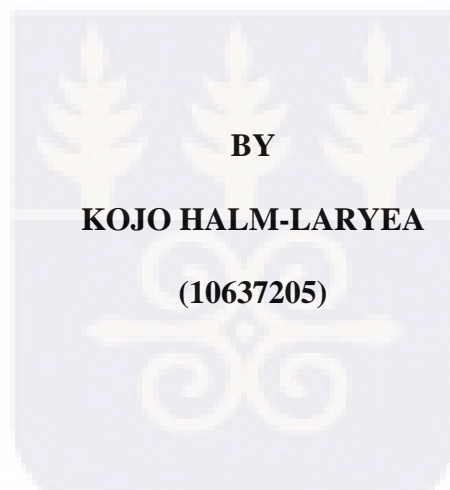


UNIVERSITY OF GHANA

**EFFECT OF RISK MANAGEMENT ON THE PROFITABILITY OF UNIVERSAL
BANKS IN GHANA**



BY

KOJO HALM-LARYEA

(10637205)

**A LONG ESSAY SUBMITTED TO THE DEPARTMENT OF FINANCE,
UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE
REQUIREMENT FOR THE AWARD OF MASTER OF BUSINESS
ADMINISTRATION DEGREE**

JULY, 2019

DECLARATION

I hereby affirm that this thesis is the result of my own original work towards the Master of Business Administration in Finance and to the best of my knowledge neither the whole nor a part of this thesis has been presented by someone else for another degree in this or any other university. All references used in this work have been accordingly acknowledged.

.....
KOJO HALM – LARYEA
(10637205)

.....
DATE

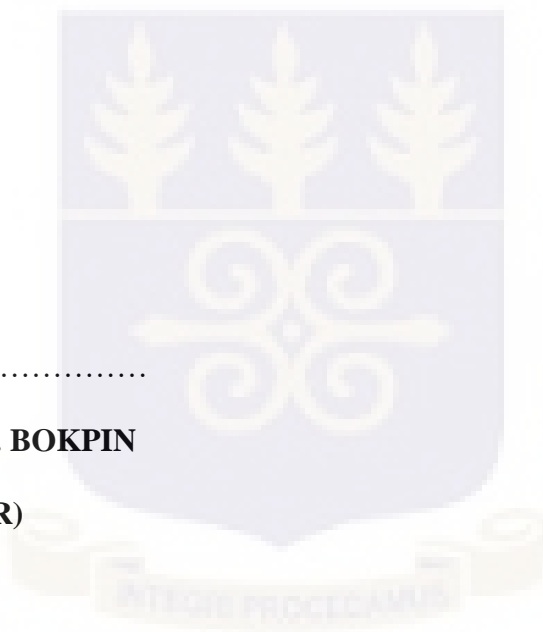


CERTIFICATION

I solemnly affirm that this thesis has been assessed and all corrections have been made following the comments made by my supervisor and the laid down procedures of the university.

.....
PROF. GODFRED A. BOKPIN
(SUPERVISOR)

.....
DATE



DEDICATION

This thesis is dedicated to the Almighty God for the gift of life and to my lovely children.



ACKNOWLEDGEMENT

My sincere appreciation goes to the Almighty God for granting me life, good health and strength to complete the programme.

My profound gratitude goes to Professor Godfred A. Bokpin, a truly talented gem for his contribution and supervision of my work. My heartfelt appreciation goes to my family for motivation and support given to me during my period of study.

Finally, to all colleagues and friends who played diverse roles throughout the course I say a big thank you; God richly bless you all.



TABLE OF CONTENTS

DECLARATION	i
CERTIFICATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES AND FIGURES	viii
ABSTRACT	ix
CHAPTER ONE.....	1
INTRODUCTION	1
1.1 Background of Study	1
1.2 Statement of the Problem.....	2
1.3 Research Objectives.....	3
1.3.1 Specific Objectives	3
1.4 Research Questions.....	4
1.5 Research Hypotheses	4
1.6 Significance of the Study.....	4
1.7 Summary of the Proposed Methodology	5
1.8 Scope and Limitations of the Study.....	6
1.9 Organization of the Study.....	6
CHAPTER TWO.....	7
LITERATURE REVIEW	7
2.1 Introduction.....	7
2.2 Assessment of Listed Banks and the Banking Industry in Ghana	7
2.3 The Conceptual Framework	8
2.3.1 Risks	9
2.3.2 Categories of Risk.....	9
2.4 Theoretical Literature	14
2.4.1 Credit Risk Indicators	14
2.4.2 Liquidity Risk Management and Framework	16
2.4.3 Operational Risk Management and Framework.....	20
2.4.4 Capital Adequacy and Framework	23
2.5 Financial Performance	25
2.5.1 Profitability Performance.....	25
2.5.1.1 Return on assets	25

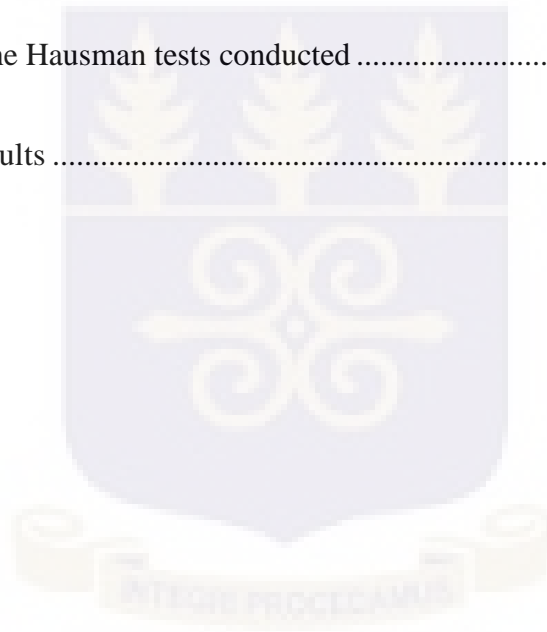
2.5.1.2 Return on equity	26
2.5.1.3 Net Interest Margin.....	26
2.6 Empirical Literature.....	27
2.6.1 Liquidity Risk Management and Bank Profitability.....	27
2.6.2 Credit Risk Management and Bank Profitability.....	28
2.6.3 Operational Risk Management and Bank Profitability.....	29
2.6.4 Capital Adequacy and Bank Profitability	30
CHAPTER THREE	31
METHODOLOGY.....	31
3.1 Introduction.....	31
3.2 Research Design	31
3.3 Population and Sampling techniques.....	31
3.4 Estimation Method.....	32
3.5 Variables definition and Hypotheses development	33
3.5.1 Profitability (ROA).....	33
3.5.2 Independent variables	33
3.6 Data Collection Procedure.....	34
3.7 Data Analysis and Presentation	34
3.8 Diagnostic Tests.....	34
3.8.1 Hausman Test	34
3.8.2 Multicollinearity Test	35
3.8.3 Heteroscedasticity Test.....	35
3.9 Chapter Summary	35
CHAPTER FOUR	36
ANALYSIS AND DISCUSSION OF FINDINGS.....	36
4.1 Introduction.....	36
4.2 Descriptive Statistics	36
4.3 Correlation Matrix	38
4.4 Regression Results.....	40
4.5 Hausman Test Results.....	45
4.6 Heteroscedasticity.....	46
4.7 VIF test	46
4.8 Conclusion	47
CHAPTER FIVE.....	48
FINDINGS, CONCLUSION AND RECOMMENDATIONS.....	48
5.1 Introduction.....	48
5.2 Summary of Findings	48
5.3 Conclusion	49

5.4 Recommendation	50
REFERENCES	51



LIST OF TABLES AND FIGURES

Figure 2.1: Typology of Risks.....	10
Table 2.1: Categories of Banking Risks.....	11
Table 4.1: Descriptive statistics.....	36
Table 4.2: Correlation matrix	38
Table 4.3: Regression table	41
Table 4.4: Results of the Hausman tests conducted	45
Table 4.5: VIF test results	47



ABSTRACT

The banking industry plays a crucial role in the economic eco-system and its development means fostered growth for the country. For a financial system to be sound, a vibrant banking system needs to be present. Any shake in the banking system can send a ripple effect to the financial system and it can topple down, causing a recession. The collapse of two Ghanaian banks in 2017 and the consolidation of five other banks a year later raised concerns about the crucial role of risk management in the banking institutions. Therefore, the study sought to examine the effects of risk management on the profitability of universal banks in Ghana. Ten banks were sampled over the period 2006 to 2016. Using a random effect model, and performing all pre-estimation tests, the study revealed that credit risk had a negative effect on bank profitability (return on assets). Liquidity did not have a statistically significant effect on bank profitability. On the other hand, capital adequacy ratio, bank size and operational risk all had a positive effect on bank profitability whilst inflation was statically insignificant. Based on the findings, credit risk and capital adequacy are crucial indicators that impacted financial performance and easily resulted in banking failure. Operational risk is a dynamic factor that management can capitalize on to improve profitability, in our situation it is possible that whilst inadequate systems and processes contributed to poor performance some banks capitalized on it to make profits. Bank size improves performance; howbeit in this case profitability was small. The study recommends banks to make adjustments to reduce their credit risk for example through the use of credit rating bureaus when giving out loans. Also, good corporate governance is very important. Bank of Ghana must ensure compliance to the Basel Accords to maintain sound financial practice in the banking system. On the part of the central government, there should be effective regulations of the financial market.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The Basel Committee on Banking Supervision (BCBS) is responsible for banking supervision and regulation issues. The promotion and supervision of risk management practices globally is their core mandate (BCBS, 2009). The role of Basel I which was enforced in 1992 to regulate the capital of banks aims at ensuring the maintenance of sufficient capital, cushion losses, ensure consistency amongst banks globally and most essentially, ensure effective risk management practices (Allen, 2013). Basel II accord essentially deals with the Internal Capital Adequacy Process (ICAP) by improving the structure for setting capital requirements and ensuring effective operational risk management processes (Chance & Brooks, 2011). Banks are therefore looking forward to combine the first two pillars, to create a consistent approach, and limit regulatory costs (BCBS, 2010).

Risk management guarantees ongoing operation and increases profitability in banking practice. There is an absolute need for efficient and effective risk management. In this respect, Allen (2013) points out that risk management in the economic industry is more crucial than in other areas of the economy. The mandate of financial institutions is to minimize risk and maximize income. They also need to give value for cash to their shareholders through their financial services, and in particular through risk management (Collier & Agyei-Ampomah, 2006). Authors who write on risk have combined the structure for their own analyzes in distinct respects, but the prevalent ones are credit risk, liquidity risk, operational risks that sometimes include legal risk, and more lately, strategic risk and e-bank risk (Marrison, 2012). The present research will

examine the impacts of risk management on Ghana's universal bank profitability with a focus on credit risk, liquidity risk, operational risk, and capital adequacy risk.

1.2 Statement of the Problem

The collapse of UT bank and Capital Bank in August 2017 left in their wake discussions within the banking industry in Ghana, as to what possible conditions may have triggered the situation. The situation exposes universal banks in Ghana to operational risk, credit risk, market risk, liquidity risk, reputational risk, compliance risk and regulatory risks as sighted by Deloitte & Touche (2012).

Poor risk management of universal banks it reflect in banking failures, bank takeovers, mergers and acquisitions, low profit margins and weak performances (Allen, 2013), as was recently witnessed in Ghana. The above notwithstanding, the extant literature on the internal risk management of banks, have been limited to banks' liquidity risk and their impact on financial performance (Sushil & Bivab, 2013), banking performance and their efficacy on risk management (Agbada & Osuji, 2013), and the relationship between risk management and business value of firms (Tahir & Razali, 2014).

Risk management issues, have been at the center of controversy and attracted lots of debate in recent times, First and foremost, with regards to the collapse of two Ghanaian banks in August 2017, and the consolidation of five other Ghanaian banks, a year later, in August, 2018. Research in this field of research conducted according to the researcher's best understanding is insufficient. Previous studies include prospective obstacles to the application of Basel II (Masood & Fry,

2009), risk management in the Ghanaian insurance sector (Akotey & Abor, 2010), obstacles to family risk management (Collier & Agyei-Ampomah, 2006), and the effect of banks' danger and performance (Bessis, 2009). But not much research has been performed widely on an evaluation of banks' inner risk management and their general impact on economic results to the researcher's highest understanding. Therefore, the present research aims to fill the existing literature knowledge gap by performing an initial job that will examine the impacts of risk leadership on the profitability of universal banks in Ghana.

1.3 Research Objectives

The main aim of the study is to examine the effects of risk management on the profitability of universal banks in Ghana.

1.3.1 Specific Objectives

In order to achieve the main objectives as stated above, the following specific objectives have been outlined:

- i. To examine the effects of credit risk on the profitability of universal banks in Ghana.
- ii. To ascertain the influence of operational risk on the profitability of universal banks in Ghana.
- iii. To ascertain the effects of liquidity risk on the profitability of universal banks in Ghana.
- iv. To assess the effect of capital adequacy on the profitability of universal banks in Ghana.

1.4 Research Questions

The following research issues were described in order to attain the study's particular goals:

- i. What is the effect of credit risk on the profitability of universal banks in Ghana?
- ii. What is the influence of operational risks on the profitability of universal banks in Ghana?
- iii. What is the effect of liquidity risk on the profitability of universal banks in Ghana?
- iv. What is the effect of the capital adequacy ratio on the profitability of universal banks in Ghana?

1.5 Research Hypotheses

The research hypotheses will be stated in the alternative as follows:

H1: There is a significant relationship between credit risk and the profitability of universal banks in Ghana

H2: There is a significant relationship between liquidity risk and profitability of universal banks in Ghana

H3: There is a significant relationship between operational risk and the profitability of universal banks in Ghana

H4: There is a significant relationship between capital adequacy ratio and the profitability of universal banks in Ghana

1.6 Significance of the Study

The study will make the following contributions to academia, practice, and policy. Firstly, the study will add to the extant literature by carrying out an original work which will address the

effectiveness of the risk management practices of universal banks in Ghana, thereby serving as a reference material for future researchers. Secondly, an assessment of the operational, liquidity and credit risk practices of universal banks hopes to provide information about the financial institutions' capability to handle the risks confronting their day-to-day operations. Finally, the regulator (Bank of Ghana) may use this study to design and improve upon the current risk management framework for all universal banks in Ghana, in order to reduce banking failures and improve upon the overall profitability of the banking industry in Ghana.

1.7 Summary of the Proposed Methodology

For the study and the fixed effect or random effect model of panel data analysis used as the method for examining the impact of risk management on the profitability of universal banks in Ghana, the quantitative research method will be adopted. This strategy will be adopted as the research will use Ghana's sampled universal banks' secondary information sources. This will consist primarily of the financial statements, consisting of the full income statement, the financial position statement and the cash flow statements. Secondary data based on the annual financial reports will be obtained from the official website of banks and bank databases such as 'bankscope' over a period of eleven (11) years as at the end of December 2016. The information of the panel will be statistically summarized and analyzed using both correlation analysis and multiple regression analysis to determine the relationships between the dependent and independent variables. The investigator will use the formula below to assess the impact of risk management on the profitability of universal banks in Ghana following the normal linear specification for the regression model:

$$Y_{it} = \beta_0 + \beta' X_{it} + \varepsilon_{it}$$

The regression outputs will be obtained by the use of the Stata software.

1.8 Scope and Limitations of the Study

The scope of the study is limited to examining the effects of risk management on the profitability of universal banks in Ghana. The study is limited to ten (10) universal banks in Ghana, and who have been operating in the Ghanaian economy, within the period 2006 to 2016. The study is therefore limited to selected universal banks in Ghana.

1.9 Organization of the Study

The research will be organized into five main chapters detailed as follows:

Chapter one will offer a background overview of the study covering the issue declaration, research goals, research issues, research hypothesis, study importance, study scope and organisation. The appropriate literature on the research, the literature on the conceptual framework and the definition of terms and constructs will be examined in Chapter two. Chapter three describes the study's overall design and other analytical methods covering research design, target population, information collection, statistical tools, and analytical techniques used in data analysis. Chapter four will concentrate on the outcomes and discuss the findings on the information gathered from the accounts and annual reports. Chapter five will draw conclusions based on the information gathered analysis, make recommendations based on the results of the research, and lastly make suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section analyzes prior associated research. It starts with the evaluation of listed banks in Ghana, focuses on the conceptual risk management framework, the theoretical reflections of various kinds of risk, and a review of empirical literature on the impacts of risk management on the results of universal banks in Ghana.

2.2 Assessment of Listed Banks and the Banking Industry in Ghana

As at the end of 2016, the Ghana Stock Exchange reported a total of 11 banks. They were GCB, Access Bank, ADB, Barclays Bank, UT Bank, Societe Generale, Ecobank Ghana, CAL Bank, HFC, Standard Chartered Bank, and Trust Bank Gambia. The performance of these banks was very poor as the majority recorded adverse profits. GCB, Ecobank Ghana, CAL Bank, HFC Bank, Standard Chartered Bank, and Trust Bank Gambia, for example, registered -7.70 percent, -2.30 percent, -3.0 percent, -5.60 percent, -1.20 percent, and -5.40 percent, while Societe Generale recorded no profit. This produced the index for the GSE Financial Sector record a -7.02 percent as well (Peace FM, 2016).

UT Bank was considered the most risky bank on GSE and at the end of the year as its operation was temporarily stopped. This was due to its inability to publish its financial statements since December 15, 2015. The bank had challenges with credit risk to be precise high NPLs which had great effect on its financial performance (Adogla-Bessa, 2017).

The GSE in 2016 was very bearish and almost all the financial stocks did not perform well.

The banks' bad economic inventory performance was a reflection of the banking industry's

severe difficulties. The industry faced three significant difficulties: high-performance loans (NPLs) from the 2015 energy crisis, slow loan development for the private sector and overcrowded smaller banks.

With all these challenges in the industry, there was the need to comprehensively address them to ensure the robustness of the industry. The current management of the Bank of Ghana therefore embarked on a comprehensive reform agenda, with the objective of cleaning up the industry and strengthening the regulatory and supervisory framework for a more resilient banking industry.

The Minimum Capital Directive was component of legislative initiatives aimed at toughening the banking industry and making it resilient to shock and positioning the banks to better assist the Ghanaian economy's increasing requirements. It was also the Bank of Ghana's expectation that the recapitalization exercise would help promote banking industry consolidation through sustainable mergers and acquisitions along with stronger corporate governance structures and risk management systems and practices. Twenty-three (23) banks currently exist in the country (Joy FM, 2019).

2.3 The Conceptual Framework

Risk management is pivotal in management practices among firms (Dar, 2012). Firms struggle to achieve a balance between risk and reward. These goals are achieved through an obviously organized structure for risk management. The risk management framework is an instrument for identifying, then measuring, followed by planning, tracking, and controlling main hazards to which the company is subjected (Dar, 2012). According to Res, Sa & Gemechu (2016), risk

management involves, but not restricted to, first setting the context, identifying, then analyzing, evaluating, treating, tracking and also communicating hazards that enable ongoing improvement in decision-making. Financial risk management's vital tasks are to define measure and, more importantly, track the bank's profile. Yousfi, (2014) and Res et al., (2016) argued that risk management plays a key role in determining banks ' general efficiency.

2.3.1 Risks

Chance and Brooks (2011) define risk as a probability of an occurrence of a negative outcome of a variable in question. This risk could either be anticipated or not (Collier & Agyei-Ampomah, 2006). Certain risks can also be peculiar to a certain industry or trade or a particular product or service. This has come to be known as unsystematic risk. Unsystematic risk, also called unique risk, can be gotten rid of or mitigated primarily through or diversification (Allen, 2013). On the other hand, the other type of risk is the systematic or undiversifiable risk. As the name implies, this kind of risk cannot be easily dealt away with. A characteristic of this kind of risk is that it usually affects the economy-wide and not limited to a few areas. Examples include macroeconomic rates like interest rate, inflation rate, exchange rate and others (Holton, 2013). According to Marrison (2012), risk is the probability of a loss occurring. In this case uncertainties associated with the profitability of the banks.

2.3.2 Categories of Risk

According to Van Deventer, Imai, and Mesler (2004) risks fall under different categories. They posit that from management perspective risk can be eliminated, transferred or managed at firm level and all these are categories of risk. Different authors have grouped these risks in various ways to develop the frameworks for their analyses.

Figure 2.1: Typology of Risks

Source: Crouhy et al (2014).

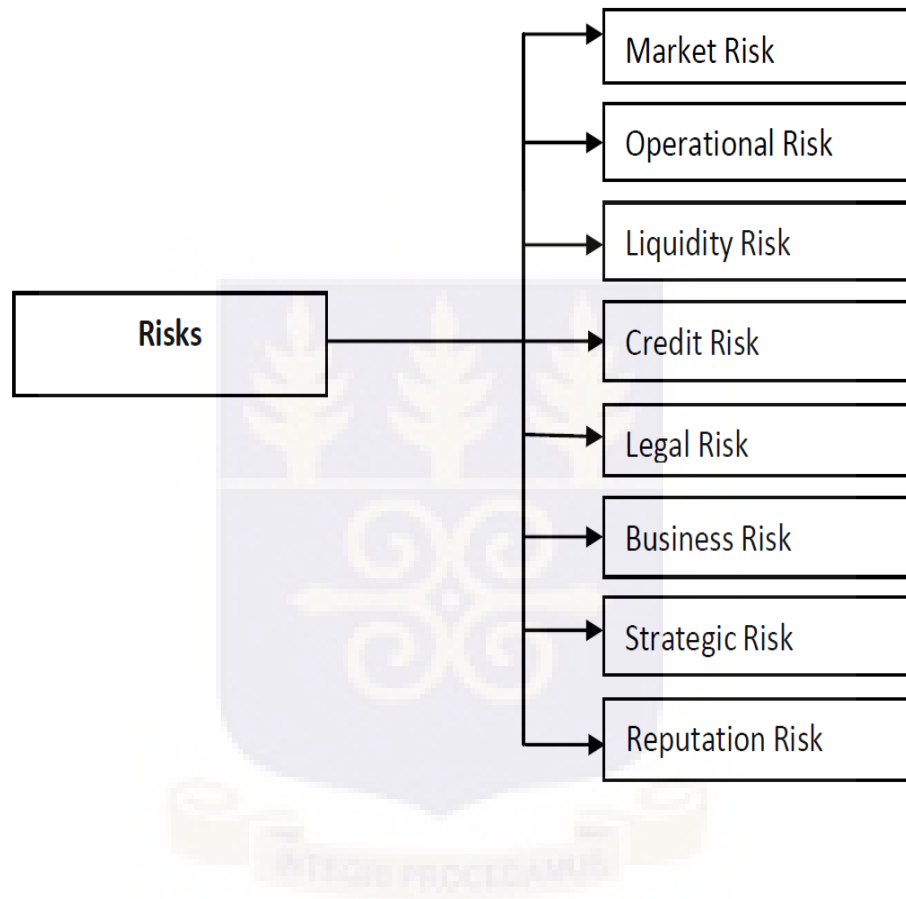


Table 2.1: Categories of Banking Risks

Financial Risks	Operational Risks	Environmental Risks
Balance sheet structure	Internal fraud	Country and political risks
Earnings and income statement structure	External fraud	Macroeconomic policy
Capital adequacy	Employment practices and workplace safety	Financial infrastructure
Credit	Clients, products, and business services	Legal infrastructure
Liquidity	Damage to physical assets	Banking crisis and contagion
Market	Business disruption and system failures (technology risks)	
Interest rate	Execution, delivery, and process management	
Currency		

Source: Chance and Brooks (2011)

Among the multiple kinds of risk encountered by universal banks in Ghana, including interest rate, foreign exchange rate, credit, liquidity, market, operational, market, strategic, legal, company and reputational risk, this research concentrated on credit risk, operational risk, liquidity risk, and capital adequacy risk.

Liquidity Risk is the risk not having enough monetary assets to meet current payment needs.

When a company faces liquidity risk, it may be forced into an uncomfortable situation of selling

its fixed assets (or un-matured assets) at a price lower than the market rate for the asset, just to relieve itself of the current financial burden (Kamau, & Njeru, 2016). Technically, liquidity problems or risk usually arises from the asset side of the balance sheet (Sonjai, 2008). According to Yousfi (2014), liquidity risk does not mean the company is out of financial resources or assets, but that it does not have enough liquid assets to pay its short term debts. It may have more than enough resources in assets but these assets may not be easily convertible into monetary assets to meet financial obligations.

Credit risk is also the risk arising from the inability of a borrower to pay back a loan received to the lender after the agreed time has elapsed. In this case, the borrower may either be unwilling or unable to service a debt upon when it has matured (Anthony et al., 1997). In lender, which is mostly a bank or a loan-giving institution, has credit risk when it is exposed to the financial burden of an unpaid loan (Luy, 2010).

Credit hazards can lead to depletion of the assets of the banks. It is said that the sort of danger they face is loan risk owing to the nature of banks and other economic intermediaries (Gray, Cassidy, & RBA., 1997). Credit risk indicators include the level of non-performing loans, problem loans or loan loss provision (Jiménez & Saurina, 2006). Moreover, (Yimka et al., 2015) states that the primary sources of credit danger include: restricted institutional ability, inappropriate credit policies, volatile interest rates, bad governance, inappropriate legislation, low concentrations of capital and liquidity, targeted lending, huge bank licensing, bad lending underwriting, reckless lending, bad credit evaluation, no non-executive directors, bad loan underwriting.

Capital Adequacy Ratio (CAR) is a mathematical calculation which is a ratio of the banks Qualifying Capital divided by its risk weighted assets. It measures the proportion of the bank's capital in relation to its risk exposure. Thus it calculates the banks' tolerance to financial stress or unanticipated risk that may occur in the financial market. Makri et al., (2014) purport that a banks' Capital Adequacy Ratio is a significant determinant of the banks' risk behaviour. Thus should there be any financial risk, the CAR measures the banks' ability to absorb the risk without going into bankruptcy. The CAR also protects bank customer's interest and helps maintain a stable financial system. The expectation is that when the CAR of the banks are high, the more strong they are and able to with financial shocks. A lower CAR may also imply the bank is weak and may run into financial distress when there is an economic shock. Generally, banks with high CAR are expected to be more profitable and vice versa. Therefore the expectation is that CAR should have a positive effect on bank profitability (Berger, 1995; Bourke, 1989; Hassan & Bashir, 2003).

Operational risk is also the risk that the bank will incur losses due to internal exploitation. Thus weakness in the bank's operations leads to losses (Barakat & Hussainey, 2013). Operational risks are mitigated by sound accounting practices, internal and external audit engagements and regular checks and balances.

2.4 Theoretical Literature

This section looks at frameworks developed by the Basel Committee for Banking Supervision (BCBS) and financial risk management experts to help control or mitigate risk in the banking sector.

2.4.1 Credit Risk Indicators

Non-performing loans (NPLs) is the commonest indicator of credit risk. Other indicators used over time include loan provisions and loan loss provisions (Jiménez & Saurina, 2006). Yimka et al., (2015) also identify the main sources of credit risk to be weak management and credit policies (like ineffective lending, underwriting and credit risk assessment), interest rate fluctuations, low liquidity levels, managerial inefficiencies and ineffective government supervision.

Credit Risk Mitigation and Reduction Strategies

The well-known credit risk mitigation strategies include mostly hedging techniques like derivatives, securitization and others. The author elaborates on some of them.

Credit Derivatives: A derivative is an asset which derives its value from an underlying asset. Credit derivatives allow banks to bundle and transfer or sell that risk attached to its loans to a third party through derivative techniques. This technique leaves the banks' loan portfolio intact and does not affect it. So the bank is able to transfer loan risk whilst continuing to manage its loan portfolio (Marsh, 2008).

Credit Securitization: Similarly, to using derivatives, banks can securitize their loan portfolio by transferring the loan risk component to an insurance company or a factor. Thus this approach

allows banks to insure against their lending activities (Michalak & Uhde, 2009). Another form of securitization, known as a cash collateralized loan obligation, is the securitization of the banks loans bank loans and packaging them into new assets which can be sold separately in tranches usually via a special purpose vehicle (Marsh, 2008). The New Basel Capital Accord places emphasis on banks as solely a responsible unit for the adoption of sound risk management practices to mitigate their credit risk and towards meeting their capital adequacy requirements (Chen & Pan, 2012).

Sound internal lending management and policy: banks are supposed to have lending policies which regulates their lending behaviour. It provides a framework for lending to customers Strong and sound lending policies would therefore protect the banks from careless lending which protect them from high rates of default. It is also simple and easy to achieve this compared to the others. The lending strategy should be well aligned to the overall organization goals and plan (Kithinji, 2010).

Credit Reference Bureau (CRB): A CRB is an impendent institution which collects stores the lending history of people. The information is then passed on to banks, who make their lending decisions based on them. this information help the banks greatly reduce the problem of adverse selection, which in turn reduces their credit risk. CRB are significant in reducing banks' credit risk which accounts for between 2/3s to 3/4s of the overall risk that banks face (Lam, 2007).

Credit Risk Measurement

Credit risk is usually managed by banks using two main methods which is the Standard Approach (SA) and the Internal Ratings Based Approach (IRB). These methods derive portfolio losses by examining default probability, exposure, and Maturity.

The Default probability (DP) is the statistical percentage of the likelihood that a borrower will default on a loan advance; the default exposure (DE) the quantum of loan to be left outstanding by the borrower should the borrower default; the loss given default (LGD) is that loss amount in actual terms after all other outstandings are catered for (thus after all technical corrections, securitizations, and other issues have been adjusted) (BCBS, 2001).

So the expected loss (EL) is calculated as;

$$EL = DP \times LGD \times DE.$$

And the expected loss percentage, which is calculated as a percentage of exposure at default is also calculated as

$$EL\% = DP \times LGD.$$

Basel II lists a number of credit risk mitigation strategies which include collateralized loans, diversification, credit derivatives, risk-based pricing, credit insurance and deposit insurance.

2.4.2 Liquidity Risk Management and Framework

Liquidity risk is the inability of a bank to convert its assets into a liquid form to meet its short term monetary obligations without significantly incurring losses. That's it is the risk that the banks in trying to meet its urgent current obligations to depositors, it would have to sell off its assets at below market values (Gup & Kolari, 2005). Liquidity risk normally happened through two ways; first when depositors all come to withdraw their monies at the same time (what is typically called a bank run) or secondly, if borrowers draw on their loan commitments without prior warning as this must be funded

immediately (Wood & Kellman, 2013). In a typical situation like this, the banks would have to quickly borrow from another bank, or sell off its assets usually at a lower price.

Liquidity risk framework

CRISIL (India Limited Credit Rating Information Services) is a worldwide S&P firm with power in risk and policy assessment, which encompasses aspects of CRISIL's liquidity structure; liquidity risk drivers; measurement and reporting; asset management and mitigation (BCBS, 2008). In 2013, the Basel Committee for Banking Supervision launched the revised Basel III framework: International Framework for the Measurement, Standards and Monitoring of Liquidity Risks. The revised liquidity risk structure shows the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). In addition, surveillance instruments were created as metrics to provide specific information linked to the bank's cash flows, market parameters, accessible unimpeded collateral and balance sheet structure (BCBS, 2013).

Liquidity Risk Indicators

Key Liquidity risk indicators include; 3 months liquidity gap /total deposits, long term funding ratio, liquidity asset ratio to mention a few (Owusu-Acheampong, 2018). Risk drivers of liquidity framework include wholesale liquidity risk, off-balance sheet liquidity risk and intra-group liquidity risk. For banks to manage their liquidity risk they must identify the internal and external factors with potential to lead to liquidity crisis, these factors consist; high off-balance sheet exposure, concentration deposits in short term tenor, fewer placement of funds in long-term deposits. The external factors comprise low or slow economic performance, sudden and

massive liquidity withdrawals from depositors and unplanned termination of government deposits (Kumar and Yadav, 2013).

Measurement and Reporting

Cash flow forecasting, collateral management and stress testing are the primary components of liquidity risk measurement. The need for measurement becomes critical after the liquidity risk management goals have been described (Owusu-Acheampong, 2018). The LCR and NSFR are normal instruments to be measured and reported under Basel III, LCR is a metric that encourages short-term liquidity profile resilience of banks. This is achieved by requiring the banks to maintain a substantial stock of unimpeded High-Quality Liquid Assets (HQLA) which can quickly be changed into cash in private markets to solve their liquidity challenges for a thirty (30) day period liquidity stress scenario.

$$\text{LCR} = \frac{\text{stock of High-Quality Liquid Assets (HQLA)}}{\text{total net cash flow over the next 30 days}} \geq 100\%$$

Source: Goel, 2017, p.6

It means that, in order for the banks to meet their funding needs and be able to rely on the contingent liabilities for the 30-day period, they are required by the LCR to hold a stock of High-Quality Liquid Assets (HQLA) greater than or equal to the stressed net cash outflows. The banks are further required to achieve this persistently and report on a monthly basis to the supervisors with a grace period of fourteen days (Kenton & Murphey, 2019). The Net Stable Funding Ratio (NSFR) was also developed to enhance the robustness of the banking sector over a longer period of one year by making complementary incentives for the banks to fund their operations with more resilient avenues of funding on a daily basis (BIS, 2018). The Net Stable

Funding Ratio (NSFR) is determined as the *available stock of stable funding / amount of stable funding required* great (>) hundred percent (100%).

Asset-Liability Management

As stated by Owusu-Acheampong (2018), the main objectives of ALM in banks are: the protection and enhancement of the banks net worth; the maintenance and protection of the spread of Net Interest Margin through appropriate pricing mechanisms and the increase in Net Interest income. ALM uses concepts such as duration matching, variable rate pricing and static and dynamic simulation models.

Mitigation of liquidity risks for banks include: extending the maturity of liabilities and reducing the tenure of assets; exiting from expensive business lines due to high cost of funding; raising new capital and issuing medium to long-term wholesale funding.

The Monitoring Tools

In addition to certain metrics that are considered to be monitoring instruments, the Liquidity Coverage Ratio (LCR) as a standard must be used. Together, the LCR and the metrics serve as an essential source of data to assist managers determine the liquidity risk of the bank (BIS, 2013).

In addition, managers may need to complement this structure by using other metrics and instruments specifically intended to capture aspects of liquidity risk that are unique to specific demographics. Contractual maturity mismatch, Concentration of financing, Available unencumbered assets, LCR by major currency, market-related surveillance instruments are the following surveillance instruments (metrics).

2.4.3 Operational Risk Management and Framework.

Operational risk is described as the risk of failure arising from insufficient or failed structures, inner procedures and individuals as well as external events. The Basel Committee gave this definition (BCBS, 2001). It involves errors in the data systems, fraud and human error.

The operational risk framework's fundamental elements include: risk identification, measurement, assessment, distribution of capital, and risk management and mitigation (Harmantzis, 2004, p.5).

Risk Identification

Assessment of risk can be done using the Risk and Control Self-Assessment program (RCSA), where line of business managers identify key processes, risks and controls in the processes. The alternative is the assessment of the impact and likelihood of risks in a qualitative manner (Correa and Raju, 2008). Risk mapping and key risk indicators are also ways of identifying operational risk. A risk map can consist of credit card fraud, transaction errors, system failures, government and employee claims, rouge trading, terrorist attacks and lawsuits etc.

Risk Measurement and Analysis

A quantitative framework should be followed so that operational risk can be measured accurately. Key risk indicators should be numeric in value; counts, numbers, percentages, ratio etc. this helps to track changes and show trends in forecasts (Schutter, 2013). Operational risks in banks can be derived from data on internal fraud, external fraud, employment practices and workplace safety, damage to physical assets and business disruption system failures. Typically, risk indicators e.g gross income, past losses and expenses are used in risk determination. To quantify operational risk an actuarial based approach is adopted using either real loss data or

scenario analysis, a compound Poisson derives distributions for each line of business and a Monte-Carlo simulation calculates the expected loss (Cruze, Coleman & Salkin, 1998).

Operational Risk Capital Requirement

The capital adequacy framework of the Basel II accord identified three methods for calculating operational risk capital charge. These are the Basic Indicator Approach (BIA), the Standardized Approach (SA) and the Advanced Measurement Approach (AMA). It should be noted however that, banks that adopt SA will not be permitted to change to a less complex approach unless approved by their central banks (Harmantzis, 2004)

The Basic Indicator Approach (BIA)

The Basic Indicator Approach (BIA) requires banks to hold capital for operational risk which must be equal to the average over the past three years of a fixed percentage (denoted α) of positive annual income. The approach formula is below:

$$K_{BIA} = \{\Sigma (GI_{1...n} \times \alpha)\} / n$$

Where:

K_{BIA} = capital charge under BIA

GI = annual gross income of the banks are positive over the previous three years

n = number of the previous three years where annual gross income is positive

α = 15%

The bank can determine its gross income from its normal banking activities as the total of the net interest income, and the net non-interest income gross of: provisions, operating expenses, any income or expense from extraordinary or irregular items and income derived from insurance recoveries (BCBS, 2002).

The Standardized Approach (SA)

Based on the approval of the central bank, the banks can adopt the SA but they must group their business operations into eight (8) business lines such as retail banking, payment and settlement, corporate finance, agency services, asset management, commercial banking, retail brokerage and trading and sales

The banks using the Standardized Approach (SA) calculate their capital for operational risk as a 3-year average of the total of the regulatory capital charges across the eight (8) business lines for a year. Each business line capital charge is determined by multiplying the annual gross income by a determinant (designated β) given to a particular business line. The SA formula as found in the Basel consultative document is presented below:

$$K_{SA} = \{\sum_{\text{years } 1-3} \max [\sum (GI_{1-8} \times \beta_{1-8}), 0]\} / 3$$

Where:

K_{SA} = capital charge under SA

GI_{1-8} = annual gross income in a given year for each of the eight business lines

β_{1-8} = a fixed beta factor for the business lines

(BCBS, 2002).

Operational Risk Mitigation

The impact of operational risk on the reputation and financial stability of businesses is devastating if strong mitigation risk strategies are not put in place. Possible measures to put in place in managing and controlling operational risk include: insurance to cover operational risk; controls, reviews and audits to ensure integrity of operational risk management process; bank systems monitoring and reporting operational risk exposures and other data quality considerations and assessing overall capital adequacy for operational risk in relation to its risk profile (Cole, 2003).

2.4.4 Capital Adequacy and Framework

The capital adequacy as a ratio measures the banks' available capital expressed as the percentage of the banks' risk-weighted credit exposures. The capital adequacy ratio is used to secure the depositors and to enhance the efficiency and stability of the banking industry across the world. The capital can be measured in two ways. These are tier-1 and 2 capital which absorbs the losses of the banks in operation and during winding-up respectively. Tier-2 capital provides a lesser degree of security or protection to the depositors. The minimum capital requirement is fixed at 8% of risk-weighted assets (RWA).

In the wake of the global financial crisis, the Basel Committee introduced a new capital adequacy framework or strategies to provide a very holistic approach to managing the actual risks of banks. The framework is premised on three main pillars which are minimum regulatory capital requirements, direct supervisory review of the banks' capital adequacy and more usage of market discipline to ensure robust risk management procedures practices. However it must be noted that minimum risk-based capital requirement sets common equity tier 1 to be at least 4.5% of RWA, tier 2 capital must be at least 6% of RWA and total capital 8% of RWA. A capital conservation buffer (CCB) is also set to cushion banks from adverse financial distress.

A CCB of 2.5% comprised of common equity tier 1 is established above the regulatory minimum capital requirement. Bank of Ghana has set its minimum capital requirement at 10% (Owusu-Acheampong, 2018).

1. The Minimum Capital Requirements

These requirements help the banks to rightly align their capital with the actual risks that they face. The risk weights are 0%, 10%, 20%, 50, and 100%. For even the more standardized method, the weights on capital will be depended on external ratings as provided by globally accepted ratings such as standard & Poor's and Moody's.

The framework considers the banks own capital distribution models as fitting for regulatory capital requirements. The management of banks uses the models to measure the likely credit risks in the internal capital decisions. The committee has also expanded the capital requirements beyond market and credit risks to include interest rate risk and operational risk.

2. The Supervisory Review

The Basel committee requires all banks to ensure that their own capital positions are consistent with their total risk profiles. This implies that, the internal systems by which the management of the banks evaluate and determine capital must be subjected to the supervisory review. The supervision is to promote supervisory intervention when old capital levels cannot provide adequate security against the bank defaults. Also, the supervisors must require the banks to hold capital beyond the regulatory minimum capital requirements under certain occasions.

3. The Market Discipline

The Basel Committee has issued a more detailed guidance on the public disclosure of the capital requirements of banks and their risk exposures. The guiding rule is that an increased

transparency in relation to the actual risks of banks can promote effective monitoring by the private investors. This in turn will enhance better risk management and the capital allocation by the banks.

2.5 Financial Performance

Financial performance is a measure of a bank's operations expressed in monetary terms. The income statement and the balance sheets are useful tools in measuring financial performance (Adam, 2014). Financial performance demonstrates a bank's strengths and weaknesses and also helps in decision making (Islam, 2014). Financial performance can be measured in a number of ways using ratios. These include profitability performance, liquidity performance, assets management and solvency measures (Casu *et al.*, 2006).

2.5.1 Profitability Performance

Profitability performance is the most common measure of bank performance. A high profitability ratio indicates a high financial performance. Profitability ratios can be measured using Return on Assets (ROA), Return on Equity (ROE) and Net Interest Margin (NIM).

2.5.1.1 Return on assets

This is the ratio of the net profit and the total assets of a bank. According to Ahmed (2009), ROA demonstrates the ability of a bank to acquire deposits at reasonable cost and investing to yield worthwhile profits. It estimates the profits made on assets after all expenses and taxes are paid (Van-Horne, 2005). It is also a measure of how banks convert their assets into earnings (Samad & Hassan, 2000). A higher ROA indicates that profitability is high and hence a high managerial performance of the banks and an efficient utilization of assets of the firm. Low ROA, on the other hand, shows an inefficient use of assets and hence this lowers the profitability

and performance of the banks. ROA increases when banks increase their profit margins or asset turnover (Islam, 2014).

2.5.1.2 Return on equity

ROE is the most important measure of a bank's profitability. It is defined as the amount of net income returned as a percentage of shareholders' equity. It indicates how much a company or bank makes from investments made by shareholders. It is calculated as expressed as a percentage. It is also a measure of profitability to shareholders after expenses and taxes (Van-Horne, 2005). It signifies growth of a bank or company. The ROE is affected by the profitability of the bank. A bank with high profitability will have a high return on equity, whereas low profits lower the ROE (Merritt, 2018). ROE is also affected by the financial leverage or debts of the bank. When a bank borrows it get more cash which in itself is an asset and this makes available more funds to work with which may lead to the generation of more revenue or profits (Merritt, 2018). It is also affected by asset turnover. Asset turnover increases, when more revenue is obtained from the existing assets or when the same amount of revenue is generated from fewer assets. When that is done, it increases managerial efficiency which further increases ROE and hence the profitability of the bank (Merritt, 2018).

2.5.1.3 Net Interest Margin

NIM is the ratio of Interest Margin to Total Assets. Banks which are based on traditional activities prefer to use NIM as their measure of profitability since it reflects higher performance (Zaghdoudi, 2017). Empirical data shows that during financial crisis, bank stability is threatened and NIM which is a principal banking indicator declines.

2.6 Empirical Literature

This section presents literature review on the various studies that been conducted on the subject both in Ghana and outside. It also indicates the relationship that exists between risk management and banks' profitability.

2.6.1 Liquidity Risk Management and Bank Profitability

A study conducted by (Konadu, 2009) aimed at establishing the relationship between selected banks' liquidity and profitability movements in Ghana. He gathered data on the commercial banks that were listed from 2006 to 2009. The banks included Societe Generale, Cal Bank and Standard Chartered Bank. A trend analysis was employed on the liquidity and profitability ratios of the banks. The findings concluded that an adverse relationship or association exist between the liquidity movements and the profitability of the selected Ghanaian banks.

Another study was carried out by (Mwangi, 2014) to determine how the financial performance of Kenyan commercial banks is affected by liquidity risk management. He used a descriptive research design with the sample being the listed commercial banks as at the end of 2013. The published financial statements served as his secondary data and the period was between 2010 and 2013. He developed a regression model where the banks' financial performances were measured with Return on Assets (ROA) as the dependent variable. The independent variables were the liquid assets to total deposits, liquid assets to total assets and balances owed to other banks / total assets and assets quality. His findings established that there was a significant adverse association between liquidity risk management and the financial performance of the commercial banks. His study also recommended that keeping more liquid assets as linked to total assets will result in lower profits to the commercial banks but however, the effect will not

be 5% significant and keeping more liquid assets as linked to total deposits will result in lower profits to the commercial banks with 5% significant effect.

2.6.2 Credit Risk Management and Bank Profitability

Boahene et al., (2012) performed a survey on the connection between the leadership of credit risk and the profitability of certain chosen Ghanaian banks using both fixed effect and random effect models. The research created an important connection between the components of loan danger and bank profitability. The study's implication was that, despite the increased exposure to loan danger, Ghanaian banks experience increased profitability. Kolapo et al. (2012) performed another survey to comprehend the effect of credit risk on banks with ROA's economic results as a performance measurement using a panel data analysis. The research found that an increase in the provision of non-performing loans (NPLs) or credit losses decreases economic efficiency (ROA), while an increase in complete loans and advances enhance economic performance. Kithinji (2010) also performed a survey to determine the connection between Kenyan business banks' loan risk management and profitability. Secondary data on non-performing loans (NPLs) and credit for the period 2004 to 2008 have been gathered. The loan quantity was evaluated as a percentage of borrowers' loans and advances to the total assets. The NPLs were also evaluated using Total Asset Return (ROTA) as a percentage of NPLs for total loans and total profit. He created a model of regression to create the connection within a time window between the quantity of credit, NPLs and profitability. Finally, he found that the regression model created an adverse link between credit, NPLs and profitability.

Lastly, Li and Zou (2014) performed a survey to establish the link between credit risk management and European commercial banks to determine whether the association was fluctuating or stable. Data were gathered for the 47 (47) biggest European business banks

covering a period from 2007 to 2012 on the annual and risk reports. Return on Assets (ROA) and Return on Equity (ROE) were used as profitability measures, while NPL ratio and equity adequacy ratio were used as credit risk management measures. The research found that management of credit risk has a adverse effect on commercial bank profitability. The research created a favorable impact on both ROE and ROA in relation to the credit risk management proxy NPL ratio, while the capital adequacy ratio (CAR) proxy had a adverse impact on ROE and ROA. They also found that a fluctuating connection existed during the study period between credit risk management and profitability. They suggested that banks' management need to be more efficient in managing credit risk especially the NPLs.

2.6.3 Operational Risk Management and Bank Profitability

Lyambiko (2015) performed a survey to determine Tanzanian business banks' operational risk management policies and economic results. The research also intended to identify Tanzanian business banks ' sources of risk exposure.

A descriptive research design with a registered bank population of thirty-six (36) as at the end of 2013 was used. As of December 31, 2013, the study used a descriptive research design with a target population of 36 registered business banks. Secondary data were gathered between 2009 and 2013 from business banks ' economic statements. A regression model with ROA measuring bank performance and independent variables composed of credit risk, insolvency risk, and operational efficiency was created. The research found that the independent variables and the economic results of the banks had distinct rates of connection. The research created a favorable connection between operating efficiency and economic performance of banks, while credit and insolvency risks had a adverse connection to economic performance of banks.

Finally, a study was carried out by Sewanyana, (2015) to determine the association between the operational risk and the organizational environment as well as the association between the operational risk and organizational performance using Stanbic Bank as the study case in Uganda. He adopted both descriptive research design and cross-sectional approach. The techniques used to obtain the data were interviews and questionnaires. The Council Reports, annual financial statements and journals served as secondary data. The study concluded that a significant and positive association existed between the organizational environment, operational risk management and the organizational performance. The results from the regression analysis also showed a positive relationship between the organizational environment, operational risk management and the organizational performance.

2.6.4 Capital Adequacy and Bank Profitability

Short, (1979) argue that a bank's size is normally to its capital adequacy and so banks with large capital are able to produce higher rates of returns with less costly capital than banks with small capital. A study by Akhavein, Berger & Humphrey (1997) to determine the relationship between capital adequacy and profitability established that a positive and significant relationship exists. Another study by Reynolds and Ratanakomut, (2000) also agreed that profitability is positively related to the banks' capital adequacy because as capital adequacy declines with size, the large banks will have lower capital adequacy ratios (CAR) in relation to the small banks with higher ratios.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter details the research design and sampling technique, data source, models for measuring competition and cost efficiency in banking. Thus, how the research is conducted is presented in this section.

3.2 Research Design

This study mainly adopted a quantitative technique. The choice of this approach was influenced by the fact that the study, as part of its objectives tries to examine the effect of risk on banking performance. Creswell (2013) suggest that this approach is often suitable for studies that test the links among variables using statistical and mathematical approaches. Moreover, these analytical techniques adopted in this study were comparable to those usually used in the banking literature and as such could be depended upon to provide reliable and valid answers for the research questions.

3.3 Population and Sampling techniques

The population of a study can be defined as the full set of cases from which a sample is taken (Saunders, Lewis and Thornhill, 2009). Since this study focuses on banks in the Ghanaian financial markets, the target population for this study will be the total number of regulated banks in Ghana. The study population comprises all universal banks accepting deposits from customers and granting loans to borrowers in Ghana over the period 2006-2016. Purposive

sampling was used to select ten universal banks as at December, 2016. The sampling technique is the most appropriate since it will set the inclusion and exclusion limits for the universal banks to be included in the study.

3.4 Estimation Method

This study employs panel data technique to shed insights on the risk and profitability of ten (10) banks in Ghana between 2006 and 2016. Baltagi (2001) posits that the panel data technique presents more convincing and conclusive results than the traditional cross-sectional and time series techniques as the panel takes advantage of the strengths and corrects for the weaknesses of both time series and cross-sectional technique. Similarly, the panel data presents that ability to control for omitted variable and allows for both long and short run effect which controls for the weakness of cross-sectional and time series techniques (Imbens and Wooldridge, 2009). Given the panel nature of the data, the study adopts the modified empirical models of Akotey et al (2013), Alhassan et al. (2015) and Olalekan et al (2018). The model is presented below;

$$ROA_{it} = \beta_0 + \beta_1 CRSK_{it} + \beta_2 OPRSK_{it} + \beta_3 LIQRSK_{it} + \beta_5 CAR_{it} + \beta_6 SIZE_{it} + \beta_8 INFLATION_{it} + \epsilon_{it} \dots \dots \dots (2)$$

Where ROA_{it} is defined as the return on assets of bank i in period t ; $CRSK_{it}$ represents the credit risk of the bank, $OPRSK_{it}$ represents the operational risk of the bank, $LIQRSK_{it}$ represents the liquidity risk of the bank, CAR represents capital adequacy ratio, and ϵ_{it} represents the error term. β_0 represents the constant and β_1 to β_4 represents the constant. The it subscripts represents i bank and t time respectively. Size and Inflation are also represented.

3.5 Variables definition and Hypotheses development

3.5.1 Profitability (ROA)

Bank profitability is measured as return on assets and employed as dependent variable. ROA is computed as earnings before interest and tax divided by total assets following from Djan et al., (2015). Goddard, Molyneux and Wilson (2004) posit that ROA is a better measure of profitability due to its ability to capture leverage usage effect which ROE (return on equity) ignores. Hence, the ROA is employed ahead of ROE.

3.5.2 Independent variables

Liquidity risk is evaluated as the loan-to-deposit ratio of Yousfi, (2014). This variable's anticipated connection with the dependent variable is negative. Credit risk is evaluated as the relationship between non-performing loans and complete loans (Arif Hussain, Ihsan & Hussain, 2016). The risk of capital adequacy is evaluated as the complete equity ratio to the complete asset (Yousfi, 2014). The anticipated connection is negative with the dependent variable. The bank's operating risk is evaluated by the proportion of working loss to operating income. The connection that is anticipated is also negative. The bank's size is used as a performance determinant. The size of the company can either enhance or slow down development, following economies of scale and scale and disease economies of scale. A company's size is calculated as the natural log of total assets. The anticipated size-to-bank profitability connection is positive.

The World Bank (2011) defines inflation as a continuous increase in the general price level of prices for goods and services (World Bank, 2017). Inflation is expected to be negatively linked to profitability.

3.6 Data Collection Procedure

The information source for this research was ten business banks ' annual reports for the 2006-2016 period. The annual reports will be used for the research to obtain information. The banks in particular are: Barclays Bank Ghana, Cal Bank, Ecobank, First Atlantic Bank, Ghana Commercial Bank, Guaranteed Trust Bank, HFC, Standard Chartered Bank, and SG-SSB. Most of the information was accessible in either paper or electronic form. The "bankscope" bank database was a helpful instrument for information collection.

3.7 Data Analysis and Presentation

The study used secondary data sourced from the bank scope database of 10 Ghanaian over the period 2006 to 2016. A number of diagnostic test are done on the data to ensure there are no issues with it, and that the findings would be consistent and statistically significant. Regression analysis is conducted and the findings presented mainly in tables.

3.8 Diagnostic Tests

3.8.1 Hausman Test

Hausman Specification Test was performed to determine the most effective of random and fixed-effect models. This test, named after Durbin-Wu-Hausman, examines a estimator's consistency compared to another alternative estimator that is supposed to be less effective. The test enables to determine how the empirical matches the information used in the research. This method is used in panel regression to explain the connection between dependent and autonomous variable(s) by choosing between random and fixed effect effectiveness. The random effects model is chosen on the alternative set effects model under the null hypothesis.

3.8.2 Multicollinearity Test

Multicollinearity occurs when the autonomous variables have correlations. We use the inflation factor Variance (VIF) to check for this. The Variance Inflation Factor measures how much the variance is inflated, which is multicollinear in effect multicollinearity tests as inflatable factors.

3.8.3 Heteroscedasticity Test

With respect to our FE regression, we check the robustness of our standard errors. If our standard errors are robust, we need not add robust to our regression equation when using Stata. To test for that, we test whether our data is hetero- or homoscedastic. If our sample is homoscedastic, meaning there's constant variance in the error term, then we need not use robust standard errors in our regression else our regression will be biased. The opposite is true if our data is heteroscedastic; if our data is heteroskedastic, we have to use robust standard errors else our results will be biased. To test this, we use the heteroscedasticity test Breusch-Pagan / Cook-Weisberg.

3.9 Chapter Summary

The methods and econometric techniques used in the achievement of the goals of this study are discussed here in detail. Thus, the study provided insights on the research strategy, where the information/data for the study was acquired and the specification of the models. Finally, the instruments used to analyse the data were also explained.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Introduction

In line with the objectives of the study, the data analyses and findings of the study are presented in this chapter. The chapter describes the descriptive statistics of the variables used in the study. This is then followed by the correlation matrix which examines the correlation among the variables. Next, the findings from the regression results are analyzed and the chapter is then concluded.

4.2 Descriptive Statistics

Table 4.1 presents the summary statistics of the variables used in the study.

Beginning with return on assets (ROA), the mean rate over the period of 2006-2016 is 3.9 % which means the banks made 3.9% returns from their total assets invested. The average performance can be considered poor over the period with a maximum growth of 10.88% and a minimum of -4.5%. The standard deviation of 3% shows that the variation in the mean value is also small in the data, confirming that lower profits were earned from investments.

Table 4.1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max

ROA	109	.0390792	.0301252	-.044567	.108868
Credit risk	109	.0321284	.0329334	-.0110013	.1773175
Liquidiy risk	104	.0697772	.1356326	.006725	.635287
Capital adequacy	109	.1365996	.0599052	.027163	.395048
Operational risk	109	.2792924	.4064646	-3.195102	.7860032
Size	109	13.83012	1.07607	10.82353	15.89495
Inflation	109	13.38899	3.569867	8.6	18.1

The average value of non-performant loans in the event of loan danger was 3.2%, with a minimum of -1.1% and a maximum of 17.7%. The Standard 3.3 percent deviation also indicates that the value of loan danger in information varies less. The statistics indicate that the default among the borrower was small during the time span and confirm from research by Boahene et al.

The liquidity risk value averagely stood at 7% and this figure varied by about 13.5%. The average figure tells us that averagely the banks give out 7% of deposits as loans within the time period. The high standard deviation shows that liquidity risk varied widely among the banks. This is also seen in the wide gap between the highest value of 64% and the lowest of 0.7%. The low loan to deposit ratio posits that the banks depended on their own deposits for provision of loans without external borrowing, resulting in lower returns.

Average capital adequacy ratio also stood at 13.7% within the time period which is above the 8% threshold set by the Basel II accord, which means the banks have enough capital to meet its

risks levels. Thus they have enough capital to reasonably meet any financial uncertainty or put differently, they have enough capital to cushion against risk. The standard deviation was about 6% which is low comparatively but shows there's some variation in the data. The maximum and minimum values were also 40% and 2.7% respectively.

The operational risk was also 28% which means averagely, operational expenses accounted for about 28% of operational income, which is comparatively good. But this value varies by about 41% showing how wide the figure varies in the data and this highlights potential problems of rising costs for some banks. The maximum recorded was 78% and the minimum is -319%.

The average size of the banks, which was measured by taking the log of total assets was 13% and the standard deviation was 1% showing a small variation from the mean. The minimum and maximum values were 11% and 16%.

The average inflation for the period was also about 13% and it varied by 4% in the data. The highest recorded inflation was 18.1% and the lowest recorded was 8.6%.

4.3 Correlation Matrix

The table below presented the pairwise correlation matrix. Correlation shows the relationship between two variables. The correlation matrix is meant to examine the association between the variables used in the study.

Table 4.2: Correlation matrix

	ROA	Crisk	Liquitiy	cap	Op. risk	Size	inflation
ROA	1.0000						

Credit risk	-0.3694	1.0000					
Liquidity risk	0.1168	0.0321	1.0000				
Capital adequacy	0.4237	-0.0525	-0.0292	1.0000			
Operational risk	0.7151	-0.1974	0.0480	0.1841	1.0000		
Size	0.5305	0.1119	0.0695	0.0943	0.4618	1.0000	
Inflation	0.0275	0.1391	-0.0792	-0.1796	0.0484	0.2169	1.0000

(0 – 0.5 : weak; 0.5 – 1.0 : strong)

Following from the summary statistics, there is a weak positive correlation between ROA and liquidity, capital adequacy ratio and inflation, and a strongly positive relationship with operational risk and size. With regards to credit risk, the relationship with credit risk is weakly negative. The strong relationships may indicate multicollinearity in the data so the author checks for it. To check for multicollinearity, VIF test (Variance Inflation Factor) is conducted. The findings indicate that VIFs (see Table 4.5) are less than 4 (Gordon, 2015), and are useful for each of our factors. As the equivalent expressed in Hair, Anderson, Tatham & Black (2015), Kutner (2004) suggested 10 as a cut off. The mean VIF of our data is also 1.14 and less than 4, so we don't investigate further, but we can conclude enough that we don't have multi-colinear variables.

Credit is weakly correlated with liquidity risk, capital adequacy, operational risk, size, and inflation, albeit the relationship is negative in the case of operational risk and capital adequacy. Credit risk positively relates to liquidity as expected because when a bank has a high credit risk, its liquidity risk would also be high. Credit risk also positively affects size, albeit weakly, is

also expected because to expand the size of the bank, banks may make decisions that would lock off their credit in assets, which may increase their credit risk. Credit risk also weakly negatively affects capital adequacy which is expected because lower capital levels will increase the banks credit risk.

Liquidity risk also weakly positively affects operational risk, which is expected because a bank with liquidity constraints may have its operations being a contributing factor. Liquidity risk also weakly positively affects size as it is possible for banks to convert liquid assets into fixed assets to grow the bank, which in effect increases its liquidity risk.

As expected also, capital adequacy positively and weakly affects operational risk and size as a bank with sufficient capital adequacy may mean it growing in size which may possibly affect operational risks (due to size). Inflation also weakly negatively affects bank liquidity and its capital adequacy as expected. However, inflation positively, albeit weakly affects ROA, credit risk, operational risk, and size. The author suspects that this is so because banks are able to transfer the negative effects of inflation to consumers, thereby securing their returns (or profitability).

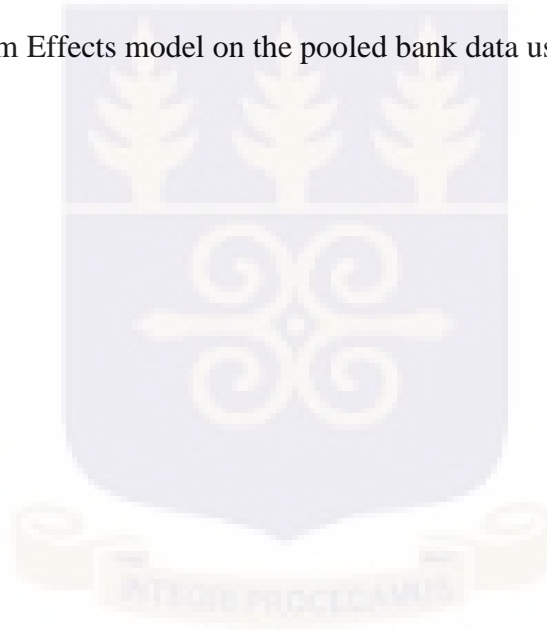
4.4 Regression Results

The regression findings are shown in the table below following the regression model estimated in chapter three. A Hausman test is carried out as an estimate test to determine whether the regression is suitable for a fixed effect or random effect model. The sample outcome showed a chi-four of 7.16 and a value of P of 0.30 after the Hausman test (see table 4.4), so the null hypothesis that the coefficient distinction is not systematically dismissed is not rejected. In this

situation, therefore, the random effect estimation model is adequate. The Breusch-Pagan / Cook-Weisberg heteroscedasticity test is also performed (see section 4.6). The probability of 0.0007 chi2 for the experiment indicates that the factors have no steady variances. Therefore solid defects in the regression estimate should be included as a check.

Three regression results are presented. They are;

1. Model one – OLS regression using the pooled bank data
2. Model two- Random Effects model using the pooled bank
3. Model three- Random Effects model on the pooled bank data using robust standard errors as a control check



The regression results are presented in the table below;

Table 4.3: Regression table

VARIABLES	(1) ROA	(2) ROA	(3) ROA
Credit risk	-0.292*** (0.0514)	-0.302*** (0.0489)	-0.302*** (0.0910)
Liquidity risk	0.0214* (0.0116)	-0.00449 (0.0151)	-0.00449 (0.00591)
Capital adequacy ratio	0.152*** (0.0266)	0.108*** (0.0263)	0.108*** (0.0386)

Operational risk	0.0326*** (0.00448)	0.0334*** (0.00398)	0.0334*** (0.0102)
Size	0.00904*** (0.00176)	0.00912*** (0.00190)	0.00912*** (0.00296)
Inflation	0.000371 (0.000467)	0.000118 (0.000414)	0.000118 (0.000285)
Constant	-0.113*** (0.0231)	-0.103*** (0.0246)	-0.103*** (0.0350)
Observations	104	104	104
R-squared	0.742	0.7562	0.7562
Wald Chi-square		289.61	232.21
Wald Chi square probability		0.0000	0.0000
Number of banks	10	10	10

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The findings are presented in Table 4.3. The R-squared for model 1, 2 and 3 are 74%, 75% and 75% respectively. The high R-square means about 75% of the variation in the dependent variables is explained by the independent variable. Thus the high R-square affirms the predictive power of the regression results. Also, the Wald chi2 probability for all models shows that the models have a strong overall significance or high predictive significance.

Credit risk is significant (at 1% significance level) in all three models. However, the coefficients are negative in all 3 models indicating credit risk has a negative effect on bank profitability (ROA). The coefficient of about -30% shows that when credit risk increases by 1%, bank profitability falls by about 30%. The poor performance over the period can be attributed to the large fall in profitability resulting from slight increase in default rate. When credit policies are not adhered to and single obligor rule is not met, this situation can result. Banks must comply with credit risk management strategies to improve performance, adopt internal lending policies and utilize credit mitigation tools like securitization, insurance and credit derivatives. The small standard error in all three models also shows that there is a little variation from this mean value.

This finding is expected and supported by other studies as high bank credit risk affects profitability (Kolapo et al., 2012).

Liquidity risk is significant at 10% significance level only on model 1. In model 2 and three, the results are not significant in this case. Therefore the finding or results are not statistically significant. Liquidity risk did not significantly affect profitability during the period of study. That is not to say banks should not adopt liquidity risk management processes, inability to meet contractual obligations especially on the part of depositors leads to loss of confidence ultimately resulting in low profitability. Hence, the need to adopt a robust liquidity risk framework.

Capital adequacy ratio is also significant in all models (1% in all three models). The coefficient is also positive in all three cases. The coefficient of about 10.8% tells us that when the capital adequacy ratio is improved by 1%, bank profitability increase by about 10%. The low performance recorded during the period shows that more capital was required to cushion the bank against risks; banks must maintain sufficient cash reserves in order to mitigate capital adequacy problems. The standard error also fell between 2 and 3% which is very small. Akhavein et al., (1997) supports the finding that capital adequacy is positively and significantly related to profitability.

Operational risk positively affects bank ROA and it is significant at 1% in models 1, 2 and 3. Thus based on the coefficient of 3%, a 1% increase in operational expense to operation income leads to bank profitability increasing by 3%. This figure tells us that the banks are somewhat efficient; thus their operational expenses do result in operational income, which is good for the banks. The standard errors are also small in all the models. However the marginal increase is low and this could account for the poor performance recorded by the banks over the period

under study. This relation could also signify that when operational risk is high management is on high alert, resulting in better operational risk management and this improves performance confirming the findings of Sewanyana (2015). Banks should focus on maintaining high levels of liquidity and capital adequacy in order to cushion themselves against operational risks. Upgrading of internal control systems is also crucial to detect attempted fraud and cushion banks against financial fraud.

Bank size also significantly and positively affects Bank profitability (ROA) at 1% significance level in all the 3 models. But the coefficients are very small in each case. Thus a 1% change in size would lead to bank profitability increasing by 0.9%. Banks with large size enjoy economies of scale, high bargaining power and have the muscle to finance large investments ultimately resulting in higher profitability. However the relatively low profitability over the period reflects a relatively small size of the banks recorded over the period. The standard error also falls between 0.1% and 0.2% in the models.

Inflation has a positive and insignificant effect on ROA. Also the coefficients in each of the variables are very small, close to zero, thus signalling that inflation does not really affect bank profitability. What explains this is the fact that the banks are able to push the negative effects of inflation on their customers, thus reducing the risks on the individual banks.

Therefore from the regression analysis, we see that banks profitability is significantly and positively affected by capital adequacy ratio, operational risk and size whilst negatively affecting bank credit risk.

4.5 Hausman Test Results

The selection of random effect model over the fixed effect was done based on the hypothesis testing. According to the results of the Hausman specification test, the efficiency of the random effect is preferred over the fixed effect.

Table 4.4: Results of the Hausman tests conducted

(b)	(B)	(b-B)	$\sqrt{\text{diag}(V_b - V_B)}$		
	fe	re	Difference	S.E.	
crisk	-.3167083	-.30209	-.0146182	.0124131	
loansadvan~s	-.0212769	-.0044948	-.0167822	.009135	
cap	.0942905	.1079299	-.0136394	.0069893	
operatingl~e	.0331909	.0334121	-.0002213	.0004347	
size	.0090705	.0091182	-.0000477	.0007229	
inflation	.0000263	.0001182	-.0000919	.0000476	

b = consistent under H_0 and H_a ; obtained from xtreg

B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg

Test: H_0 : difference in coefficients not systematic

$$\text{Chi2}(6) = (b-B)'[(V_b - V_B)^{-1}](b-B)$$

$$= 7.16$$

$$\text{Prob} > \text{chi2} = 0.3061$$

($V_b - V_B$ is not positive definite)

A random effects estimation model is appropriate since the P value for the test is more than 0.05. This means it is not significant so we fail to reject the null hypothesis and conclude that the difference in coefficients is not systematic.

4.6 Heteroscedasticity

This test checks if the standard errors are biased or not. A biased standard error indicates that the independent variables may be heteroscedastic. The null hypothesis is the variance of the errors is constant and the alternate hypothesis is the variance is not constant. We run the test for both models;

Breuch – Pagan / Cook – Weisberg test for heteroscedasticity

Ho: Constant variance

Variables: fitted values of roa

Chi2(1) = 11.50

Prob > chi2 = 0.0007

The P value is less than 0.05 which means it is significant so we reject the null hypothesis and conclude that the errors do not have a constant variance. To correct for this we have to use models with robust standard errors.

4.7 VIF test

The Variance Inflation Factor results are presented in the table below.

Table 4.5: VIF test results

Variable	VIF	1/VIF	
Operating risk	1.41	0.707470	
Size	1.41	0.711330	
Inflation	1.12	0.891094	
Crisk	1.11	0.896885	
Cap	1.08	0.924277	
Liquidity	1.02	0.980452	
Mean VIF	1.19		

The VIFs for each of the predictors were very low between 1.02 and 1.11. So far as the VIFs are less than 4, there is no evidence of multicollinearity in the data.

4.8 Conclusion

The chapter discusses the findings of the study in accordance with the objectives. The results of the correlation matrix and summary statistics and regression results have been discussed. According to the hausman specification test conducted, the efficiency of the random effect was selected. Capital adequacy ratio, operational risk and bank size have a positive and significant impact on ROA based on the random effect model results. But, credit risk showed a negative significant relationship. Liquidity risk and inflation were insignificant based on the regression test results.

CHAPTER FIVE

FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section concludes the study by presenting the salient findings of the research, concluding the study and making recommendations based on the findings.

5.2 Summary of Findings

The study sought to examine the effects of risk management on the profitability of universal banks in Ghana. Specifically the study sought to examine the effects of credit risk on the profitability of universal banks in Ghana, ascertain the influence of operational risk on the profitability of universal banks in Ghana, ascertain the effects of liquidity risk on the profitability of universal banks in Ghana, and assess the effect of capital adequacy on the profitability of universal banks in Ghana.

Ten banks were sampled over the period 2006 to 2016. The variables of interest were return on assets, credit risk, liquidity risk, operational risk, capital adequacy, size, and inflation.

Using a random effect model, and performing all pre-estimation tests, the study revealed that credit risk had a negative effect on bank profitability (return on assets). Liquidity did not have a statistically significant effect on bank profitability. On the other hand, capital adequacy ratio, bank size and operational risk all had a positive effect on bank profitability whilst inflation was statically insignificant.

5.3 Conclusion

A sound financial system is necessary for economic growth and development. For a financial system to be sound, a vibrant banking system needs to be present. Banks face numerous risks in their daily operations and the lack of adequate risk management processes hampers financial stability. This study looked at three different risks (credit, liquidity, operational) and capital adequacy and how they relate to profitability. Result from the study show that credit risk has a negative and significant relationship with performance signifying that slight increases in default rates can result in huge fall in performance. Capital adequacy and bank size impact performance positively, hence the need to maintain high levels of capital and increase bank size to enhance performance. A surprising result from the study showed that operational risk has a positive and significant relationship with performance; in this case weak internal systems, procedures and external events are exploited to rake in high returns. On the other hand a signal of high operational risk activity over a period prompts improved risk management strategies resulting in high profitability. Consequently, the above results show that bank performance is not limited to a single risk type but rather a complex combination of multiple risks. Thus while banks should be encouraged to increase levels of liquidity and capital by improving shareholders fund and customer deposits, default in borrowing and inadequate processes, procedures and systems must be eliminated. Essentially, a risk management strategy involving all the risk types should be developed to promote a resilient banking industry capable of withstanding unforeseen financial shocks.

5.4 Recommendation

As alluded to earlier, the findings shows that credit risk, capital adequacy ratio, operational risk, and size do have a statistically significant effect on bank profitability. Since banks need to make profit in order to continually exist, it is imperative for banks to seek after profits. To do this the banks need to make adjustments to reduce their credit risk. Credit rating bureaus may be very helpful in helping banks reduce their credit risks. Credit rating bureaus could help pre-warn banks by helping them avoid giving loan facilities to un-credit worth customers.

The banks should put in place good corporate governance measures that will allow for transparency and minimize fraud in the bank. Good governance would also reduce operational losses and help improve the internal structures of the bank.

The central bank, Bank of Ghana, should also regulate effectively the financial market so that banks can better operate in the market. The central bank can perform this supervisory role by establishing and enforcing good regulations, working in consultation with banks and helping the banks comply with the Basel Accords. This would provide a fair ground for banks to operate, and provide some protection to these banks who are market participants.

REFERENCES

- Agbada A.O & Osuji, C.C. (2013). The efficacy of risk management and firm performance in Nigeria. *International Review of Management and Business Research*, 2(1)
- Akhavain, J. D., Berger, A.N. & Humphrey, D.B. (1997). The effects of mega merger on efficiency and prices: Evidence from a bank profit function. *Review of Industrial Organization*, 12(1), 95-139
- Alhassan, A. L., Addisson, G. K., & Asamoah, M. E. (2015). Market structure, efficiency and profitability of insurance companies in Ghana. *International Journal of Emerging Markets*, 10(4), 648-669.
- Allan, I., & Olomi, D. R. (2003). Why MSMEs Have Limited Access to Bank Loans. *University of Dar es.*
- Allen, S. L. (2013). *Financial risk management: a practitioner's guide to managing market and credit risk*. Hoboken, NJ: Wiley.
- Anthony, M. & David, F. (1997). Financial Risk Management by Insurers: An Analysis of the Process. *The Journal of Risk and Insurance*, 64(2), 231-270.
- Baltagi, B. (2008). *Econometric analysis of panel data*. John Wiley & Sons.
- Barakat, A., & Hussainey, K. (2013). Bank governance, regulation, supervision, and risk reporting: Evidence from operational risk disclosures in European banks. *International Review of Financial Analysis*, 30, 254-273.
- Basel Committee on Banking Supervision (2000), Sound Practices for Managing Liquidity in Banking Organizations, *Bank for International Settlements*.
- Basel Committee on Banking Supervision (2006), The Management of Liquidity Risk in Financial Groups, *Bank for International Settlements*.
- Basel Committee on Banking Supervision (2008), Principles for Sound Liquidity Risk Management and Supervision, *Bank for International Settlements*.

Basel Committee on Banking Supervision (2010), Basel III: International Framework for Liquidity Risk Measurement, Standards and Monitoring. *Bank for International Settlements*.

Berger, A. N. (1995). The relationship between capital and earnings in banking. *Journal of money, credit and Banking*, 27(2), 432-456.

Bessis, J. (2009). Risk Management in Banking. *John Wiley & Sons Inc. Chichester*.

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*. Vol. 3, No.7, pp. 6 - 14

Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking & Finance*, 13(1), 65-79.

Chance, M. & Brooks, T.B. (2011). *An introduction to derivatives and risk management*, (8th ed.). South-Western: Cengage Learning.

Collier, P.M., & Agyei-Amponsah, S. (2006). *Management accounting: risk and control strategy*. Oxford: Elsevier. (CIMA Official Study System)

Creswell, J. W., & Poth, C. N. (2017). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Cruz, M., Coleman, R., & Salkin, G. (1998). Modelling and Measuring Operational Risk. *Journal of Risk*. (1), 63-72.

Dar, B. (2012). Implications of risk management practices on the financial performance of sugar manufacturing firms in Kenya. *International Journal of Arts and Humanities, AFRREVIJAH*, 1(1), 14-29.

DeBenedictis, L. F., & Giles, D. E. A. (1996). Testing the specification of regression models using Fourier approximations: the FRESET test. *mimeo*.

Deloitte, A. & Touche, B. (2012). Risk assessment in practice, Durham: Committee of Sponsoring Organizations of the Treadway Commission (COSO).

- Fernández, E., Gallus, S., Schiaffino, A., López-Nicolás, A., La Vecchia, C., Barros, H., & Townsend, J. (2004). Price and consumption of tobacco in Spain over the period 1965–2000. *European Journal of Cancer Prevention*, 13(3), 207-211.
- Goddard, J., Molyneux, P., & Wilson, J. O. (2004). The profitability of European banks: a cross-sectional and dynamic panel analysis. *The Manchester School*, 72(3), 363-381.
- Gordon, R.A. (2015). Regression Analysis for the Social Sciences. New York and London. Retrieved from [https:// stats.stackexchange.com/questions/34216/](https://stats.stackexchange.com/questions/34216/)
- Gray, B., Cassidy, C., & RBA (1997). Credit risk in banking : proceedings of a conference at *Financial Risk Management and the Profitability: An Empirical Evidence From Commercial Banks in Nigeria*
- Holton, G.A. (2013). *Value-at-Risk: Theory and Practice*, San Diego, California: Academic Press.
- Hair, J.F.Jr., Anderson,R.E., Tatham, R.L. & Black, W.C. (1995). *Multivariate Data Analysis* (3ed.) New York: Macmillan
- Harmantzis, C. F. (2004). Operational Risk Management in Financial Services and the New Basel Accord. Stevens Institute of Technology. Retrieved from <https://www.sgrn.com/abstract=579321>
- Hassan, M. K., & Bashir, A. H. M. (2003, December). Determinants of Islamic banking profitability. In *10th ERF annual conference, Morocco* (Vol. 7, pp. 2-31).
- Hussain, A., Ihsan, A., & Hussain, J. (2016). Risk Management and Bank Performance in Pakistan. *NUML International Journal of Business & Management*, 11(2), 68-80.
- Imbens, G. W., & Wooldridge, J. M. (2009). Recent developments in the econometrics of program evaluation. *Journal of economic literature*, 47(1), 5-86.
- Jiménez, G., & Saurina, J. (2006). Credit cycles, credit risk, and prudential regulation. *International Journal of Central Banking*, 2(2), 65-98.

Kamau, F., & Njeru, A. (2016). Effect of Liquidity Risk on Financial Performance of Insurance Companies Listed at the Nairobi Securities Exchange. *International Journal of Science and Research*, 867-872.

Kithinji, M. A. (2010). *Credit Risk Management and Profitability of Commercial Banks in Kenya*. School of Business, University of Nairobi.

Kolapo, T. F., Ayeni, R. k. and Oke, M. O. (2012). Credit risk and Commercial Banks Performance in Nigeria. *Australia Journal of Business and Management Research*. Vol 2, No. 02, pp. 31-38.

Konadu, J. S. (2009). *Liquidity and Profitability*. Empirical evidence from banks in Ghana. Kwame Nkrumah University of Science and Technology.

Kutner, N.N. (2004). *Applied Linear Regression Models*. 4th edition, McGraw-Hill Irwin

Lam, J. (2013). *Enterprise risk management: From incentives to controls*, Hoboken, New Jersey: Wiley.

Li, F., & Zou, Y. (2014). *Impact of Credit Risk Management on Profitability of Commercial Banks*. A study of Europe. Umea School of Business and Economics.

Lyambiko, R. M. (2015). *The Effect of Operational Risk Management Practices on The Financial Performance in Commercial Banks in Tanzania*. Master of Business Administration, School of Business University of Nairobi.

Makri, V., Tsagkanos, A., & Bellas, A. (2014). Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus*, 61(2), 193-206.

Marrison, C. (2012). *The fundamentals of risk measurement*, (New York: McGraw Hill).

Merritt, J. F. (2018). *The social world of early modern Westminster: Abbey, court and community 1525–1640*.

Michalak, T., & Uhde, A. (2009). Credit risk securitization and banking stability: Evidence from the micro-level for Europe. *Draft, University of Bochum, Bochum*.

- Mwangi, M. F. (2014). *The Effect of Liquidity Risk Management on Financial Performance of Commercial Banks in Kenya*. Master of Science in Finance, School of Business, University of Nairobi.
- Partnoy, F., & Skeel Jr, D. A. (2007). The promise and perils of credit derivatives, University of San Diego School of Law. *Legal Studies Research Paper*, (07-74).
- Res, I. J. A., Sa, K., & Gemechu, D. (2016). Risk management techniques and financial performance of insurance companies. *International Journal of Accounting Research*, 4(1), 1–5.
- Samad, A. (2004). Performance of Interest-free Islamic banks vis-à-vis Interest-based Conventional Banks of Bahrain. *International Journal of Economics, Management and Accounting*, 12(2).
- Saunders, M., Lewis, P., & Thornhill, A. (2009). Research methods for business students. Essex. *Financial Times/Prentice Hall*.
- Scutter, H. (2013). Key Risk Indicators. Conference on Operational Risk Management conducted at Karachi, India. Retrieved from <http://www.riskbusiness.com>
- Shao, Y., & Yeager, T. J. (2007). The effects of credit derivatives on US bank risk and return, capital and lending structure. *Unpublished working paper*.
- Sushil, S., & Bivab, N. (2013). Determinants of banks' liquidity risk, and their impact on the financial performance in Nepalese commercial banks. *Unpublished thesis, submitted to the Ace Institute of Management*, University of Pokhara.
- Short, B. K. (1979). The Relation between Commercial Bank Profit Rates and Banking Concentration in Canada, Western Europe, and Japan. *Journal of Banking & Finance*, 3 (3), 209–219.
- Tahir, I., & Razali, A. (2012). The relationship between enterprise risk management and firm value: Evidence from Malaysian public listed companies. *International Journal of Economics and Management*, 1(2), 32-41.

Torres-Reynia, O. (2007). *Panel Data Analysis: Fixed and Random Effects Using Stata*, Princeton University, available at <http://dss.princeton.edu/training/>

Van Horne, J. C., & Wachowicz, J. M. (2005). *Fundamentals of financial management*. Pearson Education.

Van Deventer, D.R., Imai, K., & Mesler, M. (2004). *Advanced financial risk management: tools and techniques for integrated credit and interest rate risk management*. Hoboken, NJ: John Wiley and Sons

Waweru, N., & Kalani, V. M. (2008). Commercial banking crises in Kenya: Causes and remedies. *Global journal of finance and banking issues*, 3(3).

Yimka, A. S., Taofeek, A., Abimbola, C., & Olusegun, A. (2015). Management and Financial Performance of Selected Commercial Banks in Nigeria. *Journal of Economic & Financial Studies*, 3(1), 1–9.

Yousfi, I. (2014). Risk Management Practices and Financial Performance in Jordan: Empirical Evidence from Islamic Banks. *International Shari'ah Research Academy for Islamic Finance*, 6(5), 1–24.

