks that have the key variables to be considered in the study. The sample included 76 banks that operate in low income country, 65 banks in low middle countries and 56 in upper middle income countries.

The banks were divided according to the income brackets of the countries within which they operate (World Bank; 2010). Over the period of study all countries, but Angola and Ghana did not move into different income brackets. The two countries, Angola and Ghana were classified according to their new income level; upper middle income and lower middle income respectively. Banks in these countries were classified accordingly. The low income bracket

includes banks in countries with an annual Gross National Income (GNI) per capita of $1025 dollars or less. The lower middle bracket includes banks in countries with annual GNI per capita ranging between $1026 and $4035. The annual GNI per capita ranges $4036 and $12475 in the upper income bracket.

2.2 The banks in the various income brackets

The financial sector is a key driver of the service sector in most African economies. One key feature of the financial sector in African countries is the dominance of banks (Amidu, 2013). The banking sector, which continues to grow, plays an important role in the financial sector. This might be ascribable to the fact that efforts have been made by countries to restructure their banking system to ensure development (Dziobek and Pazarbasioglu, 1998). Most developing countries have embarked on liberalization in order to fuel economic growth and eventually development. The assets of banks in Africa have been on the increase. Table 2 shows that the total assets of banks in the low and low middle income bracket have grown over the 5 year period. In the low income brackets total assets have increased from 30,716 (thousands USD) in 2008 to 49,872 (thousands USD) in 2012. In the low middle income brackets the total assets have increased from 206,958 (thousands USD) to 268,842 (thousands USD). In the upper middle income bracket the total assets in 2008 was 419,386 (thousands USD) and by 2012 it had increased to 532,317 (thousands USD). This increase in total assets of banks in the income brackets has not however translated to a persistent increase in profitability of banks. The average return on assets in the low income for instance increased from about 1.89% in 2008 rose to 2.31% in 2010 and began to decline till it reached 1.72% in 2012. The increase in profitability has not been as consistent and as high as in the case of total assets.

Other financial institutions are not as developed as the banks and most of the credit that is extended by the banks to the private sector is appreciably higher. Financial markets are also not as developed as in the case of the developed economies. The banks are therefore the main source of external funds for investing thus compelling most individuals and businesses (private sector) who have limited access to capital markets to rely on banks for external sources of funds (Greunig and Bratanovic, 2003). This could be the reason why banks assets increased over the period. The role of banks in developing economies could not be overemphasized.

Another key feature of banks in Africa is the reliance of banks on the deposits of their clients and other forms of short term funding (Table 2). They take these deposits and give out loans at a rate to earn interest income. The rate will be set to earn enough interest income to compensate their depositors as well. They keep very little equity therefore they have a relatively large portion of their assets being financed by their deposits and short term funding (Amidu, 2013). This presupposes that these banks are highly leveraged and with a small proportion of their loan getting bad they will be in a liquidity fix (Ntow-Gyamfi and Boateng, 2013).

The structure of the banks in the sample to be used in the study are described by computing the total assets of the banks, the average return on assets, the average CR, average deposits and short term to asset ratio, average lending rate and average loan asset ratio of the three income brackets. The banking sector in the income brackets will be described using the author's computations with the data from Bank scope. The values are shown in the table below;

Table 2 Banks in the Income Brackets.

VARIABLE	YEAR	LOW INCOME	LOW MIDDLE	UPPERMIDDLE
Total assets of banks in the income bracket (thousands USD)	2008	$30716	$206598	$419386
	2009	$35266	$224767	$473797
	2010	$38697	$242466	$537099
	2011	$44210	$255838	$529473
	2012	$49872	$268842	$532317
Average Return on Assets of banks	2008	0.019	0.016	0.027
	2009	0.020	0.010	0.026
	2010	0.023	0.015	0.022
	2011	0.019	0.015	0.021
	2012	0.017	0.020	0.020
Average Deposits and Short term funding to assets ratio	2008	0.784	0.775	0.775
	2009	0.794	0.777	0.779
	2010	0.802	0.791	0.773
	2011	0.803	0.801	0.791
	2012	0.794	0.798	0.790
	2012	0.152	0.110	0.093
Average loan asset ratio of banks	2008	0.499	0.521	0.553
	2009	0.497	0.512	0.572
	2010	0.494	0.509	0.573
	2011	0.522	0.510	0.587
	2012	0.533	0.529	0.590
Average Credit risk of banks	2008	0.047	0.079	0.051
	2009	0.044	0.084	0.053

	2010	0.045	0.086	0.053
	2011	0.040	0.082	0.048
	2012	0.041	0.078	0.050
Average Lending rates	2008	0.128	0.116	0.118
	2009	0.131	0.126	0.103
	2010	0.125	0.118	0.101
	2011	0.131	0.104	0.097
	2012	0.152	0.110	0.093
Average Z-score	2008	44.947	68.856	63.402
	2009	43.503	70.819	58.270
	2010	42.244	69.901	59.591
	2011	42.168	67.409	57.226
	2012	44.814	67.131	57.046

Source: Authors computation of data from Bankscope.

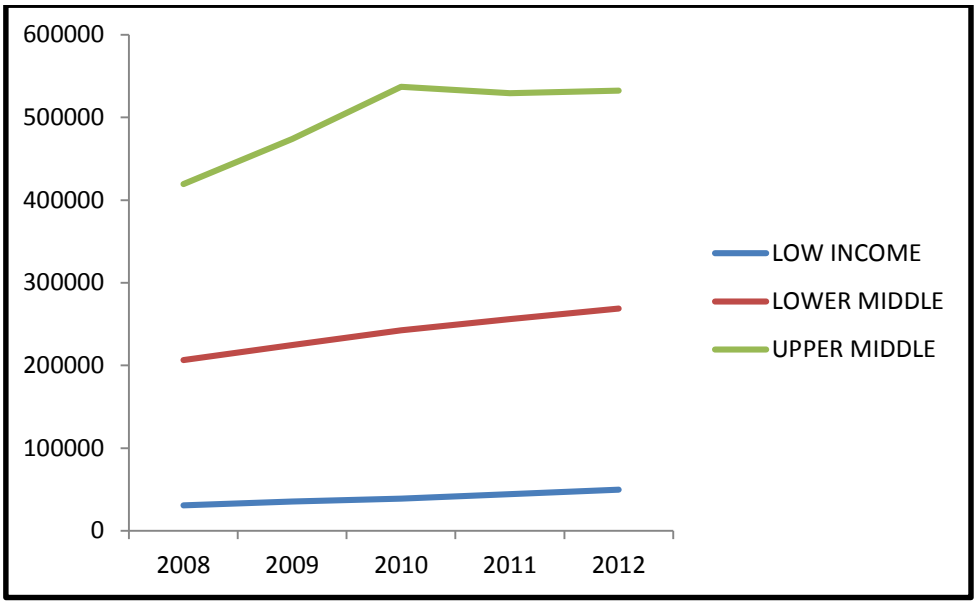
Figures in the above Table 2 are computed by the author with the available data of the 197 banks from Bank scope. Graphical presentations of these figures are given below to show how the variables have varied among the income brackets and over time.

2.2.1 Total assets of banks

The total assets of the banks in the upper middle countries have the highest value of $419,386 thousand followed by banks in the low middle countries with total assets of $206,598 thousand in 2008. The banks in the low income have the lowest total assets of $30,716 thousand. This trend continues throughout the study period. These figures suggest that the banking sector's total asset is positively correlated with the income level of the country.

Higher level of economic development is associated with higher total banks assets. The banking sectors in the three brackets have been growing in terms of assets over the period of study (as seen in Figure 1 below). The growth in the total assets might not necessarily suggest increase in the profitability or performance of assets hence the need to compute the average return on assets.

Figure 1: **Total Assets of Banks**

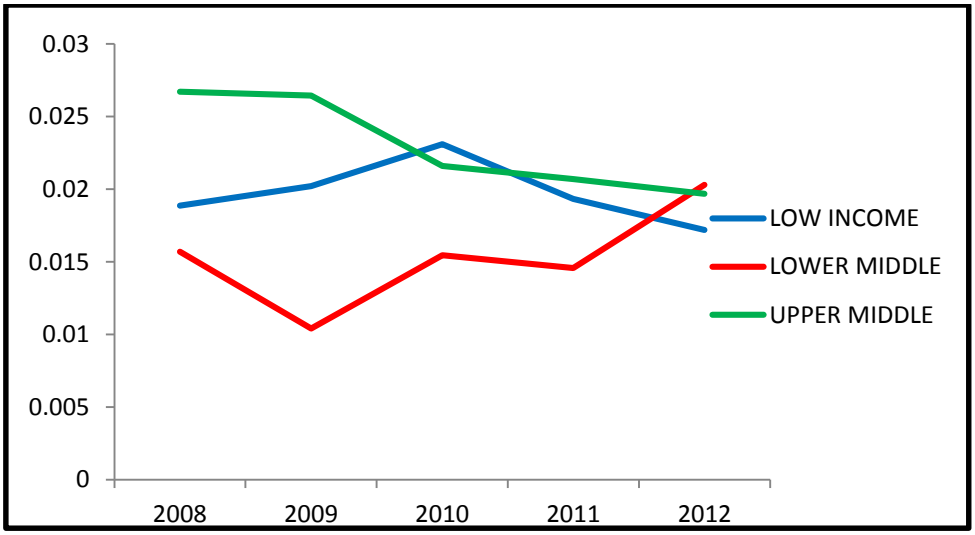


2.2.2 Profitability of banks

The average return on assets was computed to give an overview of the performance of the banks in Africa. The figures(as depicted in Table 2) suggest that in early years 2008 and 2009 the banks in the upper middle income brackets were the most profitable with an average return on assets being 2.7% (2008) and 2.6%(2009). Interestingly the banks in the low income bracket (lowest total assets) were much profitable (1.9% in 2008 and 2.00% in 2009) than those in the lower middle income countries (1.6% in 2008 and 1.00% in 2009).The

profitability of the upper middle income in 2010 took a nose dive and fell below that of the low income brackets. The return on assets of banks in low middle income countries on the other hand rose in 2010 fell by a small margin and rose significantly in 2012. Despite the differences in the trend of the profitability of the banking sector of the three income brackets, there is a general mismatch between the asset growth and profitability. The assets of the banks are increasing persistently however the profitability of these assets is rather growing sluggishly. The increase in the average return on assets of banks in the income brackets has not been persistent.

Figure 2: **Profitability of Banks**

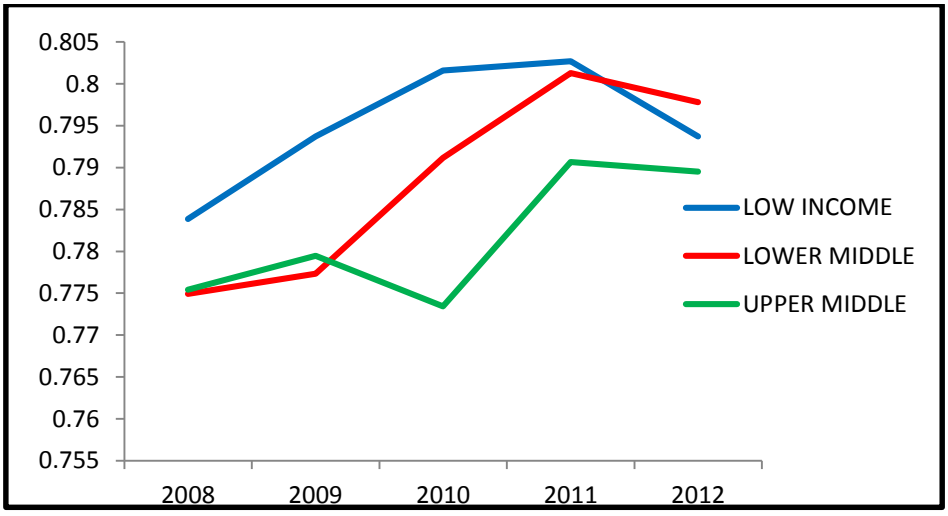


2.2.3 Deposits and other short term funding of banks

As indicated earlier most banks have thin equity and depend heavily on deposits (leverage) in Africa. The average ratio of deposits and other short term funding to the assets of banks in the different income brackets is computed from the sample. The computed ratios over the period of the study affirm the findings of Ntow -Gyamfi and Boateng (2013); banks in Ghana and

generally Africa are thinly capitalized. Banks in the low income bracket have the highest ratio between 2008 and 2011 and falls thereafter to 79.4% in 2012. In 2008 and 2009, banks in the lower middle income brackets had the lowest ratio .The ratio of the low middle income brackets differs from that of the upper middle income brackets by a small margin. After 2009 the banks in the upper middle had their ratio being the lowest. The ratio of the low income brackets and low middle brackets falls after 2011, but the fall in the low income brackets is more pronounced as compared to the low middle brackets. The fall in the ratio of short term funding to asset ratio suggests that banks in Africa are eventually buying into the idea of raising funds through equity and perhaps other long term sources of funding. Despite the fall of the ratio of the banks in the later years (2011and 2012) banks remain highly dependent on short term source of funds.

Figure 3: Deposits and other Short Term Funding of Banks

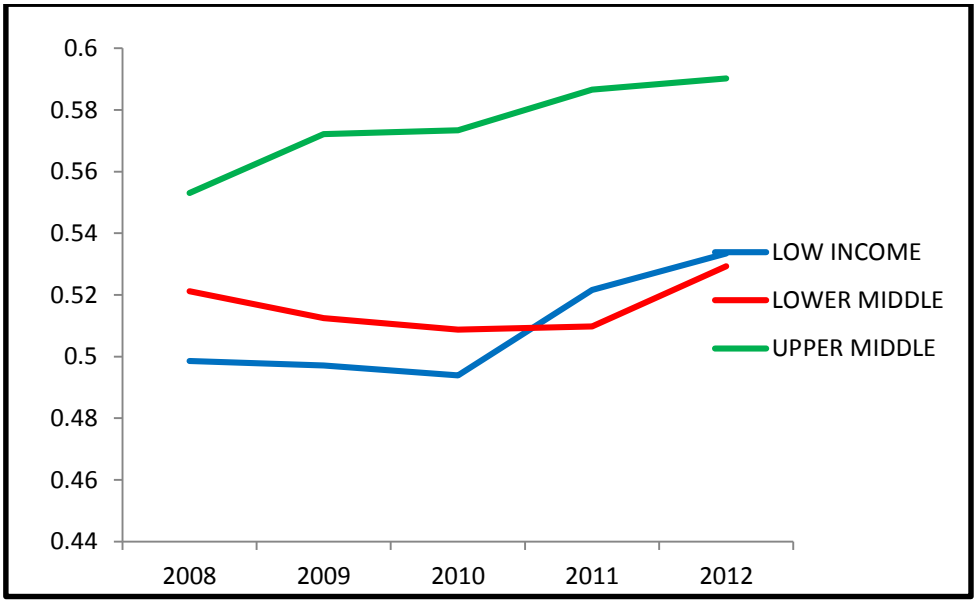


2.2.4 Loan Asset ratio of banks

The deposits and other forms of debt mostly short term of the banks represents the liabilities of the banks whereas the loans that are given out are their assets. The traditional or core

activity of banks is to give out loans (Amidu and Hinson, 2006). The dependence of a bank on loans could be captured by the loan asset ratio. A high ratio means that the bank depends more on loans for income whereas a low ratio means the bank earns more income from other non-interest sources. The loan asset ratio of banks in the upper middle income bracket is highest over the period of study. Between 2008 and 2010 the banks in the low income bracket reported a lower loan asset ratio compared to the low middle income bracket. In the years 2011 and 2012, banks in the low middle income bracket had the lowest ratio. The loan-to-assets ratio of each of the income brackets continues to grow. This suggests that although the assets of these banks have grown over the years these banks continue to depend on loans in earning income.

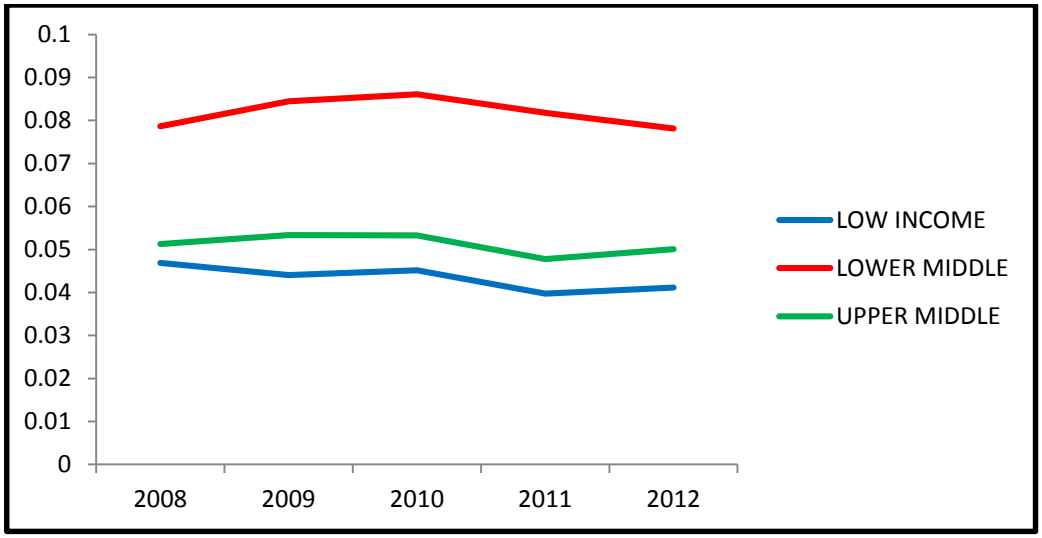
Figure 4: **Loan Asset Ratios of Banks**



2.2.5 Credit risk of banks

The average LLP to asset ratio was computed to measure the amount of credit risk the banks in the different income brackets are faced with. A high LLP assets ratio suggests that the bank expects a higher CR. The LLP ratio is highest for banks in the low middle income bracket followed by the banks in the upper middle income brackets. The banks in the low income brackets have the lowest LLP assets ratio. The CR of the banks in all the brackets has not changed significantly over the years. The slope of the trend lines in Figure 5 is low in the three income brackets. The CR of banks is therefore persistent among these banks over the study period (Alhassan et al,2014).The problem is much more severe for these banks because the banks are heavily leveraged and depend appreciably on giving out loans. These banks are therefore in a trap of having short term funds and giving out loans with a longer term maturity. Even a very low CR exposure could sabotage the operations of the banks since they will not be able to meet the cash demand of the depositors.

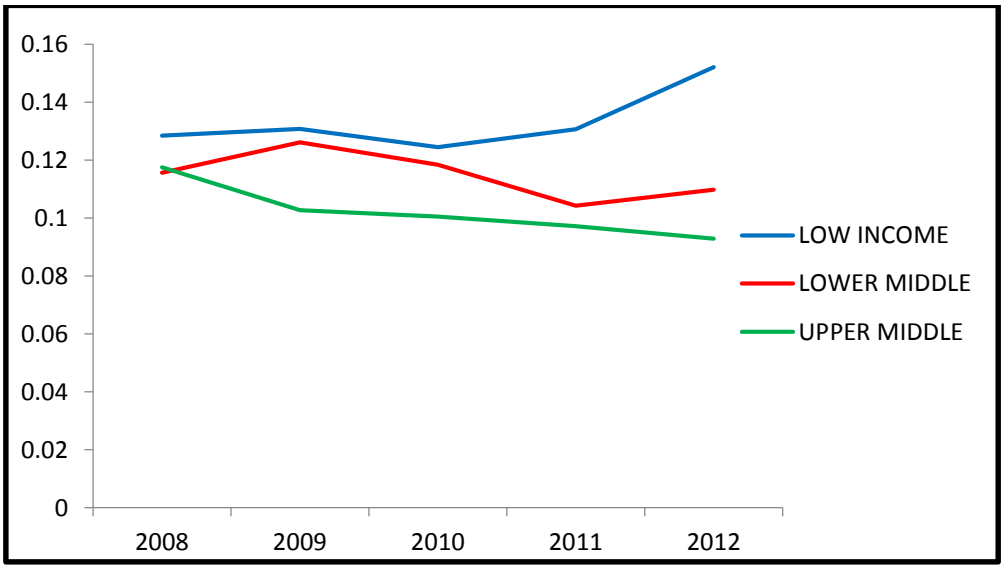
Figure 5: **Credit Risks of Banks**



2.2.6 Lending rates of banks

It has been established that these banks depend on loans as a source of income (Figure 4). They charge the lending rate as the price at which they give out loans. Banks may charge different rates on different classes of loans, but in this study we consider the average price they are willing to charge on their total loan portfolio. The price of the loans or the lending rates of these banks is a ratio of how much they will earn on the loan to the gross loan amount. The lending rate of banks in the low income brackets are the highest among the income brackets and continue to rise. The average lending rate increased from 12.8% in 2008 to 15.2% in 2012. The average lending rate of the low middle income countries range increased from 11.6% in 2008 to 12.6% in 2009. After 2009 it continued to fall and thereafter rose to 10.98% in 2012. The average lending rate of banks in the upper middle income is the lowest ranging between 9.3% and 11.8%.

Figure 6: **Lending Rates of Banks**

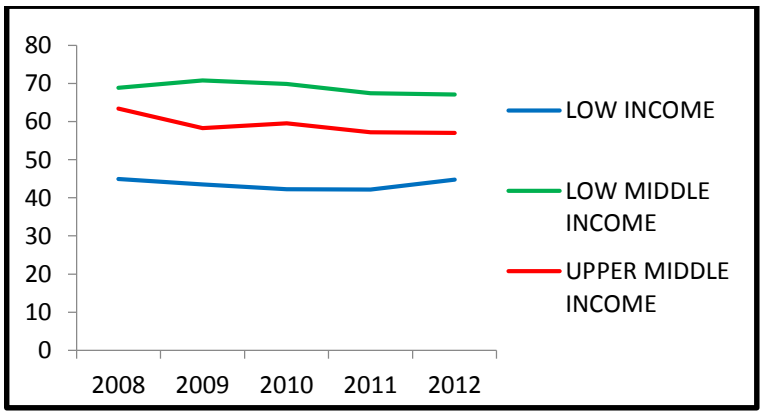


2.2.7 Banks stability-average Z-score

The Z-score is a measure of banks stability.The Z-score is the ratio of the sum of return on assets and equity to asset ratio, to the standard deviation of return on assets.The higher the Z-score the more stable a bank is and the lower the Z-score the less stable a bank is.The computation of the Z-score would be further discussed in chapter four.

From the table banks in the low income bracket have the least Z-score followed by the upper middle income bracket and then the low middle income brackets. This suggests that banks in the low income are the least stable and are more prone to insolvency and bankruptcy. Banks in the low middle income bracket are the most stable. In the low income bracket the average Z-score fell between 2008 and 2011 from 44.95 to 42.17.It then rose to 44.81. In the middle income brackets the average Z-score increased 68.86 in 2008 to 70.82 in 2009. After this increase it falls to 67.41 in 2012. The upper middle income bracket the average Z-score reduced between 2008 and 2009. After 2009 however it has fallen to 57.05 in 2012. The diagram below Figure 7 shows that there have not been significant changes in bank stability in all the income brackets over the period of study.

Figure 7: **Average Z-score**



2.3 Conclusion

This chapter gives a clear picture of the banking sectors of the low income, low middle income and the upper middle income bracket. The trends above could be considered as stylized facts of the banking industry in Africa per the data available for this study. It has been established that banks in the brackets depend on short term sources of funds and depend on loans to earn income. CR is a persistent issue of concern that cuts across all banks irrespective of the income bracket. And lending rates of the banks is highest in the low income bracket followed by the low middle and upper middle brackets. There are however some subtle differences among the income brackets' banking sectors. There are profound differences among the income brackets in terms size of the banking industry in terms of assets. The profitability of the banking sector in the three brackets follows a rather different pattern. Due to these differences studying banks in Africa as if they operate in a homogenous economic unit would be misleading.

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

CR that banks are faced with leads to illiquidity and eventually instability (Marcucci and Quagliariello, 2008). There is the need to consider CR determinants and the impact of CR on bank's lending rates and banks stability. This chapter seeks to focus on the literature on CR, definitions and measures of CR, the underlying theory that could explain CR (information asymmetry), CR and bank crisis nexus, its determinants as well as literature on lending behaviour and risk taking. This chapter enables the researcher and readers appreciate previous studies and position the work appropriately in the current asset quality literature.

3.1 Definition of CR

CR exposed by banks is the risk they face in terms of NPL. A loan is termed nonperforming if the principal and or the interest on the loan have not been paid as agreed upon in the loans agreement. NPL have also been referred to as problem loans (Berger and De Young, 1997) as well as impaired, bad and unhealthy loans (Nkusu, 2011; Fofack, 2005).NPL have been defined qualitatively or quantitatively in the literature (Bloem and Gorter, 2001). Impaired loans have been qualitatively defined as a loan that a borrower is likely to default per the current information and events, and the creditor cannot recover the amounts that must be repaid (Financial Accounting Standards Board, 1993 in Dahl, 2013). NPL are defined quantitatively as loans that are a number of days overdue. IMF (2009) classified loans that are 90 days overdue as NPL; meaning repayments of principal and additional charges have not been made or would not be made as anticipated.

3.2 Measures of CR

There have been different measures that have been used to capture CR in the literature. These measures include the ratio of impaired loans to gross loans (Chaibi and Ftiti, 2015), the ratio of nonperforming loans to total gross loans (Castro, 2013), the ratio of NPL to gross loans and advances (Alhassan et al, 2014) and the amount of NPL (Badar and Javid, 2013). Probability of default, loss given default and loan charge offs have also been used (Festic et al., 2011).The CR proxies with impaired loans or NPL are backward measures, as they are accumulation of all the loans that have gone bad in the past. Other studies have used forward looking measures which captures the risk of default. They measure the CR exposure of the bank by considering the loan loss provisions. Flamini, McDonald and Schumacher (2009) use a forward looking measure the ratio of loans to deposits and short term funding. Garr (2013) measures credit risk as the ratio of LLP to total assets.

This study will measure CR using the ratio of LLP to gross loans. Loan Loss provisions (LLP) also known as valuation allowance are made by all banks to cater for impaired loans that are overdue (principal and or interest payments).It includes write-offs as well as recoveries. LLP has two components discretionary and regulatory/non-discretionary (Wahlen, 1994). LLP are made to mitigate the deterioration of a bank's credit portfolio, banks that are faced with high NPL will have to make more provisions as compared to those that have low CR exposure (Greenidge and Grosvenor, 2010). Badar and Javid (2013) find empirical evidence that as banks record high NPL in their books they have to increase their reserves. LLP is therefore an appropriate measure for CR for this study.

3.3 Credit risk and Bank crisis nexus

CR has been a major problem for banking institutions in all countries (Demirguc-Kunt and Detragiache (1998). Banks take short term deposits (liabilities) and give out loans at a longer term (assets). Banks by default have a mismatch between the duration of assets and liabilities (Ntow - Gyamfi and Boateng, 2012). Banks therefore are exposed to the risk of not being able to meet debt holders' demand for cash and other obligations (Schueman et al, 2003). When these loans are not serviced on time a longer gap is created between the duration of the assets and the liabilities (Ntow-Gyamfi and Boateng, 2012). Depositors due to the liquidity problems of the bank lose confidence and tend to "run" for their deposits in fear of losing their wealth (Aharony and Swary, 1996). Since banks depend heavily on short term sources of funds mainly deposits a bank run would distort the operations of banks. The equity holders of these banks are likely to also follow suit and demand their wealth (Dziobek and Pazarbasioglu, 1998).

Bank problems of this kind affect the operation of the banking system and in economies that have their financial sector being dominated by banks the whole financial sector stands the risk of a crisis (Ahmad, 2002). Banking crisis could either be borderline or systemic (Kane and Rice, 2001). It is borderline if some relatively small banks in the country go bankrupt whiles some of the country's major banks' capital is not eroded away due to the banking crisis, but if bank capital is depleted in all banks then the banking crisis is systemic. Both types despite the difference in the extent are detrimental to the economy. Makrio, Tsagnos and Bella (2014) have referred to CR as a financial pollutant that impedes economic development and social welfare. This is because injections such as capital inflow and investments will be disrupted and growth will be stunted.

The CR and banking crises nexus as established above has been proven in the literature. NPL paves way for banking or financial crises (Brownbridge, 1998; Demirguc-Kunt, 1989). Kane and Rice (2001) indicated that Africa as a continent was faced with banking problems between 1980 and 1989 and more than eighty percent of the countries of the continent were faced with persistent systemic banking crises. Countries such as Algeria, Burkina Faso, Central African Republic, Chad, Senegal, Sierra Leone and South Africa had more than 30% of their loans to the private sector going bad (Kane and Rice, 2001). Khemraj and Pasha (2009) also find empirical evidence which suggests that the banking crisis in East Asia in 1997 and Sub Saharan Africa also in the late 1990's were preceded by accumulation of loans that had gone bad. Nkusu (2011) posits that the deterioration of credit portfolio quality is a persistent issue in all economies, its associated bank problems can therefore not be considered as an issue of the past.

3.4 Theory of Information Asymmetry

Most of the studies on CR and loan portfolio quality are empirical, however this study just like Stiglitz and Weiss (1981) considers the theory of information asymmetry as the underlying theory that could explain CR faced by banks in the form of NPL. Information asymmetry refers to the situation in which the two parties in an economic transaction or other contractual agreements do not have equal amount of information. The party that has superior information might take advantage and extort the other party (Bardhan and Udry, 1999). Asymmetric information in the market could lead to inefficiencies in the market and this will be in the form of nonperforming loans in credit markets (Brownbridge, 1998).

In extending credit facilities there are two parties involved; the banks who are the lenders and the borrowers. When banks are giving out loans they have various processes that the borrower must go through. These processes are put in place to ensure that banks have adequate information on the borrowers in order to categorize their borrowers according to their credit worthiness. The borrowers will be categorized into two; those that are credit worthy and are less risky borrowers and high risk borrowers who are not creditworthy. The acquired information would ensure that lenders do not select high risk borrowers who have a higher probability of defaulting and increase CR. Some banks in rationing credit avoid high risk borrowers completely. Others also charge a higher rate to include a risk premium to compensate the bank for the higher probability of default (Stiglitz and Weiss, 1981).

Banks and other lending institutions could make the process of getting loans complex and bureaucratic, so as to deter high risk borrowers. No matter how complicated and bureaucratic the procedure might be, there is a possibility that banks will record bad loans in their books. The bank which seeks to maximize revenues and returns might set high lending rates and this would deter borrowers who are taking the credit for less risky yet fruitful ventures (Stiglitz and Weiss, 1981). Higher risk borrowers who take the credits and invest in risky lucrative ventures would be more willing to take the loans even at the high lending rate. The bank therefore adversely selects the wrong group of borrowers and therefore exposes itself to high default rates on loans. This occurs because it does not have enough information to adequately access loan applicants and distinguish between borrowers with different risk characteristics (Bardhan and Udry, 1999).

Adverse selection occurs before the loan is granted, however, even after the loan has been granted asymmetric information can come into play in the form of moral hazard. After the

loan has been given to the borrower, his behaviour changes, either due to macroeconomic pressures or deliberately. The borrower could invest in ventures riskier than intended and this can increase the probability of loan default. CR generally can be attributed to asymmetric information on the side of the lender or the borrower as well as the unanticipated information about changes in the economic environment. From this theory, one probable solution for CR is the creation of credit registry platform, where there will be adequate information on borrowers that could be easily accessed at a low cost by the banks and other lending institutions in Africa. This is very important due to the great disparity of information in developing economies like Africa (Brownbridge, 1998). Information sharing among lenders will improve quality of loans by disciplining borrowers to repay their loans especially those that are hoping to access credit again in the future(Behr and Sonnekalb, 2012).

Information asymmetry is the underlying principle that explains CR. However this study focuses on the factors that make banks more or less exposed to CR.

3.5 Determinants of CR

The potential harm CR can cause in an economy has made it expedient to consider the factors that lead to CR in the form of NPL. In as much as the theory of information asymmetry explains default of loans there are certain factors that could increase or decrease the exposure of banks to CR. These factors are macroeconomic and bank specific. This study just as Louzis et al. (2012), Zribi and Boujelbene (2011) and Salas and Saurina (2002) focuses on the macro environment and the bank specific variables in explaining the variations in CR. This study will therefore be of value at the macroeconomic level and internal management of CR analysis at the bank level (Marcucci and Qualiariello, 2008).

3.5.1 Bank specific variables

The bank specific determinants that have been identified in previous studies include size of firm, inefficiency, quality of management, leverage, ownership and profitability (Zribi and Boujelbene, 2011; Podpiera and Weil, 2008; Ahmad and Ariff, 2007; Salas and Saurina, 2002). These factors pose unique risk to individual lending institutions and can be controlled by the institution (Chaibi and Ftiti, 2015).The study of these factors is of key interest to the management of banks and to a larger extent other financial institutions. The control of these variables is to a large extent in the hands of managers at banks. These are the factors that would cause banks within the same macroeconomic environment to have different levels of credit risk exposure.

These factors have been referred to as either bank specific determinants or idiosyncratic ex-post credit risk factors (Louzis et al, 2012). Berger and De Young (1997), study US banks during the period from 1985 to 1994 and came out with empirical explanations through which cost efficiency and capital level of banks could influence banks' credit risk. In their study banks that were cost efficient were considered to have good management. The resources were effectively managed and fewer expenses were incurred whiles generating income. Podpiera and Weil (2008) contribute to this strand of literature on efficiency and the loan quality nexus of banks between 1994 and 2005.They conclude that cost efficiency significantly influences loan default rates in Czech banks: banks that are cost inefficient tend to have high incidence of NPLs. This suggests that the banks that were cost inefficient could not afford to incur more cost in monitoring loan defaults and therefore report higher bad loans in their books. This contradicts the skimping hypothesis of Berger and De Young (1997). The current study

includes the ratio of operating cost to income as a bank specific determinant of CR to find the relationship between CR and cost efficiency in the Africa context.

Ahmad and Ariff (2007) using a cross section data, conducts a comparative study that considers the firm determinants of NPL in developed economies (Australia, France, Japan and the USA) and emerging economies (India, Korea, Malaysia, Mexico and Thailand).They consider the following bank specific factors, management efficiency, loan loss provision, loan to deposit ratio, leverage, regulatory capital, funding costs, liquidity and total assets. However the results showed that the management quality in terms of efficiency decreases NPL, regulatory capital affect NPL negatively, but no relationship was found between leverage and NPL. This study would consider the impact of short term debts of banks on CR in the three income brackets. This study does not consider leverage in totality. It rather considers deposits and short term debts only since the literature on banks in Africa and the stylized facts (of the study in the previous chapter) have shown that the banks depend on short term funding. From the literature on bank specific determinants of CR it could be observed that most of these studies have been done in advanced countries with very few done in the less advanced countries. The cross sectional studies, like Ahmad and Ariff (2007) do not consider the particular income bracket the banks operate in.

However other studies have highlighted that these factors depend to a large extent on the institutional setting as well as the macroeconomic variable of the country within which they operate (Marcelin and Mathur, 2014). Breuer (2006) shows how institutional and macroeconomic indicators of an economy to a large extent explain the quality of loan portfolios of banks. Chaibi and Ftiti (2015) found that bank specific variables have different impact on loan quality in France and Germany because of the differences in their economies

although both of them are developed economies. The economic environment and the level of development to some extent, dictate how the bank specific variables affect CR. This therefore suggests that bank specific variables that have been identified in previous studies in developed economies to affect CR may not necessarily affect CR in developing economies in the same way since the economic environment differs. Also, it could be inferred then that the impact of bank specific determinants will be different among the three income brackets even in Africa. The reason being that, income brackets have different levels of "development". Although there is extant literature on the bank determinants, the current study considers size, deposits and short term funding to assets, efficiency, return on assets (profitability), loan assets ratio as the bank specific variables that could explain CR at the bank level in Africa in the three income brackets. These variables have been selected from the available data based on literature.

3.5.2 Macroeconomic determinants

The macroeconomic environment affects all firms and individuals in an economy. The banks in any country are also affected by macroeconomic forces. Some studies have indicated that in explaining the credit default and banking crises the macroeconomic environment is the most important indicator (Louzis et al, 2012; Nkusu, 2011; Kattai, 2010; Salas and Saurina, 2002). Marcucci and Qualiariello (2008) suggests that the up and down movements in economies impact the portfolio quality of lending institutions. Therefore, considering the causes of CR the economic variables need be considered.

Rinaldi and Sanchis-Arellano (2006) studies the macroeconomic determinants of credit risk in Belgium, France, Finland, Ireland, Portugal and Spain by considering the loans given to various households and prove that disposable income, unemployment and monetary

conditions play essential roles in the determination of the credit risk of the banks that operate in these countries. Ali and Daly (2010) using Structural equations approach find that GDP, interest rates, industrial production and debt to GDP ratio affect credit risk in banks in USA and Australia. However the impact of these macroeconomic factors on the default rates differs between the two countries. Castro (2013) studies the macroeconomic determinants that affect credit risk in banks in Greece, Ireland, Portugal, Spain and Italy (GIPSI) using quarterly data from the first quarter in 1997 to the third in 2011. In his study, he uses a dynamic approach to capture the persistent nature of credit risk and proves that in the GIPSI, unemployment, growth rate of GDP, the difference between long term and short term interest rate, the real effective exchange rate, the share price indices, quarterly housing price index inflation and financial crisis significantly affect bank credit risk. Zribi and Boujelbene (2011) identifies GDP growth, Inflation, exchange rate and interest rate as the macroeconomic factors that have significant impact on credit risk in ten Tunisian commercial banks. This shows that different studies have identified different macroeconomic factors as predictors of credit risk.

Some macroeconomic factors such as GDP growth and inflation have different effects on credit risk across studies and therefore making inferences from studies in different contexts would be inappropriate. For instance, inflation an indication of economic instability for instance, has had different effects on NPL in different studies in different contexts. Chaibi and Ftiti (2015) found that inflation has a negative effect on NPL in Germany and France, whereas Castro (2013) concludes that the effect of inflation is nullified due to its negative and positive effect on credit risk in GIPSI. Also the impact of the business cycle, GDP growth has different impact on CR. Most studies have indicated that there is a negative impact of GDP on credit risk (Castro, 2013) and even no impact on credit risk (Fofack, 2005). The impact of

macroeconomic variable on NPL as found in developed economies might not be the same in developing economies like those in Africa. Also the macroeconomic environment could affect how the bank specific variables also affect CR. There is therefore the need to consider both the bank and macroeconomic variables.

Feijo (2011) find empirical evidence that CR is a product of an interactive process between the banks features and the economic environment. Louzis et al. (2012) studied CR by considering both macroeconomic and microeconomic factors in the Greek banking sector. They concluded that the macroeconomic determinants such as real GDP growth rate, unemployment rate, interest rate and public debt have a greater predictive power over credit risk as compared to the bank specific factors like the performance and efficiency indicators. The effects of the bank specific variables were however not negligible. Chaibi and Ftiti (2015) explore the bank and macroeconomic determinants of credit risk amongst commercial banks in France and Germany using a dynamic panel data approach. Most of these studies have been conducted in the developed countries where economic environment is different from that in the developing countries.

The current study would include macroeconomic factors as well as bank specific variables. The macroeconomic factors that will be included are inflation and GDP growth. These two variables were considered because they measure instability and growth in the economy respectively. The instability and low growth of economic activity are key features of developing economies. It was therefore necessary to consider how these variables could affect CR in Africa. These macroeconomic indicators are measured at the country level. In this study, however the focus is not on countries, but rather banks hence these variables would indicate the macroeconomic condition that a particular bank is exposed to within a particular

year. It therefore varies with banks and with time. This study would therefore explain loan quality by considering factors at the micro and macro level in an attempt to explain CR in banks in Africa.

3.6 Lending rates of banks

Banks in Africa engage mainly in lending as their major activity and this is evidenced by their high loan assets ratio (Table 2 /Figure 4).Through the collection of deposits and extending of loans they gather funds from deposits and channel them into investments to make profits. In an attempt to make profits and grow, the banks contribute to the development of the economy (Olokoyo, 2011). Banks could earn other sources of income; non-interest income sources, however, banks in Africa continue to depend on loans (Figure 4). Boahene, Dasah and Agyei (2012) stated that banks in Ghana for instance, have their loan portfolio being ten to fifteen times the equity they hold. This could be attributed to the fact that banks in developing countries are restricted from other ventures due to regulation and also the underdeveloped capital markets (Bhaumik and Piesse, 2008).

The literature on banks' lending behavior has focused on the willingness to extend credit (Micco and Panizza, 2006), the approach or behaviour that the banks adapt in giving out the loans; the pricing (Bassett, Chosak, Driscoll, and Zakrajsek, 2014), the guidelines and the sectors of the economy to which loans must be channeled (Olokoyo, 2011). It has been established clearly that banks depend on loans in Africa. The pricing of these loans could be explained with the loan pricing theory and credit market theory (Olokoyo, 2011). Under the loan pricing theory, banks that set high lending rates are likely to adversely select the wrong class of borrowers. Higher lending rates also lead to moral hazard on the part of the borrower. Higher lending rates would therefore be associated with poor loan quality (Stiglitz and Weiss,

1981). Banks that set low rates might have a better loan portfolio. Therefore, under the loan pricing theory, the bank in setting a lending rate makes a trade-off between loan quality and interest earnings. Under the credit market theory, the lending rate is simply considered as a pricing mechanism (Bardhan and Udry, 1999). Therefore the lending rates will be the equilibrium price set given the demand and supply of loans. The loan pricing and credit market theories explain loan pricing theoretically, however, there are certain factors that could determine lending rates empirically (Olokoyo, 2011; Villalpando and Guerrero, 2007).

Lending rates of banks could be considered as a product of internal and external factors. The source of funding, efficiency, profitability, GDP growth and inflation in the literature alter lending behaviour, specifically lending rates of banks. These variables have been considered in previous studies to explain the interest rate spread; the difference between the lending rate and interest rate on deposits (Caporale, Di Colli and Lopez, 2014; Maudos and Guevera, 2004). However the interest rate on deposits remains relatively stable. Factors that lead to variations in the interest rate spread are the very same factors that affect lending rates (Maudos and Guevera, 2004).

In this study bank specific and macroeconomic determinants of lending rates are considered in the three income brackets in Africa. This study contributes to the literature by considering CR as a determinant of banks' lending rates in Africa. The expectation is that CR will cause lending rates to be high .The banks would want to supply loans in the credit market if the equilibrium price is high enough to compensate them for future CR. Regulatory determinants such as monetary policy at the country level (Amidu, 2006) are excluded from the study. The lending rate of banks in this study considers what the banks are earning on their loans and will therefore automatically cater for changes in regulatory variables.

3.7 Banks stability

Banks have been noted to be in the business of taking risks. Some banks, however, deliberately tend to be generally more risky than others and this increase the probability of insolvency and bankruptcy. The riskiness of a bank in terms of the volatility in its profits is harmful to the economy because it could make the financial sector and the economy at large unstable. The excessive risk appetite of banks is an issue of major concern for regulatory authorities in most countries. The risk taking behaviour of banks makes the banking sector, the financial sector as well as the economy vulnerable (Keeley, 1990). CR has been said to be the dominant source of risk and instability of banks (BIS, 2001a, b).

Different measures have been used to capture risk; these include the standard deviation of the banks daily stock return (Demsetz, Seidenberg and Strahan; 1998), profitability variations (ROA/ROE) volatility (Laeven and Levine, 2008). Boyd, Graham and Hewitt (1993) developed the metric Z-score to explain the risk behaviour and stability of banks. This measure under the assumption of normality of banks' profits explains risk taking as well as insolvency of a bank (Amidu and Wolfe, 2013). This measure has been preferred to the capital market measures because it focuses on the bank's stability and insolvency and not just the unpredictability of the returns of stocks of a bank (as in the case of capital market measures). Also in a context like Africa, where the capital markets are not as developed as the banking system very few banks are on the capital market using capital market measures will significantly reduce the sample. Risk taking measures that consider the volatility of bank profits do not fully measure the insolvency risk of the banks.

Risks are inevitable in the operations of the bank. However, due to the possibility of banks taking too much risk it is incumbent on regulators to "restrict" the risk appetite of the banks.

Efforts have therefore been made by authorities in the form of regulations to alter riskiness of banks. Regulatory pressures through the increase of capital requirement that is increasing in banks' capital (less deposits and short term funds) has been found to reduce the incentive to take up too much risk (Konishi and Yasuda, 2004). Gonzalez (2005) opposes this opinion by explaining that such restrictions reduce the funds at the exposure of banks and therefore reduce the possibilities of diversification and rather increase risk. Similarly, Kim and Sontomero (1988) confirmed that the increase of capital of banks exerts a downward pressure on deposits and this might cause banks to take more risk. The relationship between capital restrictions and risk taking is ambiguous in the literature as well as in theory (Konishi and Yasuda, 2004). This current study indirectly contributes to this study by considering the relationship between short term funds to total assets and riskiness/instability. In this study an increase in deposits and short term funding to total assets is assumed to mean less capital regulatory requirements, whereas a decrease will mean an increase in capital requirements.

The value of a bank that is given up or loss when there is bankruptcy and an event of closure has been known to serve as a disincentive for taking risks (Keeley, 1990; Merton, 1977). In this study franchise value would not be considered, however, profitability of the bank will be used appropriate proxy for the franchise value (Mohsni and Otchere, 2014). This relationship between the franchise value and profitability is based on the intuition that as the bank becomes more profitable much more will be lost in the case of closure. The return on average assets not return on equity (Mohsni and Otchere, 2014) is therefore included to explain risk behaviour of the banks. The return on assets was used since it captures the profitability of all assets of the bank.

Size has also been established as one of the bank specific variables that explain risk taking of banks. Demsetz, Seidenberg and Strahan (1998) posit that larger banks all things being equal, have low levels of risk because they have the ability to diversify and reduce the level of risk that they are exposed to. The larger banks are more likely to be public and could therefore fall on the capital markets when they are faced with liquidity and solvency problems. Smaller banks on the other hand may not easily have access to these capital markets and are more likely be risky and unstable. Gonzalez (2005) however, explains that larger banks tend to take up more risk than the small banks and this is in accordance with the "too big to fail "hypothesis. The effect of size on risk appetite (instability) could either be positive or negative (Amidu and Wolfe, 2013). In this study banks are not classified into big or small banks. In considering the impact of size on stability this study seeks to find out how bank stability is affected as the bank gets larger or smaller.

CR that banks face is an indication of risk taking behaviour and stability of most banks (Marcucci and Quagliariello, 2008). This is especially the case where the bank primarily gives out loans (Schuermann et al, 2003). The current study, therefore, includes the CR as an explanatory variable to find out if it has an impact on the general riskiness and stability of the bank or otherwise. It is expected that the CR will impact positively on risk taking since CR will mean banks have a high appetite of risk by lending to high risk borrowers. The risk taking could increase the possibility of insolvency and banks become unstable. The current study seeks to find evidence suggesting that CR makes banks unstable or otherwise. Other bank specific and macroeconomic variables that are available are also included.

3.8 Chapter Conclusion

In this chapter, the empirical literature on CR, lending rates and banks' stability is synthesized. In this chapter also, CR of banks is identified as a source of banks' vulnerabilities. This could eventually lead to bank crisis. The literature has identified two set of factors that lead to CR; factors at both the bank and macroeconomic level. This study adds up to literature by finding how some of the factors in existing literature influence CR of banks in the various income brackets in Africa. It also seeks to find out if CR is a determinant of banks' average lending rate and banks' stability.

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter describes the methodological approaches that were used to meet the objectives of the research. It deals with the research design, the population to be considered, the sample, and the sampling technique and the data source. In this chapter suitable multiple panel regression models were specified to find out the determinants of CR and the impact CR has on lending rates and banks' stability Africa.

4.1 Research Design

A quantitative approach will be used for the study since the data to be used is secondary numeric data (Wooldridge, 2013).This quantitative approach will enable the researcher examine relationships among the variables of interest. The data on the various banks are obtained from the Bank scope database, this database was used because that was the best alternative available. The database reports, bank specific variables in US dollars and this ensures uniformity (Amidu and Wolfe, 2013). This therefore makes comparison of banks even across countries and income brackets permissible. Also Bank scope has been known to report bank specific accounting information in standardized format, therefore comparability of banks with different accounting standards is possible. The macroeconomic indicators are obtained from World Bank's World Development Indicators (WDI).

4.2 Population, Sample Size, Sampling technique

The population for the study includes all the banks in Africa. Panel data will be used in order to capture how the determinants affect the three dependent variables in the 197 banks in 29

African countries over the period between 2008 and 2012.The cross sectional units are the 197 banks. The data will be unbalanced panel due to the unavailability of data on some of the banks for particular years. However, this will not pose any challenge to this study. According to Rinaldi and Sanchis-Arellano (2006) unbalanced data ensures that results are not anchored on a particular period.

The sample includes 197 banks; these are the banks that had three or more data points on the dependent variables. Financial institutions other than banks such as discount houses and savings and loan companies were excluded as well as banks that do not have enough or any data in the Bank scope database. These financial institutions were excluded and banks were considered because the banks dominate the financial sector in Africa. The 197 banks selected are in 29 countries. The countries are Ghana, Benin, Mali, Mauritania, Kenya, Nigeria, Rwanda, Senegal, Sierra Leone, Uganda, Burkina Faso, Cameroun, Cote D'Ivoire, Ethiopia, Algeria, Egypt, Morocco, Sudan, Tunisia, Angola, Botswana, Malawi, Namibia, Mozambique, South Africa, Swaziland, Tanzania, Zambia and Mauritius.

The study seeks to find the determinants of CR and impact on lending rates and bank's stability in Africa. With the assumption that the income level has an impact on CR the study is done by considering the three income brackets in Africa separately. The 197 banks in the 29 countries cut across all the three income brackets in Africa. The dataset of this study has 76 banks in the lower income bracket, 65 banks in the lower middle income bracket and 56 banks in the upper middle income bracket. All the income brackets are well presented in the dataset. Thus the sample is representative enough of banks in Africa and can meet the objectives of this research.

4.3 Data Analysis

4.3.1 Data Gathering

The data was sorted onto an excel spreadsheet to include the bank specific variables as well as the macroeconomic variables. The banks were also coded with numbers so that each bank has a unique code. The banks were then divided into three brackets and separate excel sheet was created for each income bracket. The data was imported into Stata 13 software for analysis.

4.3.2 Data Analysis Plan

To give a clearer picture of the data descriptive statics will be used. The descriptive statistics shows the maximum, minimum, mean and standard deviation of all the variables to be included in the study. Pair wise correlation analysis is done to measure the correlation among the explanatory variables. This is done to identify the pair of variables that are highly correlated. When a pair of explanatory variables is correlated there is multicollinearity. Multicollinearity is not a mere problem of presence, but magnitude. Therefore, when the absolute value of the correlation coefficient between two explanatory variables is above 0.5 one of the variables would have to be dropped. Panel regression models are specified and estimated to measure to what extent the explanatory variables explain the dependent variable.

4.4. Models Specification

Multiple panel regressions will be specified and estimated for all of the three income brackets. There will be three main models to meet the research objectives. These three models that will be specified for each of the income brackets.

4.4.1 Determinants of CR

To find the factors that explain the variations in CR across the banks and time CR as a variable will be regressed on the following regressors; size of the firm (Siz), deposits and short term funding to asset ratio (Depshterm), efficiency (Eff), return on average assets (ROA), loan asset ratio (Loanass),Gross Domestic Product Growth rate (GDPG) and Inflation rate(Inf).There have been many more variables that have been used to explain loan quality in the literature. The variables to be used in the study were chosen due to data availability. The bank specific variables are from Bank scope and the macroeconomic variables from World Bank Development indicators. In this model the macroeconomic variables vary with banks over time because country variations are ignored. The annual GDP and annual inflation rates will be considered as the macroeconomic environment that each bank is exposed to at a particular point in term. The model to be used is specified as;

$$CR_{i,t} = \alpha_1 Siz_{i,t} + \alpha_2 Depshterm_{i,t} + \alpha_3 Eff_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 Loanass_{i,t} + \alpha_6 GDPG_{i,t} + \alpha_7 Inf_{i,t} + \mu_{i,t} \text{ (model 1)}$$

$\mu_{i,t}$ is the error term that includes ommited bank specific time specific and idiosyncratic error

$$\mu_{i,t} = \lambda_i + \nu_t + \varepsilon_{i,t}$$

CR=loan loss provision to total asset ratio (credit risk)

Siz =size of the bank in terms of total assets

Depshterm=deposits and other term funding to total assets

Eff=efficiency

ROA=return on assets;

Loanass=loan to asset ratio

GDPG= growth rate of Gross Domestic Product

Inf=Inflation rate

The dependent variable CR refers to the ratio of loan loss provision to gross loans. A higher ratio suggests that a bank has a higher proportion of its loans expected to be nonperforming and has high credit risk (Greenidge and Grosvenor, 2010; Hasan and Wall, 2003).

Size

Size is proxied using the natural log of total assets. The total asset of a bank was captured in the data in US dollars and the various banks vary widely in sizes. There was therefore the need to find the natural log and minimize the effects of outliers as done in literature. This was also necessary because the variables in the study were ratios including variable in money terms would not be appropriate.

The size of a bank has been established in the literature to have some explanatory power on the occurrence of loan defaults. Boyd and Gertler (1994) found evidence that due to government policies to protect US large banks the large banks were taking too much risk and this translated into giving out loans to a risky class of borrowers. The large banks were therefore reporting more bad loans in their books, whereas the smaller banks without any protection were more meticulous in giving out loans therefore having less of their loans going bad. Chaibi and Ftiti (2015) attributed the positive relationship between size and loan default to the "Too big to fail" hypothesis. Ganbatar and Selenge (2012) found similar results after conducting stress testing in Mongolia. However in another study also in the US, Ennis and Malek (2005) posits that this relationship between size and CR could not be explained by the "Too big to fail" hypothesis. They rather found evidence that suggests that smaller banks have higher NPL (Khemraj and Pasha, 2009). The negative relationship between size and CR has also been explained through diversification hypothesis. The diversification hypothesis suggests that the large banks are able to diversify their assets to reduce the amount of CR they are exposed to. However, Louzis et al. (2012) found evidence that the differences in size cannot explain the diversification of banks. The relationship between size and CR is somehow mixed and inconclusive.

In this study it is expected that there is a negative relationship between bank size and CR in Africa. This is because the big banks do not have policies that protect them against high levels of NPL like those in advanced economies like US. The large banks would have more expertise and information to distinguish between high risk borrowers and low risk borrowers. The large banks will be exposed to less bad loans as compared to small firms. The small banks on the

other hand, have less expertise and information and may adversely select the borrowers. Therefore, as banks increase in size the CR falls.

Deposits and short term funding

The short term funding of the banks will be included in the model by using the deposit and short term to asset ratio of bank i at time t. This measure is used to capture a bank's short term liabilities .This variable was reported in the Bank scope database. As this ratio increases the bank becomes more burdened with debts in the short term. This variable in the literature has had both positive and negative impact in the literature.

Chaibi and Ftiti (2015) found empirical evidence that there is a positive relationship between leverage and CR in both bank based and market based economies. They explained that as the banks have more short term funds they rather keep little or low equity or capital. Highly leveraged banks with thin capital tend to be risky in their lending activity and have high CR exposure (Yeyati and Micco, 2013; Brownbridge, 1988).

Efficiency

The ratio of operating cost to income will be used to measure efficiency. As this ratio increases the bank is becoming more cost inefficient, as the ratio decreases the bank is becoming more cost efficient. This variable also gives an indication of the quality of management so that banks that are cost inefficient have bad management and those that are cost efficient have good management (Louzis et al, 2012).

Banks that are inefficient are assumed to lack effective credit policies and CR therefore increases. The positive relationship between this variable and NPL was explained by Berger

and Young (1997) through the "bad management" hypothesis. This hypothesis suggests that inefficient banks will have bad management and therefore their loan portfolio quality will be bad and CR will be high. The cost efficient banks will have lower CR since they can afford to reduce the CR they are exposed to through proper monitoring of their borrowers.

On the other hand Berger and Young (1997) explain that negative relationship between the ratio of operating cost to income and credit risk is also possible under the skimping hypothesis. Banks that are cost efficient and do not spend much of their resources on credit risk management will rather end up with high levels of CR and those that are cost inefficient will rather have less of their loans going bad. This difference between the bad management and skimping hypotheses stems from whether the high expense already incurred by a cost inefficient bank included cost of credit management. Chaibi and Ftiti (2015) find results that is consistent with the bad management hypothesis and explained that under the skimping hypothesis cost efficient firms that have high levels of NPL will eventually become inefficient because they will incur a lot of cost in managing their unhealthy loans. Therefore the bad management hypotheses actually explain the relationship.

In this study it is expected that there will be a positive relationship between efficiency and CR. This is because banks that are incurring high operating cost relative to their income would be seeking to minimize cost. They will not adapt credit policies and monitoring at a high cost. Inefficient banks will record higher CR.

Profitability

Profitability and performance of banks as measured by return on equity and return on assets has a negative relationship with loan quality in the literature. This study uses return on

average assets as a proxy for profitability since it is an average of the earnings on all the assets the bank owns. Chaibi and Ftiti (2015) posit that high profits signify that assets of banks are being effectively managed to earn high returns. Such banks that are effectively managed have proper credit risk management and monitoring policies and therefore reduce NPL in their books (Messai and Jouini, 2013). Also a bank that is already doing well is not compelled to give out more loans to earn interest income. Therefore, as fewer loans are given out CR exposure is low. Louzis et al (2012) also explains this relationship with the "bad management hypothesis" banks with low performance; bad management will lead to accumulation of bad loans. Fofack (2005) found no significant relationship between CR and profits of the bank.

A negative relationship between bank profitability and CR is expected in Africa. This is because it is expected that a bank earning more on its assets can afford proper credit risk management and monitoring thus reducing CR.

Loan Asset Ratio

Banks take deposits and give out these funds out as loans. This is the core business of banks, however, there are other activities they engage in to earn an income. As a bank concentrates on its traditional role and give out more loans they expose themselves to more CR, there is therefore a positive relationship between loan asset ratio and CR. As this ratio grows the bank is extending more credits to its borrowers (credit growth) and this worsens the performance of bank loans (Festic et al.2011). As the loan portfolio of a bank increases monitoring might become more cumbersome. Loan asset ratio captures banks' the dependence on giving out of loans as core business. The relationship between loan asset ratio and CR gives an indication of how credit expansion affects loan quality.

The relationship is expected to be positive in this study in Africa. This is because as banks depend heavily on loans and give out more loans, their CR exposure is high.

Gross Domestic Product Growth

This was measured with the annual growth rate of GDP (GDPG). This was expressed in the form of a ratio in the study. The annual growth in GDP in the model above will be used to capture the impact of the business cycle on CR.

During economic upturns borrowers are able to pay off their loans, the banks are tempted to overreact to this and give out more loans even to high risk borrowers, the default rates of these loans increases during the economic downturn (Barro and Lowe, 2012 in Castro, 2013). Rajan (2004) also explains the increase in lending during booms could be explained by herd behaviour of banks (Souza and Feijo, 2011). During economic booms most economic agents including banks become overconfident in the economy. Banks therefore give out more loans and during downturns CR increases. Also during economic downturn borrowers are not able to earn much income and are therefore not able to service their loans. This therefore suggests that there could be a procyclical nature of CR that could be explained by the trend of economic activity (Festic et al, 2012).

This negative relationship is expected in the three income brackets in Africa. As there is growth in the economy, borrowers earn more to defray their loans. On the other hand, when there is a downturn in economy, loans may not be serviced by the borrower.

Inflation

Inflation is included in the model to study how instability in the economy affects the ability of borrowers to pay off their loans in Africa. The inflation annual rates at the country level will be used. The sign could be positive or negative. If the relationship is positive as inflation increases CR increases because the real value of income of borrowers falls. Conversely, an increase in inflation could cause CR to fall since the real value of the loan to be serviced reduces. Chaibi and Ftiti (2015) on the other hand, in a cross country study established a negative significant relationship between inflation and NPL. This is because inflation reduces the real value of the debt to be serviced. CR will however not be influenced by inflation rate if the real value of debt to be serviced and the income of the borrower reduces simultaneously. Castro (2013) in his work stated that despite the predictive power of macroeconomic factors on credit risk the effect of inflation is nullified in GIPSI (Greece, Ireland, Portugal, Spain and Italy) due to the simultaneous negative and positive effect.

The relationship between inflation and CR is expected to be positive. This is because as inflation increases more of the income of the borrower is spent on consumption and basic needs. The portion of income left that is to be used to service the loan diminishes. The real value of the debt to be serviced would not fall because banks in Africa set high lending rates.

The expected signs of the variables in are presented below. The expectations apply for all the three income brackets.

Table 3 Determinants of CR

Variable	Measured as	Expected Sign
CR	Ratio of LLP to Gross loans	
Size(Siz)	Natural logarithm of total assets	-
Deposits and short term funding(Depshterm)	Ratio of deposits and short term funding to total assets	+
Efficiency(Eff)	Ratio of cost to income	+
Return on Assets (ROA)	Annual return on average assets	-
Loan Asset Ratio (Loanass)	Ratio of gross loans to total assets	+
Growth in GDP(GDPG)	Annual percentage growth in GDP	-
Inflation(Infl)	Annual inflation rates(consumer prices)	+

The coefficients of the model for the three brackets will be compared. This will help the researcher to find out if the determinants of CR are the same in banks in the different brackets.

4.4.2 The Effect of CR on bank lending rates

This study goes further than the empirical studies on the determinants of CR and also studies the impact of CR on banks' lending behaviour in terms of the average rate they charge on their loans. To meet these objectives average lending rate is regressed on CR and other explanatory variables; deposits and short term funding to assets ratio, efficiency, return on asset, GDP growth and Inflation rate.

$$LR_{i,t} = \beta_1 CR_{i,t} + \beta_2 Depshterm_{i,t} + \beta_3 Eff_{i,t} + \beta_4 ROA_{i,t} + \\ + \beta_5 GDPG_{i,t} + \beta_6 Inf_{i,t} + \varpi_{i,t} \text{ (model 2)}$$

$\varpi_{i,t}$ is the error term term that includes ommited bank specific time specific and idiosyncratic error.

$$\varpi_{i,t} = \omega_i + \kappa_t + \chi_{i,t}$$

LR=average lending rate

CR=loan loss provision to total asset ratio (credit risk)

Siz =size of the bank in terms of total assets

Depshterm=deposits and other term funding to total assets

Eff=efficiency

ROA=return on assets

GDPG= growth rate of Gross Domestic Product

Inf=Inflation rate

In this model also the macroeconomic variables in the model vary with banks over time because country variations are ignored.

The lending rate (dependent variable) will be captured using the average lending rate of bank i at time t. The actual rate at which the various banks give out loans is not available therefore the average lending rate (LR) will be captured using the ratio of interest income to gross loans. However, since the study is not considering the CR banks are exposed to in relation to different types of loans this proxy is appropriate. This variable could also be considered as the rate of return a bank earns on average on loans granted.

CR

The CR will be measured using the ratio of the LLP to gross loans as in Model 1.

The CR that banks are faced with may to some extent have an influence on the price they are willing to give out the loans or the rate of return the banks want on their loans (Allen, 1988). A bank that has high CR will consider giving out loans to be a risky venture and therefore will want to earn much on their loans to compensate them for the risk involved (Ramful, 2001). As banks are exposed to more CR they charge higher lending rates.

In this study a positive relationship is expected between CR and lending rates, meaning that banks that report high CR will set lending rates high.

Deposits and short term funding to assets ratio

This will be measured as the ratio of deposits and short term funding to total assets.

A bank with a high deposit and short term funding to assets ratio will have more funds available to give out as loans. However, these funds are short term and the bank will be required to meet these liabilities in the short term. Such a bank might set its lending rates (loan price) low to increase the demand of borrowers for loans. Thus, there could be a negative relationship between CR and deposits and short term to assets ratio. On the other hand, this relationship could be positive. A bank that has more deposits and short terms will have high short term liability in terms of cash demand from customers and short term creditor. The bank will set lending rates to earn much interest income to avoid liquidity problems.

In this study, since the banks have been established to be heavily dependent on short term funds, coupled with their loan dominated portfolio makes them set high lending rates to avoid liquidity problems. A positive relationship is expected.

Efficiency

Efficiency (Eff) as a variable is expected to have a positive relationship with lending rates. A bank that is cost inefficient (high operating cost to income ratio) will set high lending rates so as to earn much interest income to offset its high expenses (Sarpong, Winful and Ntiamoah, 2013). A firm that is cost efficient will on the other hand, set lower lending rates. The ratio of cost to income will be used.

A positive relationship is expected between cost efficiency and lending rates in Africa. This is the case because the banks have been noted to depend largely on loans. Therefore, when the bank incurs a higher cost it needs a high interest income to offset the cost. All things being equal, lending rates will be set higher. As a bank reports a higher cost to income ratio lending rates will be set higher to cover cost.

Profitability

Profitability (ROA) is also expected to have a negative relationship with lending rates. A firm with high ROA is doing well and would not be eager to increase lending rates to increase earnings. As a bank increases in profitability they give out their loans at lower rates as compared to less profitable banks. The banks that are recording less returns on the other hand, set their higher lending rates. This is the situation because the banks in Africa depend on their loans portfolio to earn profits.

This study expects the relationship between profitability and lending rates to be negative

GDP Growth

In an economy that is booming banks will set high lending rates to earn more. Borrowers would be capable of borrowing at high rates to invest. This is because most investments would have high returns. All things being equal the equilibrium lending rate will be high. On the other hand, in an economic downturn, investments will not be yielding much. The borrowers would want low lending rates. Banks would therefore set relatively lower lending to attract borrowers. Also in an economic boom the banks could mobilize more funds. As the supply of funds increases holding the demand of funds constant, a lower equilibrium lending rate will be set.

A negative relationship between GDP Growth and lending rates could also be possible. During economic upturn loans are not risky for most investments will yield positive returns. The banks will set lending rate low as compared to a downturn. In a downturn loans are risky and the bank would want to be compensated more for the riskiness of loans. Lending rates would therefore be high (Marcucci and Qualiariello, 2008).

The negative relationship is expected in the study.

Inflation

Inflation (Inf) is expected to have a positive relationship with the lending rate (Azeez and Gamage, 2013) .When inflation is high the lending rate will be set high in order to maintain the real value of the interest accrued from the loan. When inflation is low the lending rate is set low because the real value of the interest earned on the loan will not fall.

A positive relationship was expected between inflation and average lending rates.

Table 4 Effects of CR on Lending rates.

Variable	Measured as	Expected Sign
Lending rate(LR)	Ratio of interest income on loans	
CR	Ratio of LLP to gross loans	+
Deposits and short term funding to total assets (Depshterm)	Ratio of deposits and short term funds to total assets	+
Efficiency(Eff)	Ratio of operating cost to income	+
Profitability(ROA)	ROA	-
GDP Growth (GDPG)	Annual growth rate of GDP	-
Inflation (Inf)	Annual inflation rate (consumer prices)	+

4.4.3 Effects of CR on banks' stability

To study the impact of credit risk on banks stability model (3) will be used. The Z-score is the dependent variable. It measures risk taking behaviour of the firm and its stability (Delis, Hasan and Tsionas, 2014; Beck and Demirguc -Kunt, 2003). It is a thorough measure of bank's stability because it captures the bank's performance or profitability level, the volatility in its profits as well as the capital buffer that absorbs the risk (Beck, Demirguc -Kunt and Merrouche, 2010). In the literature, in computing the standard deviation of return on assets a rolling window has been used to capture the dynamics in banks' risk. Therefore the volatility

of banks' profitability is computed backwards. In this study, however, standard deviation of the return on assets was computed over the five year period per each bank. The Z-score therefore captures the instability and volatility of banks over the study period. It is calculated as:

$$Z\text{-}score_{i,t} = \frac{ROA_{i,t} + \left(\frac{Equity}{Totalassets}\right)_{i,t}}{\text{Standard deviation of } ROA_{i,t}}$$

This measure fully captures the risk on banks assets profits as well as leverage risk (Srairi, 2013). It can be decomposed into;

$$Z\text{-}score_{i,t} = \frac{ROA_{i,t}}{\text{Standard deviation of } ROA_{i,t}} + \frac{\left(\frac{Equity}{Totalassets}\right)_{i,t}}{\text{Standard deviation of } ROA_{i,t}}$$

In this study the log of Z-score will however be used to reduce the "size" of the variable (Amidu and Wolfe, 2013). This is because the measurement was found to be large in absolute terms. Without reducing the scale of the Z-score the coefficients will be too large given that the explanatory variables are mostly ratios.

The Z-score gives an indication of the extent to which ROA must fall before the bank goes bankrupt. A higher Z-score means the bank is less risky and stable. This explanation will be used in the interpretation of the Z-score throughout this study. The likelihood of a stable bank being insolvent is therefore less.

$$Z\text{-}score_{i,t} = \varphi_1 CR_{i,t} + \varphi_2 Siz_{i,t} + \varphi_3 Eff_{i,t} + \varphi_4 Depshterm_{i,t} + \varphi_5 GDPG_{i,t} + \varphi_6 Inf_{i,t} + \lambda_{i,t} \text{ (model 3)}$$

$\lambda_{i,t}$ is the error term that includes ommited bank specific time specific and idiosyncratic error

$$\lambda_{i,t} = \ell_i + \hbar_t + \Omega_{i,t}$$

Z-score=measure of banks' stability

CR=loan loss provision to total asset ratio(credit risk)

Siz =size of the bank in terms of total assets

Depshterm=deposits and other term funding to total assets

GDPG= growth rate of Gross Domestic Product;

Inf=Inflation rate

In this model, just like other two the macroeconomic variables in the model vary with banks over time because country variations are ignored

CR

The Z-score is expected to have a negative relationship with CR. This is expected because it's assumed that as CR increases the bank is exposed to liquidity risk and they are therefore unstable and more likely to be insolvent; low Z-score (Amediku, 2006; Gonzalez, 2005).

This negative relationship is what is expected in this study.

Size

Size is expected to have either a negative or positive effect on the Z-score. If negative, it will mean that big firms have low Z-scores and therefore generally less stable as compared to smaller firms. This might be because big firms are overconfident and due to the "Too big to fail hypothesis" take up more risk (Louzis et al. 2012). The extra risk exposes the bank to liquidity and solvency problems and thus become unstable.

If positive, it will mean big firms have higher Z-scores and are stable and taking less risk and smaller banks have low Z-scores and are therefore unstable and taking more risk. The intuition here is that as bank's assets increase it is able to diversify and hence reduce the risk.

A positive relationship is expected between the Z-score and the size of the firm in this study. This is so because the large firms have relatively more resources (assets) to avoid or absorb the risk and remain stable. The "Too big to fail hypothesis" might not hold in the African context because the policy protection of large banks does not exist as in developed economies like US (Berger and De Young, 1997).

Efficiency

Efficiency (Eff) the operating cost to income ratio is expected to have a negative relationship with the Z-score. This is because a bank that is incurring much cost relative to its income is more likely to be unstable and have a low-Z-score. The ratio of operating cost to income will be used to measure inefficiency. A bank with a lower cost income ratio is earning income at a less cost and will be stable.

The negative relationship is expected between efficiency and the Z-score in this study. This is because a bank incurring high cost relative to its income is likely to be risky and unstable as compared to a bank that is incurring less cost.

Deposits and short term funding

Deposits and short term funding (Depshterm) is expected to have a negative relationship with the Z-score. As a bank increases its deposits and other forms of short term funding the bank is becoming more risky and unstable. This is because it has more short term liabilities to be serviced with assets with relatively long terms. This increases the likelihood of liquidity problems and insolvency (Demirguc - Kunt and Detragiache, 1998; Brownbridge, 1988)

This negative relationship is expected in this study.

GDP Growth

GDP Growth which measures the business cycle trend is expected to have a positive relationship with the Z-score. This is because in an economic downturn just like most businesses, banks will be unstable and their operation becomes more risky. This means that as GDP falls the Z-score falls. When there is an economic upturn most ventures assure positive returns. All things being constant the bank will be earning much from its operations and be less risky and stable. The relationship could also be negative. That will mean that when the economy is booming the bank becomes overconfident and engages in risky lending and investments. In an economic downturn Z-score will be high banks have less risk appetite and will be more stable.

In this study a positive relationship is expected between the Z-score and GDP Growth. This is because as the economy is booming depositors and borrowers will be well off. The operations of the bank will be rewarding and less risky.

Inflation

Inflation measures economic volatility. When high inflation rates are recorded in country businesses and investments become risky and unstable. Banks just like all other businesses are expected to be unstable when inflation is high. A negative relationship is expected

Table 5 Effects of CR on Banks' Stability.

Variable	Measured as	Expected sign
Z-score	Ratio of the sum of ROA and equity asset ratio to standard deviation of ROA	
CR	Ratio of LLP to gross loans	-
Size	Naural log of total assets	+
Efficiency	Ratio of operating cost to income	–
Deposits and short term to assets ratio	Ratio of deposits and short term funding to total assets	-
GDP Growth	Annual percentage growth in GDP	+
Inflation	Annual inflation rate	-

Models 1, 2 and 3 have been specified as multiple regressions. This is to enable the researcher to investigate how a number of explanatory variables will explain the variations in the dependent variables (CR, Average lending rate and Z-score).

4.5 Model estimation technique

The study is a panel study and various panel estimation techniques such as the Generalized Least Squares techniques; random and fixed effects model (Wooldridge, 2013) could be applied. In this study, these estimation techniques were not used. For the fixed effects and random effects both techniques will be used and results will be obtained. The Hausman test, then shows which model is more appropriate to be selected. After running these it was observed that one technique was not to be used for all three income brackets. This would make comparability of results among the income brackets difficult since there are different econometric assumptions underlying the two techniques. Results from the fixed and random effect were also not considered (in Appendices D, E and F) because of the problem of autocorrelation and heteroscedasticity that were detected in the pre estimation tests. The problem of heteroscedasticity and autocorrelation was suspected because in the study the emphasis was placed on banks in income brackets. Country and industry effects were somehow silenced in the study. The country variables that were omitted in the models could influence the bank level variables. The possible relationship between the explanatory variables and the omitted country variables (captured in error term) means the error term might not be homoscedastic. It was therefore necessary that an estimation technique that permits robust results despite the presence of heteroscedasticity and serial correlated errors be adapted.

The Prais - Winstein estimation technique similar to the generalized least-squares was used. This estimation was adopted because it is used to estimate parameters in a model whose error

terms are not homoscedastic and are serially correlated (Prais and Winstein, 1954). The Prais – Winstein also is based on the assumption that the error term follows a first order autoregressive process. This means that the first lag of the residual is a significant predictor of the residual. In this study the relationship between the residual and the first lag of residual is estimated for each of the models.

The three models were estimated using the default traditional panel technique; Random effects. The error terms were predicted and regressed on their first lag (also using Random effects). The results as presented in the next chapter show that the error terms are significantly related to the first lag of error terms. Due to the fact that the error term could take on either a positive or negative value because it is deviation of the estimated dependent variables from the actual, another test was carried out using the square of the error terms. Breusch and Pagan Langrangian multiplier test was also done to test if the error terms are homoscedastic. The error term for the three models was found to be rather heteroscedastic. The results for these tests are also presented in the next chapter. The Prais -Winstein estimation technique is therefore appropriate to meet the objectives of the study.

4.6 Conclusion

In this chapter three models have been specified to meet the objectives of the study. Each model will be run thrice one for each income bracket. This is to help us determine the relationship among the various variables in the different income brackets. It was also concluded that the Prais- Winstein Estimation technique was appropriate for this study.

CHAPTER FIVE

RESULTS AND DISCUSSION

5.0 Introduction

This study examines the determinants of CR as well as its impact on the lending rates and riskiness/stability of banks in Africa between 2008 and 2012.The specific determinants of CR to be considered are the size, deposits and short term funding, efficiency, return on assets, loan to assets ratio, GDP annual growth rate and inflation rate. To study the impact of CR on lending rate, CR, deposits and short term funding, efficiency, return on assets, GDP annual growth rate and inflation are regressed on average lending rate. Also CR, size, efficiency, deposits and short term funding, GDP growth rate and Inflation are regressed on Z-score to find the impact of CR on banks stability. This chapter presents descriptive statistics on the various observations, the pair wise correlation matrix and the results on the multiple regressions among the three income brackets and other tests that had to be carried out in this study.

5.1 Descriptive statistics

This gives a clearer picture of the data being used. In total eleven variables are going to be considered in this study. The description of the variables has been done separately among the income brackets. These variables are the dependent and independent variables in the models to be estimated in this study. The descriptive statistics includes the mean, median, standard deviation and the maximum and minimum values.

Table 6 Descriptive Statistics –Low Income Bracket

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Credit Risk	370	0.043	0.041	0.002	0.277
Size	376	5.544	1.205	2.565	9.100
Deposits and Short term funding to asset ratio	376	0.796	0.080	0.452	0.963
Efficiency	371	0.612	0.185	0.148	0.995
Return on assets	376	0.020	0.036	-2.610	0.167
Loan to assets ratio	371	0.510	0.112	0.143	0.835
Lending rates	363	0.133	0.061	0.044	0.552
Z-score(log)	374	3.265	1.002	-0.929	6.142
Z-score	374	40.906	48.730	0.395	464.869
GDP growth rate	380	0.058	0.029	-0.095	0.152
Inflation rate	380	0.117	0.078	-0.008	0.444

Table 6 above presents the descriptive statistics of the variables in the low income bracket. CR has an average of 0.043. This means that on average about 4% of loans of banks operating in this income bracket are expected to go bad hence that percentage is kept as provision. The standard deviation suggests that there are variations among the banks in terms of the credit risk that they are exposed to. The values range between 0.002 and 0.277

Size which was measured by the natural log of total assets. It has a mean value of 5.544 and a standard deviation of 1.205.This suggests that banks in this income bracket operate on different scales. The deposits and short term funding to assets has an average of 0.796.This

means on average about 80% of the assets of the banks in this brackets is from short term sources. It has a standard deviation of 0.080.The ratio ranges between 0.452 and 0.963.

Efficiency has a mean value of 0.612 meaning that about 61% of operating income is spent on average on operating expenses by banks in the income bracket. There is a standard deviation of 0.185 and it ranges between 0.148 and 0.994. This suggests that some banks in this region are cost efficient while others are relatively cost inefficient.

Return on assets ranges between -2.671 and 0.167 with a mean of 0.020. This means that some banks are making negative returns whilst others are making positive returns on their assets. On average the banks are earning about 2.00% on their average assets with a standard deviation of about 0.036.

Loan to asset ratio also has an average value of 0.510 meaning more than half of the assets of banks are in loan portfolio. It ranges between 0.143 and 0.835 with a standard deviation of 0.112.

The average lending rate is the ratio of interest income on gross loans. It has an average of 0.133. This suggests that on average banks expect to earn 13.3% interest on their gross loans. The average lending rates could be as low as 0.044 and as high as 0.552.

The Z-score measures stability and has an average of 40.921 with a standard deviation as high as 48.730.This means that on average the Return on assets must deviate by 40.906 before the bank will run into the problem of insolvency and hence instability. The value of the Z-score ranges between 0.395 and 464.869. The stability of banks therefore has a lot of variations in this bracket. (The log of this measure rather the actual value is however used in the estimation of the model)

The economic environment in this study is explained by the annual growth rate and inflation that the bank is exposed to .The annual growth rate of GDP ranges between -0.095 and 0.152 and the annual inflation ranges between -0.008 and 0.444

Table 7 Descriptive Statistics-Low Middle Income Bracket

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Credit Risk	301	0.081	0.080	0.005	0.400
Size	321	6.919	1.549	2.485	10.881
Deposits and Short term funding to asset ratio	321	0.788	0.110	0.330	0.962
Efficiency	318	0.566	0.165	0.157	0.972
Return on assets	320	0.015	0.029	-0.220	0.147
Loan to assets ratio	321	0.525	0.148	0.187	0.881
Lending rates	311	0.115	0.055	0.008	0.340
Z-score	315	68.836	93.740	-2.020	470.240
Z-score(log)	313	3.586	1.214	-3.926	6.153
GDP growth rate	323	0.052	0.033	-0.050	0.150
Inflation rate	321	0.088	0.052	-0.011	0.193

The descriptive statistics of the variables in low middle income bracket is represented in the Table 7 above. The credit risk has an average value of 0.081 meaning about 8% are expected to go bad hence provision is made accordingly. It has a standard deviation of approximately 0.08. It ranges between 0.005 and 0.400.

The size of the banks ranges from 2.485 to 10.881. The standard deviation is 1.549 and the mean is 6.919.

The deposits and other short term debts to total assets ratio has a mean value of 0.788. This means that about 79% of assets of banks is funded by deposits and other forms of short term funds. It has a standard deviation of 0.110.The minimum and maximum of this ratio are 0.330 and 0.962 respectively.

The efficiency has a mean value of 0.566 with a standard deviation of 0.165. It ranges between 0.157 and 0.972. This means that in this income bracket, the most cost efficient bank has its operating cost being 15.7% of its income. The most cost inefficient bank on the other hand has the ratio being 97.2% (0.972).

Return on assets has an average of 0.015. It is expected, therefore, that banks in this income bracket earn 1.5% on its average assets. The least profitable bank earns a negative return of about -22 %. The most profitable bank on the other hand earns about 14.7% return on its average assets.

The loan to asset ratio ranges between 0.187 and 0.881.The mean is 0.525; approximately 53% of the assets are given out as loans. This suggests that although on average banks give about half of their total assets on loans. The standard deviation of loan to asset ratio is 0.148.

The average lending rate that a bank in this income bracket will charge on its loans is 0.115. The rate they charge on the loans ranges between 0.008 and 0.340.The standard deviation is 0.055.

The Z-score has a mean value of 68.836, ranging between -2.020 and 470.240.It has a huge standard deviation of 93.740.This shows that the stability of the banks varies in this income bracket.

The economic environment of the banks is described by the annual growth rate and the inflation rate. The growth rate of GDP has an average of 0.052 (5.20%) whiles the average inflation rate is 0.088 (8.8%). This shows on average the banks in this income bracket have their inflation rate higher than the growth rate. The annual growth rate of GDP ranges between -5% and 15%. The annual inflation rate ranges between -1.05% and 19.25%.

Table 8 Descriptive Statistics - Upper Middle Income Bracket.

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Credit Risk	275	0.051	0.055	0.002	0.344
Size	280	7.407	1.678	3.664	11.750
Deposits and Short term funding to asset ratio	274	0.782	0.113	0.358	0.936
Efficiency	275	0.531	0.156	0.083	0.960
Return on assets	279	0.023	0.019	-0.049	0.104
Loan to assets ratio	280	0.579	0.202	0.166	0.992
Lending rates	268	0.103	0.041	0.022	0.227
Z-score	273	59.117	60.362	7.003	364.829
Z-score(log)	273	3.718	0.828	1.946	5.899
GDP growth rate	280	0.039	0.029	-0.015	0.138
Inflation rate	280	0.076	0.035	0.025	0.145

Credit risk has an average value of 5.1%, a minimum value of 0.18% and a maximum value 34.4%. The standard deviation is 0.055.

Size of banks in this income bracket has an average of 7.407. The standard deviation 1.678.This variable ranges between 3.664 and 11.750.

The deposits and short term funds to total asset ratio has an average of 0.782.The minimum value is 0.358 and maximum value of 0.936.This suggest that the banks in this income bracket also rely on the short term sources of funds. The bank that least depends on short term funds even has about 35.8% of its assets being short term funded.

Efficiency, the ratio of operating cost to income ranges between 0.083 and 0.960.The average is 0.531.This means on average banks in this income bracket has about 53.1% of its income being absorbed by operating cost.

The return on assets has a mean value of 0.023 and standard deviation of 0.019.The least profitable bank earns -0.049(-4.9%) whiles the most profitable bank is 0.104 (10.4%).

The loan to asset ratio of banks in the upper middle income bracket has a mean value of 0.579. This means that about 57.9% of the assets of the bank on average are given out as loans. The ratio ranges between 0.166 (16.6%) and 0.992 (99.2%) with a standard deviation of 0.202.

5.2 Pair wise correlations

The correlation coefficient between any two variables ranges between -1 and 1. The sign simply signifies the direction of the relationship and the absolute value measures the extent of the correlation. A positive coefficient between two variables suggests that as one variable increases (decreases) the other also increases (decreases). A negative coefficient suggests that as one variable increases (decreases) the other decreases (increases). If the correlation coefficient between two variables has absolute value more than 0.5 then the variables are highly correlated. There will be the problem of multicollinearity if such variables are included as explanatory variables in a model. From the correlation matrix in Appendix G none of the

correlation coefficient is above 0.5(absolute terms).The problem of multicollinearity is therefore not a cause of worry in this study. The p-value was reported to show the significance of collinearity between the variables. The correlation between some of the pair of variables is significant however they are less than 0.5.

5.3 Pre Estimation Tests

The estimation technique to be used as stated earlier has an underlying assumption that the error term follows an autocorrelation process of degree one. Also the error term is heteroscedastic.

5.3.1 Test for Autocorrelation

To test for autocorrelation and heteoroscedasticity, the models were run using the default traditional generalized least squares estimation technique (random effect). The error terms were then predicted and the appropriate test carried out. To test for autocorrelation of degree one, the specified models were run for each income bracket. Also the squared of the error term was also used to test for autocorrelation since the error term could be positive or negative. The null hypothesis states that the first lag of error term (squared error term) is an insignificant predictor of the contemporary error term (squared error term). Therefore if p-value is less than 0.05 then the null hypothesis is rejected. The conclusion will therefore be that the error terms are significantly predicted by their first lags. The error terms therefore follow an autocorrelation process of degree one.

$$\Pi_{i,t} = o\,\Pi_{i,t}\,\Pi_{i,t-1} + \iota_{i,t}$$

$$\Pi_{i,t}^{2} = \pi\,\Pi_{i,t-1}^{2} + \infty_{i,t}$$

$\iota_{i,t}$ and $\infty_{i,t}$ are error terms that includes omitted bank specific time specific and idiosyncratic error

$\Pi_{i,t}$ is the residual

$\Pi_{i,t}$ is the first lag of the residual

.

Table 9 Autocorrelation Test for Low Income Bracket

Autocorrelation using error terms					
Residual (model 1)	Coefficient	**Residual (model 2)**	Coefficient	**Residual (model 3)**	Coefficient
Residual(-1)	0.736*** (0.032)	**Residual(-1)**	0.712*** (0.030)	**Residual(-1)**	0.782*** (0.033)
Intercept	0.011*** (0.001)	**Intercept**	0.038*** (0.004)	**Intercept**	0.701*** (0.109)
R-squared	0.707	**R-squared**	0.667	**R-squared**	0.729
Wald chi2(1)	541.69	**Wald chi2(1)**	568.18	**Wald chi2(1)**	555.50
Prob > chi2	0.0000	**Prob > chi2**	0.0000	**Prob > chi2**	0.0000
Autocorrelation using squared error terms					
Residual^2 (model 1)	Coefficient	**Residual^2 (model 2)**	Coefficient	**Residual^2 (model 3)**	Coefficient
Residual^2(-1)	0.714*** (0.029)	**Residual^2 (-1)**	0.707*** (0.033)	**Residual^2 (-1)**	0.745*** (0.034)
Intercept	0.000*** (0.000)	**Intercept**	0.005*** (0.001)	**Intercept**	2.674*** (0.377)
R-squared	0.698	**R-squared**	0.624	**R-squared**	0.716
Wald chi2(1)	617.45	**Wald chi2(1)**	471.19	**Wald chi2(1)**	481.36
Prob > chi2	0.000	**Prob > chi2**	0.000	**Prob > chi2**	0.000

******* significant at 1% ** significant at 5% *significant at 10%

The results in the Table 9 above shows that the error terms estimated in the low income bracket follow an autocorrelation process of degree one.

Table 10 Autocorrelation Test for Low Middle Income Bracket

Autocorrelation using error terms					
Residual (model 1)	Coefficient	**Residual (model 2)**	Coefficient	**Residual (model 3)**	Coefficient
Residual(-1)	0.807*** (0.035)	**Residual(-1)**	0.656*** (0.038)	**Residual(-1)**	0.825*** (0.031)
Intercept	0.015*** (0.003)	**Intercept**	0.035*** (0.005)	**Intercept**	0.657*** (0.112)
R-squared	0.687	**R-squared**	0.568	**R-squared**	0.826
Wald chi2(1)	540.49	**Wald chi2(1)**	295.54	**Wald chi2(1)**	712.29
Prob > chi2	0.000	**Prob > chi2**	0.000	**Prob > chi2**	0.000
Autocorrelation using squared error terms					
Residual^2 (model 1)	Coefficient	**Residual^2 (model 2)**	Coefficient	**Residual^2 (model 3)**	Coefficient
Residual^2(-1)	0.753*** (0.033)	**Residual^2 (-1)**	0.632*** (0.039)	**Residual^2 (-1)**	0.858*** (0.030)
Intercept	0.002*** (0.000)	**Intercept**	0.004*** (0.001)	**Intercept**	2.070*** (0.428)
R-squared	0.684	**R-squared**	0.542	**R-squared**	0.836
Wald chi2(1)	531.75	**Wald chi2(1)**	266.09	**Wald chi2(1)**	817.70
Prob > chi2	0.000	**Prob > chi2**	0.000	**Prob > chi2**	0.000

******* significant at 1% ** significant at 5% *significant at 10%

From Table 10 above the error term estimated for the three models in the low middle income bracket follows an autocorrelation process of degree one.

Table 11 Autocorrelation Test for Upper Middle Income Bracket

Autocorrelation using error terms					
Residual (model 1)	Coefficient	**Residual (model 2)**	Coefficient	**Residual (model 3)**	Coefficient
Residual(-1)	0.423*** (0.056)	**Residual(-1)**	0.614*** (0.044)	**Residual(-1)**	0.846*** (0.030)
Intercept	0.030*** (0.002)	**Intercept**	0.037*** (0.004)	**Intercept**	0.560*** (0.112)
R-squared	0.226	**R-squared**	0.611	**R-squared**	0.793
Wald chi2(1)	56.69	**Wald chi2(1)**	195.33	**Wald chi2(1)**	788.68
Prob > chi2	0.000	**Prob > chi2**	0.000	**Prob > chi2**	0.000
Autocorrelation using squared error terms					
Residual^2 (model 1)	Coefficient	**Residual^2 (model 2)**	Coefficient	**Residual^2 (model 3)**	Coefficient
Residual^2(-1)	0.449*** (0.057)	**Residual^2 (-1)**	0.620*** (0.043)	**Residual^2 (-1)**	0.846*** (0.030)
Intercept	0.002*** (0.000)	**Intercept**	0.003*** (0.001)	**Intercept**	0.56033*** (0.112)
R-squared	0.232	**R-squared**	0.631	**R-squared**	0.793
Wald chi2(1)	63.00	**Wald chi2(1)**	204.66	**Wald chi2(1)**	788.68
Prob > chi2	0.000	**Prob > chi2**	0.000	**Prob > chi2**	0.000

******* significant at 1% ** significant at 5% *significant at 10%

From Table 11 above all the error terms follow autocorrelation of degree one. The error term of all models are therefore serial correlate and follows an autocorrelation process of degree one.

5.3.2 Test for heteroscedasticity

To test for heteroscedasticity the Breusch and Pagan langrangian multiplier test was carried out for all the models. The error terms were predicted after running each model with the default generalized least square estimation technique (Random effects). This test had the null hypothesis stating that the variance of the error term is homoscedastic. The failure to accept this null, p-value being less than 0.05 means the error term is heteroscedastic.

Table 12 Breusch and Pagan Langrangian Multiplier Test - Low Income Bracket.

	Variance	Standard deviation		Variance	Standard deviation		Variance	Standard deviation
CR	0.002	0.041	**LR**	0.004	0.061	**Z-score**	1.059	1.029
E	0.001	0.026	**E**	0.001	0.027	**E**	0.022	0.147
U	0.001	0.031	**U**	0.003	0.051	**U**	0.752	0.867
chibar(01)	222.84			401.02			605.69	
P>chibar2	0.000			0.000			0.000	

The p-values (below 0.05) displayed above in Table 12 suggest that the error terms predicted from traditional panel estimation technique are heteroscedastic.

Table 13 Breusch and Pagan Langrangian Multiplier Test - Low Middle Income Bracket.

	Variance	Standard deviation		Variance	Standard deviation		Variance	Standard deviation
CR	0.006	0.078	**LR**	0.003	0.056	**Z-score**	1.493	1.222
E	0.001	0.031	**E**	0.001	0.027	**E**	0.073	0.270
U	0.005	0.068	**U**	0.001	0.032	U	0.796	0.892
chibar(01)	242.78			135.34			289.96	
P>chibar2	0.000			0.000			0.000	

The p-values displayed above in Table 13 suggest that the error terms predicted from traditional panel estimation technique are heteroscedastic

Table 14 Breusch and Pagan Langrangian Multiplier Test - Upper Middle Income Bracket.

	Variance	Standard deviation		Variance	Standard deviation		Variance	Standard deviation
CR	0.003	0.055	**LR**	0.002	0.042	**Z-score**	0.681	0.825
E	0.001	0.026	**E**	0.001	0.020	**E**	0.006	0.077
U	0.003	0.050	**U**	0.003	0.032	**U**	0.475	0.689
chibar(01)	305.11			229.57			360.58	
P>chibar2	0.000			0.000			0.000	

The p-values displayed in Table 14 above suggest the error terms predicted from traditional panel estimation technique are heteroscedastic.

The pre estimation tests above suggests that the generalized least squares although appropriate for panel regression estimations might not be suitable for this study. The heteroscedastic and serially correlated error terms therefore necessitates the use of the Prais Winstein estimation technique.

5.4 Determinants of credit risk

To determine the factors that determine CR panel regressions were estimated for the three income brackets. Below are the results of the panel regression for the three income brackets. The Prais -Winstein (PW) Estimation was used.

Table 15 Determinants of Credit Risk-Model 1

Explanatory variables	Low income bracket	Low middle income bracket	Upper middle income bracket
Bank specific variables			
Size	-0.001 (0.003)	0.016*** (0.004)	0.004 (0.004)
Deposits and short term funding to total asset ratio.	0.038 (0.027)	-0.013 (0.034)	0.008 (0.022)
Efficiency	0.029* (0.015)	0.009 (0.030)	-0.035* (0.021)
Return on Assets	-0.195** (0.079)	-0.404*** (0.139)	-0.203 (0.145)
Loan to asset ratio	0.011 (0.021)	-0.047*** (0.024)	0.012 (0.019)
Macroeconomic variables			
Annual growth rate of GDP	0.014 (0.045)	0.079 (0.056)	-0.078* (0.039)
Annual Inflation rate	0.027*** (0.013)	0.075 (0.051)	0.006 (0.050)
R-squared	0.465	0.608	0.443
Wald chi2(8)	337.14	255.85	184.46
Prob> chi2	0.000	0.000	0.000

*** Significant at 1% **significant at 5% ***significant at 1%

The results of model one (Table 15) suggest that the explanatory variables size, deposits and short term funding to asset ratio, efficiency, return on assets, loan to assets ratio, annual growth of GDP Growth and inflation rate explains 46.5% of variations in CR in low income bracket. The variables jointly explain 60.8% and 44.3% of the variations in CR in the low middle and upper middle income bracket. Three of the variables holding all others constant had a significant impact on CR in the low income and low middle income bracket. In the upper middle income bracket where the least proportion of the variations was explained by the model only two of the variables had significant coefficients. The results of the Wald test shows that the models specified and estimated are fit. The standard errors are also corrected for heteroscedasticity and serial correlation, the results are therefore reliable.

Size as a variable impacts CR only in the low middle income bracket. The coefficient 0.016 shows that all other factors held constant as the size of a bank in the lower middle income bracket increases CR it is exposed, to also increases. This result is in line with the too big to fail hypothesis (Berger and De Young, 1997) which posits that there is a positive relationship between the size of a bank and CR in the lower middle income bracket. This therefore suggests that in the lower middle income bracket, as banks grow in terms of asset, CR exposure is high because they take up too much risk in giving out loans. In chapter two, Figure 1 shows that the growth of assets in the low middle income brackets has been the largest. It is therefore not surprising then that CR reported in banks in the low middle income bracket is the highest. The trend line for the low middle income bracket is the steepest, although the total asset of banks in this income bracket is second to that in the upper middle income bracket (Figure 1).

Efficiency has a positive and significant impact on CR in the low income bracket. If efficiency, the ratio of operating cost to income increases CR increases. This could be because already the bank has high expenses and would be discouraged from expensive monitoring of debtors and this will increase CR (moral hazard). This is in line with the bad management hypothesis (Podpiera and Weil, 2008: Berger and De Young, 1997). Efficiency has a negative impact on CR in the upper middle income. This means that as banks are more cost inefficient their CR falls. This means that the cost inefficient banks would have spent much of income on proper credit policy management and thus CR falls. This is in line with the skimping hypothesis (Berger and De Young, 1997). In the low middle income however efficiency has no direct impact on the CR of the banks.

Return on assets which measures profitability has a negative impact on CR in all the low and low middle income brackets. As a bank becomes more profitable (due to good management and credit policies) CR falls. This negative relationship is significant at 5% in the low income bracket and 1% in the low middle income bracket. In the low income bracket and low middle income bracket the more profitable a bank is the less the CR it is exposed to. Louzis et al. (2012) in studying banks in Greece established a negative nexus between CR and performance/profitability. They explain that high profits could be explained by quality management and hence reduction in CR. This means in the low and low middle income brackets as a bank becomes more profitable CR falls.

Loan to asset ratio has no impact on CR in the low income bracket and upper middle income bracket. In the low middle income bracket however, the impact is negative and significant at 1%. As loan to asset ratio increases CR falls. This is probably because as loan asset ratio increases the banks become more prudent in credit policies and CR falls. This could be related to the fact that banks in this income bracket have the highest CR (Figure 4).

Annual growth rate of GDP has a positive, but insignificant impact on CR in the low income and the low middle income countries. This is similar to findings of Aver (2008) and Fofack (2005). In the upper middle income bracket, however there is a negative significant impact on CR. As the annual growth rate of GDP rises CR falls. This is because as the growth rate increases all things being equal there is more income in the economy and borrowers are able to service their loans and CR will fall. The assumption underlying this intuition is that the state of the economy contemporaneously impacts on borrowers' ability to service debt (Salas and Saurina, 2002).

Inflation has a positive significant impact on CR in the low income bracket. In the low income bracket as the inflation rate increases the real value of their income decreases. As the real income of borrowers decline, there is a fall in their ability to service the loan. The real value of the loan however does not decline when inflation is high since on average the lending rates are highest in the low income bracket (Figure 7). The real value of the debt remains high whiles the real income to offset the loan falls. In the lower middle and upper middle income brackets however, the impact of inflation on CR is insignificant. The lending rates are relatively low so as inflation increases the real value of loans decrease CR remains unchanged. Castro (2013) explains that inflation does reduce the value of income of borrowers, but also reduces the real value of the loan in the same proportion and inflation's effect on CR is nullified. This means that as inflation increases the real value of the loan depreciates but the borrowers' ability to pay off the loan (real) also decreases.

The results suggest the relationship between CR and these explanatory variables are not the same among the income brackets within Africa.

5.5 Effect of credit risk on lending rates

To determine the impact CR has on the average lending rates, CR was included in the model 2 as an explanatory variable. The average lending rate the banks are willing to earn on banks is the dependent variable. Some other determinants that have been seen in the literature as determinants of lending rates are also included in the model as regressors.

Table 16 Effects of Credit Risk on Lending Rates

Explanatory variables	Low income bracket	Low middle income bracket	Upper middle income bracket
Bank specific variables			
Credit risk	0.230*** (0.068)	0.057 (0.055)	0.045 (0.054)
Deposits and short term funding to total asset ratio.	0.081*** (0.014)	0.034 (0.016)	0.050*** (0.010)
Efficiency	0.080*** (0.014)	0.088*** (0.020)	0.043*** (0.013)
Return on Assets	0.295*** (0.105)	0.399*** (0.130)	0.268* (0.147)
Macroeconomic variables			
Annual growth rate of GDP	0.077 (0.053)	0.025 (0.068)	0.063 (0.041)
Annual Inflation rate	-0.000 (0.018)	0.389*** (0.049)	0.322*** (0.053)
R-squared	0.888	0.887	0.848
Wald chi2(8)	2645.69	2350.72	1288.92
Prob> chi2	0.000	0.000	0.000

*** Significant at 1% **significant at 5% ***significant at 1%

The results of model (Table 16) two suggest that the explanatory variables credit risk, deposits and short term funding to asset ratio, efficiency, return on assets, annual growth of GDP Growth and inflation rate explains more than 80% of variations in average lending rate in all income brackets. Even though these variables were included in model one as explanatory

variables of CR the pair wise correlation matrix (Table 5.2) presented show that including them and CR at the right hand side of the regression would not bring about the problem of multicollinearity. The variables jointly explain 88.8%, 88.7% and 84.8% of the variations in average lending rate in the low income, low middle and upper middle income brackets respectively. Four of the variables holding all others constant had a significant impact on CR in the low income and in the upper middle income bracket. In the low middle income bracket three variables had significant coefficients. The results of the Wald test shows that the model specified and estimated is a good model.

CR was found to be positively significant (1%) only in the low income bracket. This means that as banks report high levels in the CR they require a higher average lending rate on their loans all things being equal. Banks in the low income bracket pass on the cost of indebtedness of current borrowers to future borrowers (Allen, 1988).This could also be because as banks report high CR the giving out of loans becomes riskier and as such they charge higher returns to compensate them for additional risk. In the lower middle and upper middle income bracket CR has no impact on lending rates. This suggests that banks could not simply pass on their losses in the form of bad loans to their borrowers in the form of high lending rates.

Deposits and short term funding to total asset ratio has a positive impact on lending rates in all the income bracket. The impact is significant in the low income and upper middle income bracket and insignificant in the lower middle income bracket. This suggests that as the bank increases its deposits and short term funding to total asset, lending rates are set higher. This is because as this ratio increases the bank needs to offset liabilities in the short term. They set high lending rates to earn much interest income. Although loans might mature at later date

much interest income would be in store to meet short term liabilities. In the upper middle there is no relationship between deposits and short term funding to assets ratio and lending rates.

Efficiency has a positive significant impact on CR in all the three income brackets. This shows that as a bank reports more operating expenses to income the average lending rate will be set higher (Maudos and Guevera,2004; Martynez Peria and Mody,2004).This is probably because the banks in all income brackets (on average) depend on loans to earn income. Therefore when the bank reports high operating cost relative to income it sets its lending rate high to earn much interest to offset its expenses. Banks therefore set their mark up or net interest margins (Allen, 1988) high when they are cost inefficient. This therefore means that borrowers pay for the inefficiencies of banks in Africa.

Profitability of banks (ROA) was found to have a positive impact on lending rates across all the income brackets. This suggests that more profitable banks set higher rates on loans. This is probably to enable them stay profitable. On the other hand a less profitable bank sets lending rates lower. This also suggests that a less profitable would set lending rates low to attract more borrowers. This would enable it raise more interest income and all things being equal become more profitable.

The impact of inflation on the lending rates is positive and significant in the lower middle and upper middle income bracket. This is because their lending rates of banks in these brackets are relatively lower. When inflation is high the banks set the lending rates high to safeguard the real earnings on their loans. Also, when inflation is high there is uncertainty in economic activities. The additional uncertainty of loans induces banks to set higher lending rates.

The determinants of the lending rates in banks in Africa differ among the income brackets.CR has a positive predictive power over lending rates only in the low income bracket. CR has no impact on the lending rates in the low middle and upper middle income brackets.

5.6 Effects of Credit Risk on Banks Stability

Explanatory variables	Low income bracket	Low middle income bracket	Upper middle income bracket
Bank specific variables			
Credit risk	0.473 (0.664)	-1.952*** (0.674)	-0.128 (0.627)
Size	0.584*** (0.038)	0.705*** (0.066)	0.382*** (0.028)
Efficiency	0.329 (0.202)	1.259*** (0.451)	1.146*** (0.201)
Deposits and short term funding to total assets	-0.659*** (0.362)	-2.712*** (0.734)	0.015 (0.302)
Macroeconomic variables			
Annual growth rate of GDP	1.413 (0.873)	0.178 (1.171)	-0.247 (0.495)
Annual Inflation rate	0.894*** (0.206)	0.175 (0.854)	1.312** (0.685)
R-squared	0.940	0.889	0.970
Wald chi2(6)	6248.45	1980.83	6425.54
Prob> chi2	0.000	0.000	0.000

*** Significant at 1% **significant at 5% ***significant at 1%

The results of model three suggest that the explanatory variables credit risk, size, efficiency, deposits and short term funding to asset ratio, annual growth of GDP Growth and inflation rate explains more than 88% of the variations in banks' stability in all income brackets. The introduction of CR in this model also does not bring about the problem of multicollinearity. The variables jointly explain about 94%, 88.9% and 97.0% of the variations in banks' stability in the low income, low middle and upper middle income brackets respectively. Three of the variables holding all others constant had a significant impact on banks stability in the low income and in upper middle income bracket. In the low middle income bracket four variables

had significant coefficients. CR however, had a significant impact only in low middle income brackets. The results of the Wald test show that the model specified and estimated is fit.

The results above show that CR has a negative significant impact on the bank stability in the low middle income bracket. As a bank has high CR the bank becomes less stable and closer to insolvency. Therefore the assertion that CR is the dominant source of banks riskiness and vulnerability (BIS, 2001a, b) applies to the low middle income bracket only. This is probably the case because CR on average is highest among the income brackets (Table 2). This high CR makes them more vulnerable and makes them prone to insolvency and instability. In the two other brackets CR may not be that high to set the bank in any form of unbalance.

Size has a positive impact on the Z-score in all the income brackets. This suggests that in all the income brackets as the banks increase in size in terms of its total assets it becomes more stable. This may be similar to the Too big to fail hypothesis. The 'Too big to fail' hypothesis by Berger and De Young (1997) suggests that large banks are protected against bankruptcy and insolvency by the government through policy protection. There is no information available to suggest that banks in Africa have this sought of protection as large banks have in the USA and other advanced economies. This positive relationship between bank size and bank stability in Africa might have a different intuition. The large banks have more assets and all things being equal may be earning more on assets and due to the economies of scale reduce their exposure to all forms of risk. As a bank increases in size it becomes more stable and less likely to be insolvent.

Efficiency the ratio of operating expense to operating income has a positive impact on the banks' stability in the low middle and upper middle income bracket. This means that as the

measure of efficiency increases the Z-score increases and the bank moves further away from insolvency. This suggest that banks' incur more cost relative to its income as they embark on more proper policies and measures to avoid insolvency and maintain their stability.

Deposits and short term funding to assets has a negative impact on banks' stability in the low and low middle income brackets. This means that as the banks are more dependent on short term funding they are less stable. As banks depend more on short term sources of funds, they have more funds to give out as loans. However, these are obligations that they have in the near future. The loans are given on longer terms; therefore the bank is exposed to liquidity and insolvency risk. In the upper middle income bracket, however the impact is positive yet insignificant.

The inflation rate is found to have a positive impact on Z-score in all income brackets. This relationship was found to be insignificant in the lower middle income. In the low income and upper middle income however inflation has a positive impact on the Z-score. This means that as banks are exposed to higher inflation, they are more stable. This may be because higher inflation rates mean the macroeconomic environment becomes unstable and risky. The uncertainty makes banks tread cautiously in their operations. As the bank is exposed to high inflation the bank becomes less likely to be insolvent and unstable.

5.7 Conclusion

The result, as displayed and discussed above suggests that the relationship between the explanatory variables and CR is not uniform among the income brackets. The income bracket within which a bank operates brings about some differences in CR, average lending rates and banks stability determinants. Policies and measures that might be put in place by managers

and regulators in Africa to affect CR, lending rates and stability in banks need not be the same.

In terms of the impact of CR on banks' lending rates the results suggest that high CR leads to higher lending rates only in the low income bracket. In the low income bracket the banks pass on the default of past borrowers to the current and future loan takers. CR has no predictive power on lending rates of banks in the lower middle income and upper middle income

Also CR was found to have a significant impact on banks' stability only in the low middle income bracket. In the lower middle income bracket as the CR of a bank increases its Z-score reduces it therefore has a higher probability of going insolvent and unstable. In the other income bracket the CR has no significant impact on the banks' stability.

The application of results of previous studies on loan quality in different context or Africa that do not consider the income bracket of the bank could be misleading. In Africa the income bracket within which a bank operates affects the determinants and impact of CR. There is the need for further studies to find out if these differences will persist in different context and even in Africa using different econometric models and including more country level dynamics.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter presents a summary of the findings of the determinants of CR and the impact of CR on lending rates and bank stability in the three income brackets. These findings were revealed by performing multiple regression analysis. Conclusions and recommendation as well as suggestions for further studies are made in this chapter.

6.1 Summary of findings

6.1.1 Low income bracket

In this bracket the significant determinants of CR are efficiency, return on assets and the annual inflation rate. In this bracket the CR that banks are exposed to is not explained by size, deposits and short term funding to total assets, loan to asset ratio and annual growth rate of GDP. From the R-squared reported 46.5% of the variations in the CR in this bracket are explained by the variables. The model is unable to capture more than half of the variations in CR in the banks that operate in the low income bracket.

Also CR was found to have a positive impact on the lending rate. This suggests that banks that record higher CR pass on the cost to current borrowers by charging higher. The other variables that explain lending rates are deposits and short term to assets, efficiency and return on assets. The CR has no significance in determining or predicting bank's stability, however size, deposits and short term funds to total assets and inflation rate have predictive power over banks' stability in this income bracket.

6.1.2 Lower middle income bracket

The banks within this bracket have size, return on assets, and loan to asset ratio having explanatory power over the CR that it is exposed to. The performance (GDP Growth) and vulnerability (inflation) of the economy has no impact on the CR. The R-squared also suggests that 60.8% of the variations in the CR is explained by the variables included. The CR also has no significant impact on the average lending rate, but rather has a negative significant impact on banks' stability. As banks in the lower middle are exposed to higher CR the banks become less stable and more likely to go insolvent. The bank's stability is also predicted by size, efficiency, deposits and short term funding to total assets ratio. The variables that have a significant impact on average lending rate in this bracket include efficiency, return on assets and annual inflation rate.

6.1.3 Upper middle income bracket

In this bracket among the explanatory variables efficiency and annual rate of GDP has a negative significant impact on CR. In this bracket also 44.3 % of the variations in CR are explained by the included variables. CR also has no impact on lending rates and banks' stability in the upper middle income bracket. The lending rate in this income bracket is explained by deposits and short term funding to total assets, efficiency, return on assets and inflation. The banks' stability is also predicted by size, efficiency and annual inflation rate.

6.2 Conclusion

Loan portfolio quality determinants as well as its impact on banks have been an issue of interest for research. This study, however, brings to light a new dynamism to the issue. The results of this study show that, within Africa a developing economy context, the determinants

and impact of CR is not uniform. It has been established in the literature that the issue of CR will be different in developed and developing economy. This study provides evidence to support that there are differences in the determinants of CR among the three income brackets in Africa.

The determinants of CR in the low income bracket per this study are Efficiency, Return on assets and Inflation. The determinants of CR are size, return on assets and loan asset ratio in the lower middle income bracket. In the upper middle income bracket, Efficiency and Annual GDP Growth are the determinants of CR. There are a few similarities among the income brackets. Deposits and short term funding to total assets has no impact on CR in all the brackets. The source of funding of banks in Africa has no direct impact on their CR exposure. Return on assets has a negative impact on CR in both the Low and Lower middle Income brackets. Efficiency has an impact on CR in the Low and Upper middle income brackets .However the relationship is different; it has a positive impact in the Low income bracket and rather a negative impact in the Upper middle income bracket.

The impact of CR on average lending rate was also found not to be uniform across the income bracket. Loan portfolio quality has an impact on lending rates only in the low income bracket. The other determinants of average lending rates that were controlled for in the study show some similarities. Deposits and short term funding to total assets ratio has positive impact in the Low and Upper middle income brackets. Efficiency and Return on assets have a positive impact on lending rates in all the three income brackets. Annual GDP Growth has no impact on lending rates in the three income brackets. Inflation has a positive impact on lending rates in the Low middle and upper middle income brackets.

CR was found to have an impact on banks' stability only in the low middle income bracket. There are however some similarities among the income brackets in terms of the determinants of bank stability. Size has a positive impact on banks' stability in the three income brackets. Efficiency has a positive impact on banks' stability in the lower middle and upper middle income brackets. Deposits and short term funding to total assets has a negative impact on banks' stability in the low and low middle income brackets. GDP Growth has no predictive power banks' stability in all of Africa. Inflation has a positive impact in the low and upper middle income brackets.

6.3 Recommendations

The results from this study are of value to policy makers and bank management in Africa.

With results from this study the policy makers in an attempt to protect banks would be able to channel efforts to change variables that explain CR in the income bracket. This will be much more effective than simply duplicating policies from any different context under different income bracket.

The knowledge gained from the study will be of good use to managerial banking decision-making regarding credit risk management. The study will help banks be aware how some determinants of CR have different predictive power in the different income brackets. Banks that might also have branches in Africa across the income brackets would also have insight on how the issue of CR would differ among the branches.

Also for banks within the low income bracket, policy makers should note that CR affects lending rates positively. Loan pricing in terms of higher lending rates could be managed indirectly by putting appropriate credit risk management in place. As the right policies are in

place and CR are reduced banks will set their average lending rates low. In the lower middle income bracket bank stability would be maintained if appropriate CR management is in place. Since high CR is associated with less stability policies within this bracket that would lead banks to reduce CR exposure would lead to a more stable banking system.

6.4 Suggestions for Further Research

The factors that were included in this study were bank specific and macroeconomic. Further research could also include institutional and regulatory variables, to see how they impact the findings of this study. Also in this study the focus was on banks in Africa and not countries, therefore less of the country variables were used. Therefore, further research could include more country variables to capture to a larger extent the macroeconomic environment these banks operate in. For such studies a multiple level regression could be adapted and this will consider banks in countries in Africa. This would also permit the inclusion of industry and regulatory variables at the country level.

Again, CR was measured as a ratio of loan loss provision as a ratio of gross loans. This variable was the best available proxy, however other indicators such as ratio of non-performing loans to total gross loan could be used as a form of robust check. Also, in considering the lending rate the average lending rate was considered, for a future study specific lending rates charged for different loan classes (consumer, mortgage and business loans) could be used. This would help identify the particular loans whose prices are sensitive to credit risk especially in the low income brackets where lending rates were found to be positively influenced by credit risk.

This study also considered CR of banks only. For further studies other lending financial institutions could be included to see if the results apply. This is also important since banks are not the only lending institutions in Africa, although banks might dominate the financial sector. There are differences in the operations of other lending institutions, therefore it will be necessary to include them in further studies and not simply assume findings in this study could apply.

Also for further studies different econometric estimations should be adopted to find out if the results of this study are not limited to the econometric framework used in this study. A system of equations could be used to find the interdependence of the key variables. This was beyond the scope of this study however that could give more insight.

This study identifies some differences among the income brackets in terms of the determinants of CR, lending rates and bank stability. There is the need for studies that will research and go further to explain the differences seen among the income brackets.

REFERENCES

Aharony, J. and Swary, H. (1996). Additional evidence on the information based contagion effect of bank failures. *Journal of Banking and Finance,* 20(1), 57-69.

Ahmad, H. (2003). Credit Risk Determinants: By Institutional Type. *Proceedings of Malaysian Finance Association Conferences.*

Ahmad, N. and Ariff, M. (2007).Multi- country study of bank credit risk determinants. *International Journal of Banking and Finance*, 5(1), 135–152.

Ahmed, A.S., Takeda, C., and Thomas, S. (1999). Bank loan loss provisions: a reexamination of capital management, earnings management and signaling effects. *Journal of Accounting and Economics*, 28(1), 1–25.

Akerloff, G. A. (1970). "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *Quarterly Journal of Economics*, 84(3), 488-500.

Allen, L. (1988). "The determinants of bank Interest Margins: A Note", *Journal of Financial and*

Quantitative Analysis, 23(2), 231-235.

Allen, F. and Carletti, E. (2008). "The Role of Banks in Financial Systems". *Oxford Handbook for banking*.

Alhassan, A. L., Kyereboah- Coleman, A.K. and Andoh (2014). Asset quality in a crisis period: An empirical examination of Ghanaian banks. *Review of Development Finance*, 4(1), 50-62.

Ali, A. and Daly, K. (2010). Macroeconomic determinants of credit risk: recent evidence from a cross-country study. *International Review of Financial Analysis*, 19(3), 165–171

Altunbas, Y., Leonardo, G. and David, M. (2010). "Does monetary policy affect bank risk-taking?" Mimeo, *BIS Working Papers* No. 298.

Amediku, S. (2006).Stress test of the Ghanaian banking sector: A VAR approach. Bank of Ghana Working Paper. WP/BOG-2006/02.

Amidu, M. (2013). The effects of the structure of banking market and funding strategy on risk and return. *International Review of Financial Analysis*, *28*, 143-155.

Amidu, M.,and Hinson, R. (2006). Credit Risk, Capital Structure and Lending decisions of banks in Ghana. *Bank and Bank Systems*, *1*(1), 93-101

Amidu and Wolfe (2013).Does bank competition and diversification lead to greater stability? Evidence from emerging markets. *Review of Development Finance,* 3(3), 152-166.

Arpa, M., Giulini, I., Ittner, A and Pauer, F. (2001). "The Influences of Macroeconomic Developments on Austrian Banks: Implications for Banking Supervision". *BIS Papers*, No. 1, 91 – 116.

Ataullah, A. and Le, H. (2006).Economics reforms and bank efficiency in developing: the case of the Indian banking industry. *Applied Financial Economics*, 16(9), 653-663

Athanasoglou, P., Brissimus, S., and Delis, M. (2005).Bank-specific, Industry-specific and Macroeconomic determinants of bank profitability. Bank of Greece Working Paper.No.32026

Aver, B. (2008). An empirical analysis of credit risk factors of the Slovenian banking system. *Managing Global Transitions*, 6(3), 317–334.

Azeez, A. A. and Gamage,S.(2013).The determinants of net interest margins of commercial banks in Sri Lanka. Vidyasagar University Journal of Commerce. 18, ISSN 0973-5917.

Badar, M. and Javid, Y. A. (2013).Impact of Macroeconomic forces on Non-performing loans: An empirical study of Commercial banks in Pakistan. W-SEAS Transactions on Business and Economics.Issue1, 10.

Balla, E., Rose, M. J. and Romero, J.J. (2012). Loan loss reserve accounting and bank behavior. Richmond Fed Economic Brief (March).

Bardhan, P. and Udry, C. (1999).Development Microeconomics. Publish in the United States by Oxford University Press Inc., New York.76-93.

Bassett, W. F., Chosak, M.B., Driscoll, J.C. and Zakrajsek (2014).Changes in bank lending standards and the macro economy. *Journal of Monetary Economics*, 62, 23-40.

Beck,T. Dermirguc -Kunt, A. and Levine, R. (2009).Financial institutions and markets across countries and over time-data and analysis. World Bank Policy Research Paper No.4923.

Beck,T. and Dermirguc -Kunt, A and Merrouche, O. (2010). Islamic vrs. Conventional Banking business model, efficiency and stability. World Bank policy research working paper.

Bellman, E. (2006). Invisible hand: Entrepreneur gets big banks to back very small loans. *Wall Street Journal.* A1 May 15.

Behr, P. and Sonnekalb, S. (2012). The effect of information sharing between lenders on access to credit, cost of credit and loan performance- Evidence from a credit registry introduction. *Journal of Banking and Finance*, 36(11), 3017-3032.

Berge, T.O., and Boye, K.G. (2007).An analysis of bank's problem loans. *NorgesBank Economic Bulletin*, 78(2), 65–76.

Berger, A. N. and De Young, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance*, 21(6), 849-870.

Bhaumik, S. K. and Piesse, J. (2008).Does lending behavior of banks in emerging economies vary by ownership? Evidence from the Indian Banking Sector.*Economic Systems*, 32(2), 177-196.

Bikker, J. A., and Metzemakers, P. A. J. (2002). "Bank Provisioning Behavior and Procyclicality", Research Series Supervision. No. 50, pp. 1 – 21.

BIS, (2001a), "The New Basel Capital Accord," Basel Committee on Banking Supervision, January. Available online at http://www.bis.org/publ/bcbsca03.pdf.

BIS (2001b). "Risk Management Practices and Regulatory Capital". The Joint Forum, November. Available online at http://www.bis.org/publ/joint03.

Bischof, J. and Daske, H. (2012).Mandatory supervisory disclosure, voluntary disclosure, and risk-taking of financial institutions: Evidence from the EU-wide stress-testing exercises. Working Paper.

Bloem, A. M., and Gorter, C. N. (2001). The Treatment of Nonperforming Loans in Macroeconomic Statistics. *IMF Working Paper*, WP/01/209.

Blose, E.L. (2001).Information asymmetry, capital adequacy and market reaction to loan loss provision announcements in the banking industry. *The Quarterly review of Economics and Finance*, 41(2), 239-258

Boahene, S. H., Dasah, J. and Agyei, S. K. (2012).Credit risk and profitability of selected banks in Ghana. *Research Journal of Finance and Accounting*, 3(7), 6-14.

Borio, C., Furfine C., and Lowe, P. (2001).Procycliclity of the financial system and financial stability issues and policy options. BIS Papers No. 1, March.

Boss, M., Fenz, G., Pann, J., Puhr, C., Schneider, M., and Ubl, E. (2009). Modeling credit risk through the Austrian business cycle: an update of the OeNB Model.OeNB *Financial Stability Report 17*, 85–101.

Boubakri, N., Cosset, J. C., Fischer, K., and Guedhami, O. (2005).Privatization and bank performance in developing countries. *Journal of Banking and Finance*, 29(8), 2015-2041.

Bouvatier, V., and Lepetit, L. (2012).Provisioning rules and Bank lending: A theoretical model. *Journal of Financial Stability*, 8(1), 25-31.

Bouvatier, V., and Lepetit, L. (2012).Effect of loan loss provisions on growth in bank lending: Some international comparisons. *International Economics*, 132, 91- 116.

Boyd, J., Graham, S., and Hewitt, R. (1993). Bank holding company mergers with nonbank financial firms; Effects on the risk of failure. *Journal of Banking and Finance*, 17(1), 43-63.

Breuer, B. J. (2006).Problem bank loans, conflicts of interests and institutions. *Journal of Financial Stability,* 2(3), 266-285.

Brock, P. L., and Suarez, L. R. (2000). Understanding the behavior of bank spreads in Latin America. *Journal of development Economics,* 63(1), 113-134

Brownbridge, M. (1998). The causes of financial distress in local banks in Africa implications for prudential policy. *United Nations Conference on Trade and Development,* 132.

Brownbridge, M., and Gockel, F. (1996). "The impact of Financial Sector Policies on Banking in Ghana". Institute of Development Studies, University of Sussex, Working Paper No.38

Bushman, M. R., and Williams D.C. (2012). Accounting discretion, loan loss provision and discipline of banks risk taking. *Journal of Accounting and Economics*, 54(1), 1-18.

Caporale, M.G., Di Colli, S. and Lopez, J. S. (2014). Bank lending procyclicality and credit quality during financial crises. *Economic Modelling*, 4. 142-157.

Caprio, G. J., and Klingibiel, D. (1996). Bank insolvency; Bad luck, Bad policy or bad banking? Annual World conference on Development Economics.

Castro, V. (2013). Macroeconomic determinants of the credit risk in the banking system: The, case of the GIPSI. *Economic Modelling,* 31, 672–683.

Chaibi, H., and Ftiti Z. (2015). Credit Risk determinants: Evidence from a cross country study. *Research in International Business and Finance*, 33, 1-16.

Cifter, A., Yilmazer, S., and Cifter, E. (2009). Analysis of sectoral credit default cycle dependency with wavelet networks: evidence from Turkey. *Economic Modelling, 26*, 1382–1388.

Dahl, D. (2013).Bank Audit practices and loan loss provision. *Journal of Banking and Finance*, 37(9), 3577-3584.

Delis, M. D., Hasan, I., and Tsionas, E. G. (2014). The risk of financial intermediaries. *Journal of Banking and Finance*, *44*, 1-12.

Demsetz, R. S., Seidenberg, M. R. and Strahan, E. P. (1998). Agency Problem and risk taking at banks. Federal; Reserves New York. Working Paper.

Demirgüç- Kunt, A. and Detragiache, E. (1998), "The Determinants of Banking Crises in Developing and Developed Countries". IMF Staff Papers, Vol. 45, (No. 1), pp. 81 – 109.

Demirgüç- Kunt, A. and Huizinga, H. (1999). Determinants of Commercial Bank Interest Margin and profitability; Some International evidence. *The World Bank Economic Review*, 13(2), 379-408.

Dziobek, C. and Pazarbasioglu, C. (1998). Lessons from System Bank Restructing (Vol. 14). Washington, DC: International Monetary and Publication Services.

Elnahass, M., Izzeldin. I., and Abdelsalam. O. (2014).Loan loss provisions, bank valuations and discretions: A comparative study between conventional and Islamic banks. *Journal of Economic Behavior and Organization*, 103, S160-S173.

Feijo, C.A. (2011).Credit Risk and Macroeconomic Interaction: Empirical evidence from the Brazillian Banking System. *Modern Economy*, 2(5), 910.

Festic, M., Kavkler, A., and Repina, S. (2011). The macroeconomic sources of systemic risk in the banking sectors of five new EU member states. *Journal of Banking and Finance*, 35(2), 310–322.

Flamini, V., McDonald, C., and Schumacher, L. (2009). The Determinants of Commercial Bank Bank Profitability in Sub-Sahar Africa, *IMF Working Paper*, WP/09/15.

Fofack, H. (2005). Nonperforming loans in sub-Saharan Africa: Causal Analysis and Macroeconomic implications. World Bank Policy Research Working Paper no. WP3769.

Ganbaatar, T. A., and Selenge, O. E. (2012).Bank specific credit stress testing –A case of Mongolia. *Procedia Economics and Finance*, 1, 148-157.

Ghafar Ismail, A. and Tan Be Lay, A. (2002).Bank loan portfolio composition and the disclosure of loan loss provisions: Empirical evidence from Malaysian Banks. *Asian Review of Accounting*, 10(1),147-162.

Godquin, M. (2004). Microfinance Repayment performance in Bangladesh How to Improve the Allocation of Loans by MFIs. *World Development*, 32(11), 1909-1926.

Gonzalez, F. (2005). Bank regulation and risk-taking incentives: An international comparison of bank risk. *Journal of Banking and Finance*, 29(5), 1153-1184.

Gorgor, G. (2014). Determinants of domestic credit levels in emerging markets: the role of external factors. *Emerging Markets Review*, 18, 1-18.

Greenidge, K. and Grosvenor, B. (2010). Forecasting Non-performing loans in Barbados. *Business, Finance and Economics in Emerging economies*, 5(1), 80-107.

Greuning, V., and Bratanovic, S. B. (2003). *Analyzing and managing bank risk. A framework for assessing corporate governance and financial risk* (2nd edition). Washington, DC: The World Bank.

Hasan, I., and Wall, L.D. (2003). Determinants of the loan loss allowance: some cross-country comparison. Bank of Finland Discussion Papers 33.

Kane, E. J., and Rice, T. (2001). Bank runs banking policies: Lessons for African policy makers. *Journal of African Economies, 10*(1), 36-71.

Keeley, M. C. (1990). Deposit insurance, risk, and market power in banking. *The American Economic Review*, 80(5), 1183-1200.

Khemraj, T. and Pasha, S. (2009). The determinants of nonperforming loans AN econometric case study of Guyana. *Proceedings of the Carribean Centre for Banking and Finance Bi-annual Conference.*

Kim, D. and Santomero, A.M. (1988).Risk in Banking and Capital Regulation. *Journal of Finance, 43*(5), 1219-1233.

Kishan, R.P. and Opiela, T. P. (2000). Bank size, Bank Capital and the Bank lending Channel. *Journal of Money, Credit and Banking*, 121-141.

Konishi, M., and Yasuda, Y. (2004). Factors affecting bank risk taking: Evidence from Japan. *Journal of Banking and Finance*, 28(1), 215-232.

Laeven, L. and Levine, R. (2008).Bank Governance, Regulation and Risk taking. NBER Working paper 14113.

Laeven, L., and Majnoni, G. (2003). Loan loss provisioning and economic slowdowns: too much, too late? *Journal of Financial Intermediation*, 12(2), 178–197.

Llewellyn, D. (2002). An analysis of the causes of recent banking crises. *European Journal of Finance*, 8(2), 152–175.

Louzis, D.P., Vouldis, A.T., and Metaxas, V.L. (2012). Macroeconomic and bank-specific determinants of nonperforming loans in Greece: a comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking and Finance*, 36(4), 1012–1027.

Marcelin, I., and Mathur, I. (2014).Financial development, Institutions and Banks. *International Review of Financial Analysis*, 31, 25-33.

Marcucci, J. and Qualiariello, M. (2008).Credit risk and business cycle over different regimes. Bank of Italy Working paper 670.

Maudos, J., and Guevara, J, F (2004), "Factors explaining the interest margin in the banking sector of theEuropean Union", *Journal of banking and Finance*, 28 (9), 2259- 2281.

Merton, R. C. (1977). An analytic derivation of the cost of deposit insurance and loan guarantees an application of modern option pricing theory. *Journal of Banking and Finance*, *1*(1), 3-11.

Messai, A. S., and Jouini, F. (2013). Micro and Macro determinants of non-performing loans. *International Journal of Economics Financial Issues, 3*(4), 852-860.

Micco, A., Panizza, U., and Yanez, M. (2007).Bank ownership and performance. Does politics matter? *Journal of Banking and Finance*, 31(1), 219-241.

Mileris, R. (2012).Macroeconomic determinants of Loan portfolio Credit risk in banks. *Engineering Economics*, 23(5),496-504.

Mohsni, S., and Otchere, I. (2014). Risk taking behavior of privatized banks. *Journal of Corporate Finance*, *29*, 122-142.

Nkusu, M. (2011). Nonperforming loans and macro financial vulnerabilities in advanced economies. IMF Working Papers, 161.

Ntow - Gyamfi, M. and Boateng, S.S. (2013).Credit risk and loan default among Ghanaian banks: An exploratory study. *Management Science Letters*, 3(3), 753-762.

Ofoeda, I., Abor, J., and Adjasi, C.K.D. (2012). Nonbanking financial institutions regulation and risk taking. *Journal of Financial Regulation and Compliance*, 20(4), 433-450.

Olokoyo, F. O. (2007).Determinants of Commercial bank's lending behavior in Nigeria. *International Journal of Financial Research*, 2(2), 61.

Pasiouras, F. and Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance,* 21(2*)*, 222-237.

Peria, M. S. M., and Mody, A. (2004). ‘‘How Foreign Participation and Market Concentration Impact on Bank Spreads: Evidence from Latin America’’, *Journal of Money, Credit, and Banking*, 511–537.

Podpiera, J., and Weill, L. (2008). Bad luck or bad management? Emerging Banking Market Experience. *Journal of Financial Stability, 4(2)*, 135–148.

Prais, S. J. and Winstein, C.B. (1954). Trend estimators and serial correlation. Working paper 383, Chicago Cowles Commission.

Ramful, P. (2004). Determinants of interest rate margin in Mauritian banking sector. Central Bank of Mauritius. Working paper WP/07/01.

Randhawa, P. K. D. (2004). Financial services for the poor, assessing microfinance institutions. *Managerial Finance*, 30(9), 70-95.

Reinhart, C., and Rogoff, K. (2010).From Financial Crash to Debt Crisis. *NBER Working Paper* 15795.

Rinaldi, L. and Sanchis-Arellano, A. (2006). Household debt sustainability; what explains household nonperforming loans? An empirical analysis.

Roslan, A.H., and Karim, M. A. (2009).Determinants of Microcredit repayment in Malaysia: The case of Agrobank. *Humanity and Social sciences Journal*, 4(1), 45-52.

Saadaoui, Z. (2014).Business cycle, market power and bank behavior in emerging countries. *International Economics*, 139, 109-132.

Salas, V. and Saurina, J., (2002). Credit risk in two institutional regimes: Spanish commercial and savings banks. *Journal of Financial Services,* 22(3), 203–224.

Sarpong, D. J., Winful, E.C. and Ntiamoah, J. (2013). Determinants of wide interest margins in Ghana:panel EGLS analysis. *African Journal of Business Management,* 7(35) 3535-3544.

Schicks, J. (2013).Over indebtedness in Microfinance: Empirical analysis of related factors on the borrowers' level. *World Development*, 54, 301-324.

Shu, C. (2002). "The Impact of Macroeconomic Environment on the Asset Quality of Hong Kong's Banking Sector". Hong Kong Monetary Authority Research Memorandum. Available online: www.info.gov.hk/hkma/eng/research/index.htm

Schuemann, T., Treutler, B. J., Weiner, S. M. and Pesaran, M.H. (2003).Macroeconomic Dynamics and credit risk: A Global Perspective. CESifo Working Paper No.995.

Schumpeter, J. A. (1911). The Theory of Economic Development.Cambridge, M A: Havard University Press.

Smith, L. D. and Lawrence, C. E. (1995). "Forecasting Losses on a Liquidating Long-term Loan Portfolio". *Journal of Banking and Finance*, 19(6), 959-985.

Sorge, M. (2004). Stress-testing Financial Systems: An overview of current methodologies. *BIS Working Paper No. 165.*

Srairi, S. (2013). Ownership structure and risk taking behavior in Conventional and Islamic banks; Evidence for MENA countries. *Borsa Instabul Review*, 13(4),115-127.

Stern, G.and Feldman, R. (2004). Too Big to Fail: The Hazards of Bank Bailouts. The Brookings Institution. Washington, DC.

Stiglitz, J. E., and Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 7(3), 393-410.

Stiroh, K. (2004).Do community banks benefit from diversification? *Journal of Financial Services Researc*h, 25(2), 135-150.

Tsorhe, J. S., Aboagye, A.Q.Q. and Kyereboah-Coleman, A. (2011).Corporate governance practices and Risk management in Ghana. Working Paper.

Van Rooyen, C., Stewart, R and deWet, T. (2012).The Impact of Microfinance in Sub-Saharan Africa; A systematic review of the evidence. *World Development*, 40(11), 2249-2262

Villalpando, M. and Guerrero, R.(2007).Determinants of Banking Interest Rates and the bank lending channel in Mexico,2001-2006.Bank of Mexico Working Paper.

Vorotto, S. (2011).Liquidity risk, credit risk, market risk and bank capital. *International Journal of Managerial Finance*, 7(2), 134-152.

Wall, L., and Koch, T. (2000). Bank loan-loss accounting: a review of theoretical and empirical evidence. *Economic Review-Federal Reserve of Atlanta*, 85(2), 1.

Wagner, C., and Winkler, A. (2013).The vulnerability of microfinance to financial turmoil-Evidence from the global financial crisis. *World Development*, 51, 71-90

Wahlen, J., (1994). The nature of information in commercial bank loan loss disclosures. *The Accounting Review*, 455–478.

Wooldridge, J. M. (2013). Introductory Econometrics. A Modern Approach. Fifth Edition. Mason, OH.

World Bank Group (2010). World Bank Income Classification of Countries as at December 2010.Available online at http//www.data@worldbank.org.

Wu, J., Luca, C.A., and Jeon, B.N. (2011).Foreign bank penetration and the lending channel in emerging economies: Evidence from bank level panel data. *Journal of International Money and Finance,* 30(6), 1128-1156.

Yeyati, E. L., and Micco, A. (2013).Concentration and foreign penetration in Latin American Banking sectors: Impact on competition and risk. Inter-American Development bank. Working paper 499.

Zribi, N., and Boujelbène, Y. (2011). The factors influencing bank credit risk: the case of Tunisia. *Journal of Accounting and Taxation*, 3(4), 70.

APPENDICES

APPENDIX A

Low Income Bracket	
Countries	Bank
Benin	1.Bank of Africa
	2.Ecobank
Burkina Faso	1.Bank of Africa
	2.Ecobank
Kenya	1.Gulf African Bank Limited
	2.Barclays Bank
	3.Kenya Commercial Bank Limited
	4.Commercial Bank of Africa
	5.National bank of Kenya Limited
	6.CFC Stanbic Bank Limited
	7.Standard Chartered Bank
	8.Bank of Africa Kenya
	9.Equity Bank Limited
	10.Middle East Bank Kenya Limited
	11.Ecobank
	.12.NIC bank Limited
	13.Credit Bank Limited
	14.Equatorial Commercial Bank Limited
	15.Diamond trust Bank Kenya Limited
	16.Co –operative Bank of Kenya
	17.Prime Bank
	18.Oriental Commercial Bank
	19.Fina Bank Limited
	20.Victoria Commercial Bank
	21.Consolidated Bank of Africa
	22.Trans-National Bank Limited
Malawi	1.National Bank for Malawi
	2.Standard Bank Limited
	3.Ecobank
Mozambique	1.Banco International de Mozambique
	2.African Bank Corporation
	3.Barclays Bank
	4.International Commercial Bank
	5.FNB Mozambique
	6.Banco ProCredit SARL
	7.Standard Bank ,SARL
	8.Moza-Banco

Rwanda	1.Banque de Kigali
	2.Ecobank
Sierra Leone	1.Rockel Commercial Bank
	2.Sierra Leone Commercial Bank
	3.Union Trust Bank Limited
Tanzania	1.Commercial Bank of Africa
	2.Bank of Baroda
	3.Bank M Tanzania Limited
	4.The People of Bank of Zanzibar
	5.Diamond Trust Bank of Tanzania
	6.Exim Bank Tanzania Limited
	7.National Bank of Commerce Limited
	8.NIC Bank Tanzania Limited
	9.Citibank Tanzania
	10.Stanbic Bank
	11.Bank of Africa Tanzania Limited
	12.Barclays Bank
	13.Tanzania Postal Bank
	14.I&M Bank Limited
	15.African Bank Corporation
	16.FBME Bank Limited
Uganda	1.Stanbic Bank Uganda Limited
	2.Standard Chartered Bank
	3.Bank of Baroda
	4.Crane Bank Limited
	5.DFCU Bank
	6.Barclays Bank
	7.Tropical Bank Limited
	8.Bank of Africa
	9.Citibank Uganda
Ethiopia	1.Coperative Bank of Oromia
	2.Commercial Bank of Ethiopia
	3.Dashen Bank
	4.Wegagan Bank
	5.United Bank
	6.N.I.B. International Bank
Mali	1.Ecobank
	2.Banque of Africa
	3.Banque de Developpement du Mali

APPENDIX B

Lower Middle Income Bracket	
Countries	Bank
Cameroon	1.CA SCB Bank
	2.Ecobank
	3.Afriland First Bank
	4.Banque Int. du Cameroun pour L'Epargne et Le Credit
	5.Societe Generale de Banque au Cameroun
La Cote D'Ivoire	1.Bank Atlantic de Cote d'Ivoire
	2.Ecobank
	3.Bank of Africa
Egypt	1.Arab Bank
	2.Bank of Alexandria
	3.Union National Bank
	4.Arab International Bank
	5.National bank of Egypt Limited
	6.Commercial International Bank, Egypt
	7.Al Watany Bank
	8.Arab African International Bank
	9.Societe Arabe International de Banque
	10.Banque MISR MAE
	11.Suez Canal
	12.Egyptian Gulf Bank
	13.Arab Investment Bank
	14.HSBC Bank Egypt SAE
	15.MISR Iran Development Bank
	16.Bank Audi
	17.QNB Al Alhi Bank
	18.Barclays Bank
Ghana	1.Fidelty Bank
	2.Stanbic Bank
	3.Bank of Africa
	4.Unibank Ghana
	5.Guaranty Trust Ghana

	6.Sahel Sahara Bank
	7.Universal Merchant Bank
	8.Barclays Bank
	9.Ecobank
	10.Cal Bank
	11.GCBBank Limited
	12.Standard Chartered Bank Limited
	13.Prudential Bank Limited
Morroco	1.Atti Jarwaff Banque
	2.Banque Marocaine pour Le Commerce et L'Industrie
	3.Credit Populaire du Maroc
	4.Credit du Maroc
Nigeria	1.Access Bank
	2.Guaranty Trust Bank
Senegal	1.Bank of Africa Senegal
	2.Ecobank
	3.Banque Internationale pour Le Commerce et L'Industrie
	4.Societe Generale de Banques au Senegal
Zambia	1.Bank of China-Zambia
	2.Investment Bank
	3.African Bank Corporation
	4.Standard Chartered Bank
	5.Barclays Bank
	6.Stanbic Bank
	7.Zambia National Commercial Bank
	8.Indo-Zambia Bank
	9.Cavmont Bank
Uganda	1.Stanbic Bank Uganda Limited
	2.Standard Chartered Bank
	3.Bank of Baroda
	4.Crane Bank Limited
	5.DFCU Bank
	6.Barclays Bank
	7.Tropical Bank Limited
	8.Bank of Africa
	9.Citibank Uganda
Mauritania	1.Banque pour Le Commerce et L'Industrie
	2.Banque Mauritanienne pour Le Commerce

	3.Banque National de Mauritanie
Sudan	1.Aljazeera Banque
	2.Blue Nile Mashreq Banque
Swaziland	1.Nedbank Limited
	2.First National Bank of Swaziland Limited

APPENDIX C

Upper middle Income Bracket	
Countries	Bank
Botswana	1.Capital Bank Limited
	2.Stanbic Bank
	3.Bank Gaborone Limited
	4.Standard Chartered Bank
	5.Barclays Bank
Namibia	1.Barclays Bank
	2Agricultural Bank of Namibia
	3.First National Bank of Namibia
	4.Bank Windhoek Limited
	5.Standard Bank of Namibia
	6.Nedbank Namibia
	7.Development Bank of Namibia
	8.African Banking Corporation
South Africa	1.Development Bank of South Africa
	2.Mercantile Bank Limited
	3.Albarak Bank Limited
	4.Invested Bank Limited
	5.African Investment Bank
	6.Jasfin Bank Limited
	7.African Bank Limited
	8.Habib Overseas Bank Limited
	9.South African Bank of Athens Ltd
	10.First Rand Bank Limited
	11.Overseas Bank Limited
	12.Nedbank
	13.Absa Bank Limited
	14.Bidvest Bank Limited
	15.Grindrod Bank Limited

Tunisia	1.Banque de Tunisie
	2.Amen Bank
	3.Union Bancaire pour Le Commerce et L'Industrie
	4.Union Internationale de Banques
	5.Banque Internationale Arabe de Tunisie
	6.Attijari
	7.Societe Tunissienne de Banques
Algeria	1.Arab Banking Corporation
	2.Natixis Algeria
	3.Credit Populaire d'Algeria
	4.Banque Nationale Algeria
	5.Trust Bank
Mauritius	1.Mauritius Post and Coperative Bank Ltd
	2.Standard Bank Limited
	3.Standard Chartered Bank
	4.Mauritius Commercial Bank
	5.State Bank of Mauritius
Angola	1.Finibanco Angola
	2.Banco de Formento
	3.Banco Millenium Angola
	4.Banco Caixa Geral Totta de Angola
	5.Banco Privado Atlantico
	6.Banco de Comercio e Industria
	7.Banco BIC
	8.Banco Sol
	9.Banco de Poupanca e Credito
	10.Banco Keve
	11.Banco de Negocios Int.

APPENDIX D

DETERMINANTS OF CREDIT RISK AT INCOME LEVELS
(Using Traditional Panel Estimation Technique)

	LOW INCOME		**LOW MIDDLE INCOME**		**UPPER MIDDLE INCOME**	
Determinants of Credit risk	Fixed Effect	**Random Effect**	**Fixed Effect**	Random Effect	Fixed Effect	**Random effect**
Size	-0.00890 (0.00557)	**-0.00431** **(0.00298)**	**0.00706** **(0.00993)**	0.00780 (0.00513)	0.00236 (0.00797)	**0.00010** **(0.00371)**
Deposits and short term funding to total asset ratio.	-0.07911** (0.04009)	**-0.09497***** **(0.03237)**	**-0.10859**** **(0.05264)**	-0.12421*** (0.04691)	-0.02642 (0.03982)	**-0.00941** **(0.03408)**
Efficiency	0.00390 (0.01737)	**0.01143** **(0.01490)**	**0.01307** **(0.02403)**	0.02008 (0.02294)	-0.03050 (0.02592)	**-0.03048** **(0.02361)**
Return on Assets	-0.16364* (0.04009)	**-0.13957**** **(0.07850)**	**-0.28226**** **(0.11749)**	-0.37606*** (0.11280)	-0.17694 (0.19788)	**-0.13133** **(0.18882)**
Loan to asset ratio	0.03385 (0.02278)	**0.01909** **(0.01987)**	**-0.14627***** **(0.03014)**	-0.13323*** (0.02774)	-0.02069 (0.03194)	**-0.00300** **(0.02393)**
Annual growth rate of GDP	-0.05849 (0.07159)	**-0.07142** **(0.06666)**	**0.22286***** **(0.08254)**	0.19779** (0.08095)	-0.10647 (0.06651)	**-0.11356**** **(0.06362)**
Annual Inflation rate	0.02160 (0.04009)	**0.02068** **(0.02106)**	**0.03920** **(0.06983)**	0.01428 (0.05928)	0.02105 (0.09515)	**-0.00672** **(0.08017)**
Constant	0.14028*** (0.03784)	**0.14028***** **(0.03784)**	**0.17491***** **(0.08498)**	0.17904*** (0.05687)	0.08927 (0.07781)	**0.08406**** **(0.04783)**

***significant at 1%, **significant at 5 % *significant at 10 %

APPENDIX E

IMPACT OF CREDIT RISK ON LENDING RATES (Hausman Test selected Regression are boldened)						
	LOW INCOME		LOW MIDDLE INCOME		UPPER MIDDLE INCOME	
Determinants of Lending rates	**Fixed Effect**	Random Effect	**Fixed Effect**	Random Effect	Fixed Effect	**Random effect**
Credit Risk	**0.09019 (0.06256)**	0.09495 (0.06045)	**0.12379** (0.05501)**	-0.00953 (0.04392)	0.11292** (0.05601)	**0.08083* (0.04765)**
Deposits and short term funding to total asset ratio.	**0.05587 (0.04088)**	0.01343 (0.03789)	**0.00270 (0.04415)**	0.00949 (0.04691)	0.00835 (0.03115)	**-0.01168 (0.02545)**
Efficiency	**0.02311 (0.01850)**	0.03900*** (0.01721)	**0.04462** (0.02152)**	0.06641*** (0.01924)	0.00115 (0.02075)	**0.01313 (0.02361)**
Return on Assets	**0.44520*** (0.10604)**	0.36180*** (0.09704)	**0.41833** (0.10251)**	0.30963*** (0.09998)	-0.12799 (0.17349)	**0.03955 (0.18882)**
Annual growth rate of GDP	**-0.00722 (0.07471)**	0.01755 (0.07359)	**-0.27925*** (0.07273)**	-0.08577 (0.07337)	0.00648 (0.05550)	**0.00266* (0.05471)**
Annual Inflation rate	**0.00846 (0.02433)**	0.00533 (0.02432)	**0.22531*** (0.0510)**	0.31586*** (0.04928)	0.41872*** (0.06557)	**0.40475*** (0.06082)**
Constant	**0.06074** (0.03454)**	0.08522** (0.03257)	**0.06777** (0.03832)**	0.04285 (0.03097)	0.06104 (0.02963)	**0.06852*** (0.02535)**
***significant at 1%, **significant at 5 % *significant at 10 %						

APPENDIX F

IMPACT OF CREDIT RISK ON BANK STABILITY (Hausman Test selected Regression are boldened)						
	LOW INCOME		LOW MIDDLE INCOME		UPPER MIDDLE INCOME	
Determinants of Z-score (Bank stability)	**Fixed Effect**	Random Effect	**Fixed Effect**	Random Effect	**Fixed Effect**	Random effect
Credit Risk	**-0.94167*** (0.34200)**	-0.93468*** (0.34648)	**-0.06002 (0.58050)**	-0.36047 (0.57069)	**0.14962 (0.20710)**	0.11969 (0.21957)
Size	**0.01435 (0.03138)**	0.04959* (0.03010)	**0.27666*** (0.08393)**	0.34167** (0.05895)	**0.02593 (0.02320)**	0.05068*** (0.02284)
Inefficiency	**-0.48058*** (0.09418)**	-0.53424*** (0.09493)	**0.57260*** (0.04009)**	0.57093** (0.21582)	**-0.23357*** (0.06923)**	-0.22768*** (0.07340)
Deposits and short term funding to total asset ratio.	**-4.18662*** (0.23122)**	-4.21962*** (0.23215)	**-6.41590*** (0.05264)**	-6.08103*** (0.43635)	**-3.50527*** (0.11618)**	-3.46596*** (0.12276)
Annual growth rate of GDP	**-0.20452 (0.41393)**	-0.23339 (0.42024)	**2.04943*** (0.74663)**	1.37950** (0.76992)	**-0.25178 (0.19464)**	-0.21517 (0.20671)
Annual Inflation rate	**0.04220 (0.13044)**	0.09168 (0.13223)	**-0.32096 (0.60626)**	-0.38563 (0.05928)	**0.49620** (0.27343)**	0.61180*** (0.28538)
Constant	**6.86993*** (0.22114)**	6.72513*** (0.24265)	**6.34120*** (0.71728)**	5.67738*** (0.56896)	**6.37632*** (0.20159)**	6.11527*** (0.22396)
***significant at 1%, **significant at 5 % *significant at 10 %						

APPENDIX G

PAIRWISE CORRELATION MATRIX										
	CR	**Siz**	**Depshterm**	**ROA**	**Loanass**	**GDPG**	**Inf**	**LR**	**Z-score**	**Eff**
CR	1									
Size	0.069** 0.033	1								
Depshterm	-0.059 0.071	0.111*** 0.001	1							
ROA	-0.202 0	0.125*** 0.000	-0.054* 0.091	1						
Loanass	-0.047 0.153	0.175*** 0	-0.069** 0.033	-0.026 0.423	1					
GDPG	-0.052 0.109	- 0.187*** 0	0.032 0.323	-0.009 0.769	- 0.224*** 0	1				
Inf	-0.027 0.409	- 0.139*** 0	-0.034 0.291	0.067** 0.036	- 0.226*** 0	0.219*** 0	1			
LR	-0.045 0.173	- 0.312*** 0	-0.053 0.105	-0.002 0.958	- 0.110*** 0.001	0.204*** 0	0.221*** 0	1		
Z-score	0.082** 0.012	0.027 0.408	-0.104*** 0.001	-0.028 0.380	-0.009 0.778	-0.061* 0.060	-0.070* 0.030	-0.0491 0.1332	1	
Eff	0.050 0.128	- 0.395*** 0.000	0.126*** 0	- 0.390*** 0	0.055* 0.090	0.008 0.799	-0.073** 0.025	0.2253*** 0	- 0.041 0.206	1

***significant at 1%, **significant at 5 % *significant at 10 %