EFFECT OF FINANCIAL RISK ON FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

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The effect of financial risk on financial performance of commercial banks in Kenya

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DECLARATION

This thesis is my original work and has not been presented for examination in any other University.

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DEDICATION

To Charles, Victor, David and Jesse for their moral support and prayers throughout the study.

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ABBREVIATIONS AND ACRONYMS

AMFI	Association of Microfinance Institutions of Kenya
BCBS	Basel Committee on Banking Supervision
CBK	Central Bank of Kenya
CRWAR	Capital to Risk Weighted Assets Ratio
FRM	Financial Risk Management
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
IMF	International Monetary Fund
KNBS	Kenya National Bureau of Statistics
OLS	Ordinary Least Squares
RAROC	Risk-Adjusted Return on Capital
ROA	Return on Assets
ROE	Return on Equity

DEFINITION OF TERMS

Credit risk is the exposure faced by banks when a borrower (customer) defaults in honouring debt obligations on due date or at maturity (Coyle, 2000). It is the possibility of losing the outstanding loan partially or totally, due to credit events.

Financial performance is a subjective measure of how well a bank can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation (Business Dictionary, 2011).

Financial risk is often defined as the unexpected variability or volatility of returns and thus includes credit risk, liquidity risk, and market risks (Holton, 2004).

Liquidity risk in commercial banks is defined as the risk of being unable either to meet their obligations to depositors or to fund increases in assets as they fall due without incurring unacceptable costs or losses (Ismail, 2010).

Market risk refers to the risk to an institution resulting from movements in market prices, in particular, changes in interest rates, foreign exchange rates, and equity and commodity prices. Form of market risk also arises where banks accept financial instruments exposed to market price volatility as collateral for loans (Worzala, 1995).

Operational risk is defined as all risks which would generate volatility in a bank's reserves, expenses and the value of its business (Commonwealth Bank of Australia, 1999) which is loss resulting from inadequate or failed internal processes, people and systems or from external events.

Return on Equity: ROE is a financial ratio that refers to how much profit a company earned compared to the total amount of shareholder equity invested or found on the balance sheet (Ongore & Kusa 2013).

ABSTRACT

Banking sector in Kenya is exposed to various risks which originate from both the internal and external environment. Banks financial viability and long-term sustainability are threatened by financial risk. Market risk, credit, liquidity and operational risks possess a major challenge despite growth in the sector. This study sought to explore the effect of financial risk on financial performance of commercial banks in Kenya. The quantitative research design was adopted in the study. The target population of this study was the 43 commercial banks licensed by CBK by December 2014. Time Series Cross Sectional unbalanced secondary panel data was anlysed. The data was obtained from published financial statements of accounts of all 43 commercial banks in Kenya, CBK, and the Banking survey publications for ten years from 2005 to 2014. The study used financial ratio analysis and panel data techniques of random effects, fixed effects estimation and generalized method of moments, GMM to purge time–invariant unobserved firm specific effects and to mitigate potential endogeneity problems. The pairwise correlations between the variables were carried out. Wald and F- tests were used to determine the significance of the regression while the coefficient of determination, overall, within and between R^2, were used to determine how much variation in dependent variable is explained by independent variables. Chow and Breusch and Pagan Lagrange multiplier (LM) tests were used to test whether the fixed effects model is better than pooled OLS model and the appropriateness of the random-effects model relative to the pooled OLS model respectively. The findings of the study indicated that credit, market, liquidity and operational risks have significant negative effect on return on equity. The component of financial risk that had the most impact on financial performance was cost to income ratio. The conclusion of the study was that there exist inverse relationship between financial risk and financial performance of Kenyan commercial banks. Hence the commercial banks together with the bank supervisors should make a trade-off between financial risk and financial performance.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Financial risk is the unexpected variability or volatility of returns (Holton, 2004). It includes credit, liquidity and market risks which contribute to the volatility of financial performance (Tafri et *al*., 2009 & Dimitropoulos *et al*., 2010). The hypothesis is that financial risk leads into failure of financial performance if it is not well managed. The financial crisis acquire unparalleled proportions and inflicted long-term damage on economies, countries and people. Every business decision and entrepreneurial act is connected with risk.

Many risks are common to all financial institutions. From banks to microfinance institutions, these include credit risk, liquidity risk, market or pricing risk, operational risk, compliance and legal risk, and strategic risk. Deregulation has been a main driving force of the trends in financial markets that have had a significant impact on risk management practices today. Since the 1970s the deregulation of capital flows has led to increased globalization (Sverrisson & Van Dijk, 2000); deregulation of industries has enabled the rapid expansion of new companies such as Enron (Bodily & Bruner, 2002; Bratton, 2003); and with the deregulation of financial operations new risks have been acquired with some banks offering insurance products and insurance companies writing market and credit derivatives (Broome and Markham, 2000).The business of a financial institution identify and manage financial risk.

When an organization has financial market exposure, there is a possibility of loss but also an opportunity for gain or profit. Financial market exposure may provide strategic or competitive benefits. The reasons for managing financial risk are the same as those for implementing a risk management, as financial risk is a subcategory of the company's risks. One of the main objectives is to reduce the volatility of earnings or cash flows due

to financial risk exposure (Dhanini *et al.*, 2007). The reduction enables the firm to perform better forecasts (Drogt & Goldberg, 2008). Furthermore this will help to assure that sufficient funds are available for investment and dividends. Another argument for managing financial risk is to avoid financial distress and the costs connected with it (Triantis, 2000; Drogt & Goldberg, 2008).

Credit Risk Management policies of a commercial bank comprise those decision-making structures associated with the reduction of exposures to credit asset classification and loan loss provisioning. According to BCBS (2003), management of bank risk relates to the minimization of the potential that a bank borrower or counter-party will fail to meet its obligations in accordance with agreed terms. Market risk encompasses the risk of financial loss resulting from movements in market prices.

Liquidity risk in commercial banks is defined as the risk of being unable either to meet their obligations to depositors or to fund increases in assets as they fall due without incurring unacceptable costs or losses (Ismail, 2010). Liquidity risk is the possibility of negative effects on the interests of owners, customers and other stakeholders of the financial institution resulting from the inability to meet current cash obligations in a timely and cost-efficient manner. Liquidity risk usually arises from management's inability to adequately anticipate and plan for changes in funding sources and cash needs (Ogol, 2011). Efficient liquidity management requires maintaining sufficient cash reserves on hand while also investing as many funds as possible to maximize earnings.

1.1.1 Financial risk

In the 1980's and early 1990's, several countries in developed, developing and transition economies experienced several banking crises requiring a major overhaul of their banking systems (IMF, 1998). As the banking sector continues to embrace innovations, the intensity and variety of risks that the players are exposed also continue to increase in tandem. To ensure that the growth in the banking sector does not jeopardize its stability, risk management is crucial.

A 1995 survey of major financial firms in Unites States of America (USA) revealed that at least 90% are using some form of financial engineering to manage market risks which are interest rates, foreign exchange or commodity price risks (Bodnar,*et al.*,1996). Although the types of risks confronting managers vary across industries, there is substantial commonality in the underlying rationale for the use of derivatives and the financial engineering techniques that are employed.

Global concerns about financial risk have been increasing. In this climate, firms of all kinds and sizes are looking to develop robust financial risk management frameworks that satisfy compliance demands, contribute to better decision making, and enhance performance. According to Mudge (2000) a consistent framework for evaluating firm wide risk and return across diverse financial activities is a key to evaluating the benefits of potential mergers among banking firms. Banks and other intermediaries can transfer the payment delays and the credit risk among producers, or between producers and outside investors (Demirguc-kunt &Huzinga, 2000).

Over-the-counter derivative markets rapidly overcame all others in notional size, but capitalization, on the global scale, decreased during this period, and by the early 1980s, some individual banks, if not national banking industries, had become highly vulnerable (Alexander, 2005). As a result, the supervision and regulation of banks and other financial firms has increased. In particular, capital adequacy requirements have been extended to cover more types of risks. The first Basel Accord in 1988 covered only credit risks in the banking book; the Basel 1 Amendment in 1996 extended this to market risks in the trading book; and the Basel 2 Accord, which was adopted by all G10 and many other countries in 2007, refines credit risk assessments to become more risk sensitive and extends the calculation of risk capital to include operational risks (Alexander, 2005).

Profit efficiency is sensitive to credit risk and insolvency risk but not to liquidity risk or to the mix of loan products (Linbo, 2004). Profitability of commercial banks is significantly associated with the degree of pre-crisis exposure and there is importance of

upgrading financial supervision and risk management practices as a precondition for successful financial liberalization (Hahm, 2004). Risk management does not only reduce earnings and cash flow volatilities, but also facilitates investors and regulators to evaluate and monitor firm performance and solvency risk (Eckles, Hoyt & Miller, 2014). The year 2008 financial crisis highlights that risk management is not only important to corporations but also to regulators and in the global economy as a whole. The topic of risk management has steadily moved up the agenda of both government and industry, to a level where it is more important than ever before (Lam, 2011).

Non-performing loans are increasing due to lack of risk management which threatens the profitability of banks (Archer and Karim, 2012). |Impaired asset ratios of smaller banks tend to be more variable than for the larger banks (Gizycki, 2001). Foreign banks with small assets bases within Australia experienced particularly high levels of impaired assets and low but variable profits between 1990 and 1992.

Although sub-Saharan Africa has witnessed a substantial improvement in informational efficiency, economic growth and, in some instances, political stability, managing financial risk for corporates on the continent still remains a high priority (Deloitte, 2013). Despite attempts to formalise and improve the local equity, interest rate and currency markets, progress is often slow in this region and is further hindered by legal, regulatory and other market factors. RMB Global Markets Research in March, 2013 reported that the illiquidity in these markets is exacerbated by the fact that banks are not willing to warehouse substantial illiquid risks, and there are almost no secondary markets to lay these off.

In the Brong Ahafo Region of Ghana, credit risk has an impact on the profitability of rural and community banks (Akotey *et al*., 2012. Credit risk management efficiency in Nigerian commercial banking sector from 2004 through 2009 provides some further insight into credit risk as profit enhancing mechanism (Onaolapo, 2012).

Banking sector in Kenya is exposed to various risks which originate from both the internal and external environment. Financial risk threaten their financial viability and long-term

sustainability. This study sought to explore the effect of financial risk on financial performance of commercial banks in Kenya. Risk is the potential that events, expected or unanticipated, may have an adverse impact on the institutions' capital and earnings. The role of risk management in financial firms has evolved far beyond the simple insurance of identified risks, to a discipline that centers on complex econometric and financial models of uncertainty. The banking sector is very important in respect of the financial allocation in the world due to its intermediation functions of transferring funds from surplus units to deficit units (Eken *et al.*, 2012; Ongore, 2013). In performing and sustaining these functions, good financial performance must be generated from which financial risk may not be avoided.

In Kenya, the topic of risk management has drawn much attention among various authors and scholars. In view of this, the CBK carried out a risk management survey on the Kenyan banking sector in September 2004. The survey's objective was to determine the needs of the local banking sector with regard to risk management. The survey was necessitated by the drive to fully adopt Risk Based Supervision and to incorporate the international risk management best practices envisioned in the 25 Basel Core Principles for Effective Banking Supervision. The survey culminated in the issuance of the Risk Management Guidelines (RMGs) in 2005 and the adoption of the Risk Based Supervision approach of supervising financial institutions in 2005. In response to this, commercial banks embarked upon an upgrading of their risk management and control systems (CBK, 2005).

In order to assess the adequacy and impact of the Risk Management Guidelines, RMGs, on Kenyan banking institutions, CBK issued risk management survey 2010. The goal of the CBK risk management survey 2010 was to determine whether the RMGs issued in 2005 have had any impact on the institutions and as to whether the RMGs are adequate, as well as establishing the necessary amendments and additions that needed to be introduced to ensure that the RMGs remained relevant, current and reflective of circumstances in the operating environment. Their finding was that generally the

institutions revealed that the Risk Management Guidelines issued in 2005 had, for the majority of them; enhanced risk-awareness and risk management at the institutions, increased the efficiency and effectiveness of risk management, helped reduce financial losses, led to the establishment of effective and better-resourced risk management functions, and enhanced the overall decision making processes in their institutions (CBK, 2010).

CBK moved to gradually raise bank capital levels by 2012 and to tightly monitor the operations of banks so as to ensure that Kenyan banks are more efficient in their operations while at the same time being profitable. CBK annual report (2013) showed that the banking sector registered enhanced performance during the period ended December 2013. The sector recorded a 16.6 percent growth in pre-tax profits during the year. Total net assets and total deposits recorded growth rates of 16.0 percent and 13.3 percent respectively. Despite the growth in the Kenyan banking sector, the sector still faces many challenges including stiff competition from MFIS, mortgage firms and SACCOs and competition over the last few years resulting from increased innovations in the market, specifically from the emergence of M-Payments and E-Payments (Maina & Muturi, 2013), coupled with adherence to the CBK stringent regulations.

However, CBK supervision annual report 2013 indicated that the ratio of non-performing loans to gross loans increased from 4.7 percent in December 2012 to 5.2 percent in December 2013. The increase in non-performing loans signaled an increase in credit risk which was largely attributable to the lag-effect of the high interest rates in the first half of 2012, and the slowdown in economic activities due to the general elections in March 2013. CBK closely monitored institutions experiencing deteriorating asset quality. Similarly, the sector's capital adequacy, which is measured by the ratio of Total Capital to Total Risk Weighted Assets, decreased from 23 percent in December 2012 to 21 percent in December 2013.

The bulk of the profits of commercial banks is not influenced by the amount of credit and non-performing loans only, implying that there are other variables (Kithinji, 2010). In addition, unrealized foreign exchange gains or losses had an effect on the Net Income of Kenyan listed companies (Gachua, 2011). Market, credit, operational and liquidity risks are the most frequent risks; whereas reputation and subsidy dependence occur at a very low incidence.

1.1.2 Bank size

The Market-Power hypothesis explains that the effect of a growing size on firms' profitability is significantly positive to a large extent (Athanasoglou *et al*., 2008). Larger firms are more efficient and profitable than smaller firms as a result of their superior efficiency as explained by relative efficiency hypothesis (Clarke, 1984).) Expansion of firm size may further separate ownership from control if the size has reached a threshold. Hence, the relationship between firm size and profitability can become negative beyond the threshold firm size (Fama & French, 2005) captured much of the cross-section of average stock returns. From the company's perspective, small firms apparently faced higher capital costs than larger firms.

This is included to control for the possibility that large banks are likely to have greater product and loan diversification. The impact of bank size on profitability is uncertain a prior for the fact that on the one hand, increased diversification implies less risk and hence a lower required return, and on the other hand, bank size takes into account differences brought about by size such as economies of scale. For large firms their size permits them to bargain more effectively, administer prices and in the end realize significant higher prices for the particular product (Agu, 1992). In most finance literature, total assets of the banks are used as a proxy for bank size

1.1.3 Financial Performance

Financial performance of an enterprise is the ability to leverage operational and investment decisions and strategies to achieve a business' financial stability. It is the

measure of an enterprise's achievement of its financial goals guided by its financial objectives and benchmarks. Banks, as the critical part of financial system, play an important role in contributing to a country's economic development. If the banking industry does not perform well, the effect to the economy could be huge and broad. Studies on performance of banking institutions are plenty. Results of these studies strongly suggest that bank profitability determinants vary across countries and also among regions of the world (Doliente, 2003). In accordance with the study of Grier (2007), profitability ratios are often used in a high esteem as the indicators of credit analysis in banks, since profitability is associated with the results of management performance.

Bank performance indicates bank's capacity to generate sustainable profits. Banks protect the profitability against unexpected losses, as it strengthens its capital position and improves future profitability through the investment of retained earnings. A bank that persistently makes a loss will ultimately deplete its capital base, which in turn puts equity and debt holders at risk. Inorder to create shareholder value, bank's return on equity (ROE) needs to be greater than its cost of equity.

Return on equity, ROE, and return on assets, ROA, are the most commonly used ratios, and the quality level of ROE is between 15% and 30%, for ROA is at least 1%. *Wong et al.*, (2008) indicated that the efficiency of banks can be measured by using the ROE which illustrates to what extent banks use reinvested income to generate future profits. According to Riksbank's Financial Stability Report (2002), the measurement of connecting profit to shareholder's equity is normally used to define the profitability in the banks. Jensen Investment Management (2008) mentioned that ROE provides a very useful gauge of profit generating efficiency because it measures how much earnings a company can get on the equity capital.

1.1.4 Commercial Banks in Kenya

According to CBK (2013) Supervision Report as of December 2013 out of the 43 commercial banks 29 of them are domestically owned and 14 are foreign owned. In terms

of asset holding, foreign banks account for about 34% of the banking assets as of 2013. The Kenyan financial system is dominated by commercial banks as financial intermediaries that act as conduits between the surplus economic units and the deficit economic units (Beck, Demirguc-Kunt & Levine, 2009). According to Rose (2002), a commercial bank is simply a business corporation organized for the purpose of maximizing the value of the shareholders' wealth invested in the firm at an acceptable level of risk. Obtaining a positive net income is imperative for permanency and sustainability.

Commercial banks are licensed and regulated pursuant to the provisions of the Banking Act and the Regulations and Prudential Guidelines issued thereunder. They are the dominant players in the Kenyan Banking system and closer attention is paid to them while conducting off-site and on-site surveillance to ensure that they are in compliance with the laws and regulations. The banking industry has been earmarked as a key pillar to the achievement of vision 2030 (a long-term strategy to achieve sustainable growth by year 2030) through increased savings, encouragement of Foreign Direct Investment (FDI), safeguarding the economy from external shocks as well as propelling Kenya to become a leading financial centre in Eastern and Southern Africa.

Government of Kenya statistics reported an alarming 45% annual average increase in number of economic crimes in year 2011. Banks in Kenya lost a staggering Kshs 1.7bn in the three months August to October 2010. Commercial banks lost Kshs 761Milion in the first six months of 2010 through fraud, according to the Central Bank of Kenya report in year 2011. The Government of Kenya earmarked the banking sector as one of the key pillars to the achievement of vision 2030. Within the Medium Term Plan (2008-2012) under vision 2030, some of the target areas include development of a safe and reliable payments system that will ensure smooth transfer and settlement of funds between customers and banks as well as between banks. Towards this end, the use of mobile phone networks, internet, payment cards, operational resilience and security will be pursued in order to increase trust, integrity and confidence in the ICT based payment systems

(Government of Kenya, 2008). In comparison with other East African economies, Kenya's banking sector has for many years been credited for its size and diversification. Private credit to GDP, a standard indicator of financial development, was 23.7% in 2008, compared to a median of 12.3% for Sub-Saharan Africa. Based on the same indicator Kenya is ahead of Tanzania which has 12.3% and Uganda with 7.2% (Beck, Demirguc-Kunt & Levine, 2009).

According to KPMG Africa banking survey (2012), the challenges facing the banking industry include new regulations which required banks and mortgage firms to build a minimum core capital of KES 1 billion (USD 11.9 million) by December 2012. The implementation of this requirement poses a challenge to some of the existing banks, and they were forced to merge in order to comply. The global financial crisis affected the banking industry in Kenya in regard to deposits mobilisation, reductions in trade volumes and the performance of assets.

1.2 Statement of the Problem

Commercial banks are predominant financial institutions and their changes in performance and structure have far reaching implications on the economy (Bohnstedt *et al.*, 2000). The very nature of the banking business is so sensitive because more than 85% of their liability is deposits from depositors (Saunders and Cornett, 2005).

The current challenges facing the financial services industry includes customer retention, financial risk, legal and compliance risk, strategic risk, technological risk and stiff competition from MFIS, mortgage firms and SACCOs. The problem facing Kenyan banking sector focused in this study was the effect of financial risk on the profitability. Kenyan banking being under the financial service sector still face many challenges with respect to management of risks which they are exposed to, despite the tremendous growth in the sector (CBK, 2011). Deterioration of asset quality relates to increase in credit risk which reduces the expected profits. For instance, according to CBK report in 2013 this growth has however been accompanied by an increase in non-performing loans from 4.7 % in 2012 to 5.2% in 2013. Market risk also emanates from the fluctuations of interest

rate and foreign exchange rate affect their returns since banks accept financial instruments exposed to market price volatility as collateral for loans. Liquidity risk arises due to mismatch of assets and liabilities as well as recessionary economic conditions. Operational risk which is paramount generates losses due to high costs which reduces the returns expected. Despite the significant 84% (36) of commercial banks in Kenya complying with risk management guidelines issued by CBK, 95% of commercial banks are concerned with risk (CBK, 2010). Also, despite the good overall financial performance of banks in Kenya, there are a couple of banks declaring losses (Oloo, 2011). A number of research studies in Kenya have attempted to address the issues of financial risk which have been studied in piece meal manner. They have addressed the different components of financial risk individually. For instance, Fredrick (2012), Kargi (2011), and Kithinji (2010) and researched on credit risk while Abid and Mseddi (2004), Gatsi *et al*., (2013), Nimalathasan *et al*., (2012) and Wachiaya (2011) studied on market risk. Akhtar (2011), Said (2014) and Ogol (2011) studied on liquidity risk. By tackling the risks individually these studies fail to acknowledge the effect of financial risk on the financial performance. Thus the need to take a comprehensive view.

Moreover, this study also introduced bank size as appropriate moderating variable and also employment of GMM making the methodology more superior from prior studies. Said *et al*., (2008); Awojobi (2011) and Al Karim *et al.*, (2013) studied the effect of bank size on financial performance of banks where their results are contradicting. Bank size as a moderating variable has hitherto not been addressed in the previous studies done in Kenya. Therefore, there was a need to investigate the moderating effect of bank size on financial risk and the financial performance of commercial banks in Kenya.

1.3 Research Objectives

1.3.1 General Objective

The main objective of this study was to determine the effect of financial risk on the financial performance of commercial banks in Kenya.

1.3.2 Specific Objectives

This study was guided by the following objectives:

1. To determine the extent to which the credit risk affects the financial performance of commercial banks in Kenya
2. To determine the extent to which the market risk affects the financial performance of commercial banks in Kenya
3. To determine the effect of liquidity risk on the financial performance of commercial banks in Kenya
4. To determine the effect of operational risk on the financial performance of commercial banks in Kenya

5. To establish the moderating effect of bank size on the relationship between the financial risk and financial performance of commercial banks in Kenya.

1.4 Research Hypotheses

The study sought to test the following hypotheses:

1. Credit risk has a significant negative effect on the financial performance of commercial banks in Kenya
2. Market risk has a significant negative effect on the financial performance of commercial banks in Kenya
3. Liquidity risk has a significant negative effect on the financial performance of commercial banks in Kenya
4. Operational risk has a significant negative effect on the financial performance of commercial banks in Kenya
5. Bank size has a significant moderating effect on the on the relationship between the financial risk and financial performance of commercial banks in Kenya.

1.5 Significance of the Study

Generally, financial institutions are expected to manage their financial risk to avoid exposing themselves to unnecessarily high levels of risk and subsequently a decline in performance. The very nature of the banking business is so sensitive because more than 85% of their liability is deposits from depositors. Financial institutions use these deposits to generate credit for their borrowers, which in fact are a core revenue generating activity for most financial institutions. The present possibilities for financial institutions to diversify into broader range of services and products have been necessitated by competition as they look out for a large clientele base. But this diversification advantage is once in a lifetime opportunity that should be consumed with some caution and prudence as this involves being exposed to a great deal of financial risk. Financial risk is an issue of concern in financial institutions today and there is need to develop improved processes and systems to deliver better visibility into future performance.

There have been controversies among researchers on the effect of financial risk on the financial performance. Good selection strategy for risk monitoring is adopted by the credit unions implies good pricing of the products in line with the estimated risk which greatly affect their profitability. The principal concern of this study is to ascertain the effect of various financial risks on the balance sheets. While the previous research outcomes provide valuable insights in various risk management techniques. This study therefore sought to fill this gap by investigating the effect of financial risk on the financial performance of commercial banks in Kenya.

The question of financial risk and common exposures are clearly of enormous importance for regulators, industry participants and investors. The study will have great benefit to the government and regulatory bodies. It will help the regulators to understand the scope to financial risks and how to strengthen the systems in the financial industry in terms of policies to determine the adequacy of the risk management provided for by the regulator.

The study is also be of great benefit to oversight boards, senior management and investors of financial institutions in Kenya. The managers in all commercial banks will clearly understand more on impact of financial risk on the financial performance of commercial banks in Kenya. They will have the advantage of applying the recommendations made on the study and engage the relevant stakeholder to determine whether to mitigate financial risk in a bid to maximize returns. These research findings will help in addressing the existing knowledge gap in literature of financial risk affecting financial performance of institutions in Kenya.

1.6 Scope of the Study

The conceptual scope of this study lies on the effect of financial risk on the financial performance of commercial banks. The specific context of the study was the commercial banks institutions in Kenya. This study was limited to commercial banks in Kenya where special focus was on the commercial banks and information provided to Central Bank. The study population constituted of all the commercial banks registered and operational in year 2014. The census study was employed. Secondary data analysed is time series and cross-sectional which was obtained from financial annual reports of commercial banks and CBK publications. Data collection was carried out in a period of three months starting July to October 2015.

1.7 Limitation of the study

The results of this study largely depend on secondary information analyses. Therefore the study results are subjected to the limitations of the bank's financial statements as reported to the general public which were under custody of CBK Supervision Department. The data available was only for the period year 2005 to 2014. The study had limitation of not having access to data as targeted and hence the unbalanced panel data was obtained.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews theoretical and empirical literature on financial risk. It develops a conceptual framework, concludes by critiquing the existing and expounds on the research gaps on the effect of financial risk on the financial performance of commercial banks.

2.2 Theoretical Literature Review

A theory is a contemplative and rational type of abstract or generalizing thinking, or the results of such thinking. It is a coherent group of tested general propositions, commonly regarded as correct, that can be used as principles of explanation and prediction for a class of phenomena (Kombo & Tromp, 2009). A theoretical framework is a collection of interrelated concepts, like a theory but not necessarily so well worked-out. According to Trochim (2006), a theoretical framework guides research, determining what variables to measure, and what statistical relationships to look for in the context of the problems under study. Theoretical frameworks are obviously critical in deductive, theory-testing sorts of studies. A theoretical framework is used by scientists when performing research studies to formulate a theory. The theoretical framework is a foundation for the parameters, or boundaries, of a study.

The study anchored its variables on three theories namely: (i) Finance distress theory which is linked with the credit and liquidity risks, (ii) Shiftability Theory is linked with liquidity risks and (iii) Extreme value theory which is linked with market risks.

2.2.1 Finance distress theory

Baldwin and Scott (1983) purported that when a firm's business deteriorates to the point where it cannot meet its financial obligation, the firm is said to have entered the state of financial distress. The first signals of financial distress are violations of debt payments

and failure or reduction of dividends payouts. Whitaker (1999) defines entry in financial distress as the first year in which cashflows are less than current maturities' long-term debt. The firm has enough to pay its creditors as long as the cashflows exceeds the current debt obligations. The key factor in identifying firms in financial distress is their inability to meet contractual debt obligations.

However, substantial financial distress effects are incurred well prior to default. Wruck (1990) stated that firms enter into financial distress as a result of economic distress, declines in their performance and poor management especially on risks. Boritz (1991) depicts a process of a financial distress that begins with an incubation period characterized by a set of bad economic conditions and poor management which commits costly mistakes. In the case of commercial banks, in ability to provide cash to depositors and loans to borrowers as and when the demand may constitute a liquidity crisis. Other creditors also need to be taken into account when firms are putting in place risk management measures. Credit risks in banks also need to be addressed since it may lead to financial distress. Loan portfolio management is an important determinant of the firm's liquidity. The banks should manage the credit and liquidity risk in order to avoid the financial distress.

The theory of financial distress emanates from the liquidity and credit risk facing a firm. This theory provides for a non-biased perspective on the relationship between credit risk and financial performance variables employed by the study. By providing information that the effects of financial distress occurs prior default risk, the theory offers a neutral platform to undertake an incisive empirical analysis of this relationship within the commercial banks.

2.2.2 Shiftability Theory of Liquidity

Formally developed by Harold G, Moulton in 1915, the shiftability theory held that banks could most effectively protect themselves against massive deposit withdrawals by holding, as a form of liquidity reserve, credit instruments for which there existed a ready

secondary market. The theory is based on the proportion that banks liquidity is maintained if it holds assets that could be shifted or sold to other lenders or investors for cash. Also, these assets could be shifted to the Central Bank for cash without material loss in case of necessity than relying on maturities to solve their liquidity problems (Ngwu, 2006). This theory posits that a bank's liquidity is maintained if it holds assets that could be shifted or sold to other lenders or investors for cash. This point of view contends that a bank's liquidity could be enhanced if it always has assets to sell and provided the Central Bank and the discount market stands ready to purchase the asset offered for discount. Thus this theory recognizes and contends that shiftability, marketability or transferability of a bank's assets is a basis for ensuring liquidity. This theory further contends that highly marketable security held by a bank is an excellent source of liquidity. Dodds (1982) contends that to ensure convertibility without delay and appreciable loss, such assets must meet three requisites.

According to Dodds (1982), liquidity management theory consists of the activities involved in obtaining funds from depositors and other creditors and determining the appropriate mix of funds for a particularly bank. Liquidity theory has been subjected to critical review by various authors. The general consensus is that during the period of distress, a bank may find it difficult to obtain the desired liquidity since the confidence of the market may have seriously affected and credit worthiness would invariably be lacking. However, for a healthy bank, the liabilities constitute an important source of liquidity.

The liquidity shiftability theory provides for explicit understanding of how the liquidity risk affects the financial performance using liquidity coverage and net stable funding ratios as stated by new Basel III framework. The analysis of this study provides the information as to whether liquidity maintained by the commercial banks affect the returns to the shareholders.

2.2.3 Extreme Value Theory

In 1709, Bernoulli discussed the mean largest distance from the origin when n points lie at random on a straight line of length (Johnson *et al*., 1995). A century later Fourier stated that, in the Gaussian case, the probability of a deviation being more than three times the square root of two standard deviations from the mean is about 1 in 50,000, and consequently could be omitted (Kinnison, 1985).The financial institutions with significant amounts of trading activity proved to be very vulnerable to extreme market movements and, in time, the measurement of market risk became a primary concern for regulators and also for internal risk control. This calls for indicators showing the risk exposure of firms and the effect of risk reducing measures. Value-at-Risk (VaR) has been established as a standard tool among financial institutions to depict the downside risk of a market portfolio. It measures the maximum loss of the portfolio value that will occur over some period at some specific confidence level due to risky market factors (Jorion, 1997). Banks and bank holding companies with an important trading portfolio are subject to market risk requirements. They have been required to hold capital against their defined market risk exposures, and, the necessary capital is a function of banks' own risk estimates.

As a result, several alternative methods have been proposed for estimating VaR, one of which being the Extreme Value Theory (EVT). EVT methods make VaR estimations based only on the data in the tails as opposed to fitting the entire distribution and can make separate estimations for left and right tails (Diebold *et al*., 2000). Proper estimation of VaR is necessary in that it needs to accurately capture the level of risk exposure that the firm is exposed to, but if it overestimates the risk level, then the firm will set unnecessarily set aside excess capital to cover the risk, when that capital could have been better invested elsewhere (Hull, 2012).

Extreme value theory helps in determining the minimum and the maximum capital that should be set aside to cover the market risks. To achieve this goal the banks need to manage the market risk by managing the financial leverage.

2.3 Conceptual Framework

A conceptual framework is a research tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny and to communicate it. When clearly articulated, a conceptual framework has potential usefulness as a tool to assist a researcher to make meaning of subsequent findings. It forms part of the agenda for negotiation to be scrutinized, tested, reviewed and reformed as a result of investigation and it explains the possible connections between the variables (Smith, 2004).

To guide the study, the interrelationship between variables discussed above were presented in the conceptual framework model shown in Fig. 2.1.

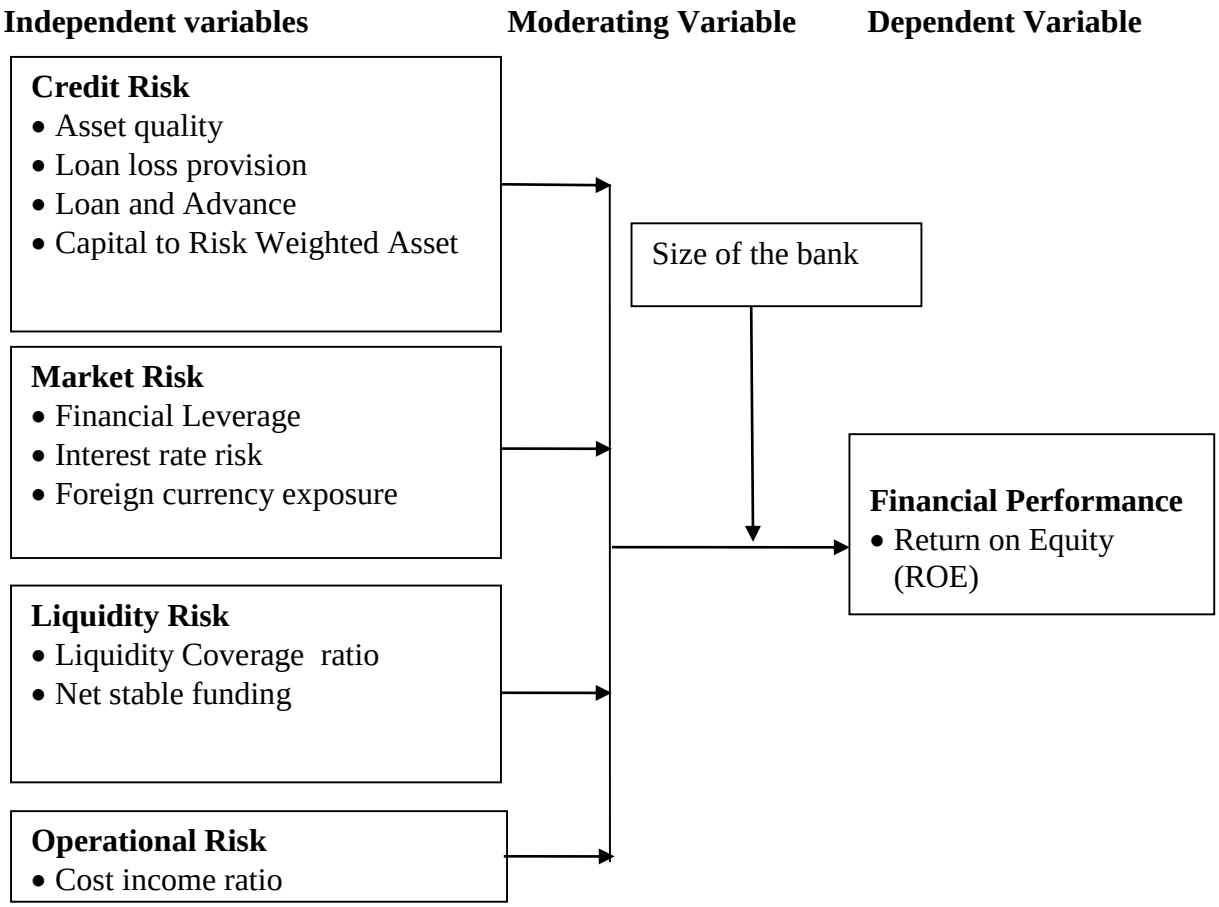

Figure 2.1: Conceptual framework

ROE was used as a dependent variable as it measures the return on shareholders' investment in the banks. This study also explored various parameters pertinent to financial risk as it affect commercial banks' financial performance. Capital to total risk weighted assets measure is used to determine a bank's capital sufficiency in relation to its risk. The ratio of Total Capital to Total Risk Weighted Assets (TRWA) and the ratio of Core Capital to Total Risk Weighted Assets are the risk sensitive measures of capital that are used (Nasieku *et al*., 2013). The minimum regulatory requirement is 12.0%and 8.0% respectively. Other indicators of credit risk that were covered in the study are asset quality ratio, loss loan provision ratio and loan and advances ratio.

Market risk which comprises of exchange rate and interest rate risks also affect the financial performance of banks. Usually, Market risks are outside the control of the banks, as they are determine by factors that affect the overall economy (Aruwa and Musa, 2014). Degree of financial leverage (DFL) is best used to help a company determine an appropriate amount of debt, and how that debt will affect its operating income. It is expected that the higher the DFL, the higher the financial risk. Foreign exchange risk and interest rate risk was used as indicators of market risk. The study captured the effect of interest rate as a measure of market risk since a change in interest rate could lead to a mismatch between interest paid on deposit and the interest received on loans. The interest rate risk is proxied by Net Interest Margin (log of NIM), and it is adjusted for change in interest rate. Foreign exchange risk manifested by exposure, the degree to which a company performance is affected by exchange rate changes. Foreign exchange risk was measured using the ratio of net foreign currency exposure between assets and liabilities to total assets. Liquidity coverage ratio and Net Stable Funding were employed as the indicators of liquidity risk as developed by Basel III. The natural logarithm of assets was used as a measure of bank size.

2.4 Empirical Literature Review

Financial institutions are faced with critical challenges of finding new and better ways to increase top-line revenues, maintaining necessary capital ratios, improving margins,

strengthening balance sheets and enhancing efficiencies within the organization. Financial risk management has received increased attention over the past years (Fatemi and Glaum, 2000). Financial risks, though they are not a core competency of non-financial firms, also influence their business operations to a large extend (Triantis, 2000). Financial risks can be of different forms. On the one hand there are external financial risks depending on changes on financial markets. On the other hand there are internal financial risks, where the company itself is the source of the risks (Eichhorn, 2004). The reasons for managing financial risk are the same as those for implementing a risk management, as financial risks are a subcategory of the company's risks. One of the main objectives is to reduce the volatility of earnings or cash flows due to financial risk exposure (Dhanani *et al*., 2007).

Commercial banks therefore employ financial risk management practices whose objective is not to prohibit or prevent risk taking activity, but to ensure that the risks are consciously taken with full knowledge, clear purpose and understanding so that it can be measured and mitigated. Allen (2003) found out that corporate financial risk management seeks to manage a companies' exposure to currencies, interest rates, energy, commodities and other factors driven by the financial market. It should be viewed as an ongoing process that continually evolves with the companies as it encounters new and unforeseen risks. However, in reality, many companies that have identified various risks in their businesses do not have formal risk policies or strategies in place to manage these risks within a corporate approved process (Baldoni, 2001 and Jalilvand *et al*., 2000).

Companies would benefit from a process that is woven into their overall business strategies and management process. When doing business, constantly decisions, where the outcomes cannot be foreseen with certainty due to incomplete information, have to be made (Stroeder, 2008). This uncertainty connected with every kind of business activity is risks. Risk management can add value to the firm when market imperfections like progressive taxing of the company, expected costs of financial distress or agency problems are present (Oosterhof, 2001). Therefore risk management is a responsibility of every stakeholder. Financial risks are also managed to avoid financial distress and the costs

connected with it (Triantis, 2000 and Drogt *et al.*, 2008). Managerial self-interest of stabilizing earnings or keeping constant tax level can be motives for financial risk management (Dhanini *et al.*, 2007. It is a focus of financial risk management to minimize volatility or avoid large losses.

2.4.1 Financial Risk and Financial Performance

Financial risk includes credit risk, liquidity risk, and market risk, which, together, contribute to the volatility of financial performance (Tafri *et al*., 2009; Dimitropoulos *et al*., 2010). Credit risk is the main financial risk that hinders the performance of banks, especially in Africa. This is the risk of the varying net worth of the assets due to the failure of the contractual debt of the counter party to meet the obligation (Pyle, 1999).

Interest rate risk is the risk of lending or deposit interest rate fluctuation (Dimitropoulos *et al*., 2010). When the commercial bank lending interest rate is less than the deposit rate, or when the lending interest rate of the bank is greater than the market rate, or the deposit interest rate is less than the market rate, banks may face interest rate risk. The exchange rate risk is associated with depreciation in the local currency, an increase in prices and a decrease in output (Berument and Dincer, 2004). When a bank fails to put a fair price on currency when it sells and buys foreign currency or when foreign currency depreciates its value continuously the bank faces an exchange rate loss.

Profitability offers information about the ability of the bank to undertake risks and to expand its activity. The main indicators used in the appreciation of the bank profitability are return on equity, ROE (Net income / Average Equity), return on asset, ROA (Net income /Total assets) and the indicator of financial leverage or (Equity / Total Assets) (Dardac and Barbu, 2005). A commonly used measure of bank performance is the level of bank profits (Ceylan, Emre and Asl, 2008). Bank profitability can be measured by the return on a bank's assets (ROA), a ratio of a bank's profits to its total assets. The income statements of commercial banks report profits before and after taxes. Another good measure on bank performance is the ratio of pre-tax profits to equity (ROE) rather than

total assets since banks with higher equity ratio should also have a higher return on assets (Ceylan, Emre and Asl, 2008). The continued viability of a bank depends on its ability to earn an adequate return on its assets and capital. The evaluation of earnings performance relies heavily upon comparison on the key profitability measures, such as return on assets and return on equity, to industry bench mark and peer group norms (Duca and McLaughlin (1990).

Banking institution's capital can be seen as the amount contributed by the owners of the institution (paid-up share capital) that gives them the right to enjoy all the future earnings of the bank. More comprehensively, it can also be seen as the amount of owners' funds available to support a bank's business (Athanasoglou *et al*., 2005). The later definition includes reserves, and is also termed total shareholders' funds. No matter the definition adopted, a bank's capital is widely used to analyze the status of its financial strength (Bobakova, 2003). Positive correlation between returns and capital has been demonstrated by Naceur (2003) and Kwan and Eisenbeis (2005). Investigating the determinants of Tunisian banks' performances during the period 1980-1995, Naceur and Goaied (2003) indicated that the best performing banks are those who have struggled to improve labour and capital productivity and those who have been able to reinforce their equity.

Naceur (2003) agree that well-capitalized banks face lower need to external funding and lower bankruptcy and funding costs; and this advantage translates into better profitability. Therefore, researchers widely posit that the more capital a financial institution has, the more resistant it will be to. If portfolio quality is poor or efficiency is low for example, this is reflected in profitability.

The solvency of financial institutions is typically at risk when their assets become impaired, so it is important to monitor indicators of the quality of their assets in terms of overexposure to specific risks trends in non-performing loans and the health and profitability of bank borrowers. Credit risk is inherent in lending which is the major banking business. It arises when a borrower defaults on the loan payment agreement. A

financial institution whose borrower defaults on their payment may face cash flow problems, which eventually affects its liquidity position. Given the importance of risk management in an organisation's functioning, the efficiency of an organisation's risk management is expected to significantly influence its financial performance (Haron and Hockn 2007). An extensive body of literature (Tummala and Burchett, 1999), argues that risk management matters for financial performance of firms. According to Parrenas (2005), risk management is an important function of financial institutions in creating value for shareholders and customers.

Tafri *et al.,* (2009) examined the relationship between financial risk and profitability of the conventional and Islamic banks in Malaysia for the period between 1996 and 2005. The components of financial risk comprised of credit risk, interest rate risk and liquidity risks. The study employed panel data regression analysis of Generalized Least Squares of fixed effects and random effects models and found that credit risk has a significant impact on profitability of the conventional as well as the Islamic banks. The relationship between interest rate risk and ROE were found to be weakly significant for the conventional banks and insignificant for the Islamic banks. The effect of interest rate risk on ROA is significant for the conventional banks. Also liquidity risk to have an insignificant impact on profitability.

Lake (2013) examined the impact of financial risk on the profitability of commercial banks for a total of eight commercial banks in Ethiopia, covering the period of 2000-2011. The quantitative part of analysis was carried out by ordinary least square (OLS) method. The findings of the study showed that credit risk and liquidity risk have a negative and statistically significant relationship with banks' profitability. However, the relationship for interest rate risk and foreign exchange rate risk is found to be statistically insignificant.

Aruwa and Musa (2014) examined the effects of the various risk components like credit risk, interest rate risk and operational risk on the financial performance of Deposit Money Banks in Nigeria. The study used the whole number of banks that have existed in Nigeria

from the year 1997 to 2011. The data was analysed using descriptive statistic and ordinary least square regression. In this study the researchers established that a strong relationship exists between risk components and the financial performance of the banks in Nigeria as was indicated by the r-squared value of 91%. However, variables that represent credit risk and the rate of capital to total weighted risk asset have positive relationship. Operational and interest rate risk affects the profitability of the banks negatively. This research covered a wider range of risks that are encountered in financial institutions.

Amin *et al.*, (2014) examined the simultaneous influence of the financial risk and financial performance of commercial banks in Tanzania. In their study the financial performance under consideration was return on assets and return on equity, while financial risk was the average of financial risks. The study employed the instrumental variable regression of fixed effect to solve simultaneous equations by two-stage least squares. By using unbalanced panel data of 21 banks from 2003 to 2012, their results showed that by applying both ROA and ROE in the performance equation, financial risk is significant. The findings were that there was inverse relation of financial risk and financial performance cannot be avoided and the commercial banks together with the bank supervisors should make a trade-off between risk and financial performance.

Al-Tamimi *et al.*, (2015) examined the relationship between financial risk and performance of Gulf Cooperation Council Islamic banks and the relative importance of the most common types of risk. The study covered 11 of the 47 Islamic banks of the Gulf Cooperation Council region from 2000 to 2012. Data was obtained from the Bank scope database. ROA and ROE were used as measures for bank performance. Four types of financial risk were used, namely credit risk, liquidity risk, operational risk, and capital risk. Regression analysis indicated that there exists a significant negative relationship between the Gulf Cooperation Council Islamic banks' performance, capital risk and operational risk. The results also confirm a significant negative relationship between Gulf Cooperation Council Islamic banks' performance. Capital risk was the most important type of risk and then followed by operational risk.

2.4.2 Credit Risk and Financial Performance

The main purpose of a bank existence is to accept deposits as well as to grant credit facilities, therefore inevitably exposed to credit risk. Credit risk is the most significant risk faced by banks and the success of their business depends on accurate measurement and efficient management of this risk to a greater extent than any other risks (Gieseche, 2004).

Hosna *et al*., (2009) studied the relationship between non-performing loan and capital adequacy ratios and profitability for four Swedish banks covering a period of 2000 to 2008. The study showed that rate of non-performing loan and capital adequacy ratios was inversely related to ROE though the degrees vary from one bank to the other. Such inverse relationships between profitability, performance and credit risk measures were also found in other studies (Achou & Tenguh, 2008; Kolapo *et al*., 2012; Musyoki & Kadubo 2011; and Tomak, 2013) conducted study on the *Determinants of Bank's Lending Behavior of commercial banks in Turkish* for a sample of eighteen from 25 banks. The main objective of the study was to identify the determinants of bank`s lending behavior. The data was covered 2003 to 2012 periods. The variables used were size, access to long term funds, interest rates, GDP growth rate and inflation rate. The finding reveals that bank size, access to long term loan and inflation rate have significant positive impact on the bank`s lending behavior but, interest rates and GDP are insignificant.

Kithinji (2010) analyzed the effect of credit risk measured by the ratio of loans and advances on total assets and the ratio of non-performing loans to total loans and advances on return on total asset in Kenyan banks from 2004 to 2008. The study found that the bulk of the profits of commercial banks is not influenced by the amount of credit and non-performing loans. Kithinji urged that on average the profits of the banking industry increased during the period 2004 to 2008. However profitability of the commercial banks fluctuated during the period but on average increased marginally during the period 2004 to 2008. The profits were generally low during the period of study. The amount of credit extended to customers was relatively high but assumed a downward trend during the

period. Whereas the level of credit and profits were relatively low and stable, the amount of credit was high and relatively volatile. Kithinji result provides the rationale to consider other variables that could impact on bank's performance and also a longer period of the study so as to capture the real picture of the banks' performance. Hence this study included the impact of liquidity, market risk and operational risk as components of the financial risk.

Afriyie (2011) examined the impact of credit risk on the profitability of rural and community banks in the Brong Ahafo Region of Ghana. The study used the financial statements of ten rural banks from the period of 2006 to 2010 (five years) for analysis. The panel regression model was employed for the estimation. In the model, of Return on Equity (ROE) and Return on Asset (ROA) were used as profitability indicator while Non-Performing Loans Ratio (NLPR) and Capital Adequacy Ratio (CAR) as credit risk management indicators. The findings indicated a significant positive relationship between non-performing loans and rural banks' profitability revealing that, there are higher loan losses but banks still earn profit. He found that there is a relationship between the credit risk management and profitability of selected rural banks in Ghana. Rural banks with higher capital adequacy ratio can better advance more loans and absorb credit losses whenever they crop up and therefore record better profitability. Afriyie and Ogboi (2011) results concur in that there is a relationship between the credit risk management and profitability. However, there are other factors that can affect the financial performance of banks especially in rural areas. In rural areas there factors such as low level of income, accessibility of the formal financial and also lack of information or awareness. Most of the banks that perform well have their head office in urban areas and research could have given better results if all the banks were represented.

Kargi (2011) evaluated the impact of credit risk on the profitability of Nigerian banks. Financial ratios as measures of bank performance and credit risk were collected from the annual reports and accounts of sampled banks from 2004-2008 and analyzed using descriptive, correlation and regression techniques. The findings revealed that credit risk

management has a significant impact on the profitability of Nigerian banks. It concluded that banks' profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress.

Kolapo *et al.,* (2012) using panel model approach carried out an empirical investigation into the quantitative effect of credit risk on the performance of commercial banks in Nigeria over the period of 11 years (2000-2010). The traditional profit theory was employed to formulate profit, measured by Return on Asset (ROA), as a function of the ratio of Non-performing loan to loan and advances (NPL/LA), ratio of Total loan and Advances to Total deposit (LA/TD) and the ratio of loan loss provision to classified loans (LLP/CL) as measures of credit risk. Five commercial banking firms were selected on a cross sectional basis for eleven years. Panel model analysis was used to estimate the determinants of the profit function. The results showed that the effect of credit risk on bank performance measured by the Return on Assets of banks is cross-sectional invariant. Their findings show that profitability is reduced by increase of non-performing loan and loan loss provision and that the effect of credit risk is similar across banks all banks considered in the study. However, an increase in total loan and advances increase the profitability.

Poudel (2012) explored various parameters pertinent to credit risk management as it affect banks' financial performance in Napel. Parameters covered in his study were such as default rate, cost per loan assets and capital adequacy ratio. Financial report of 31 banks were used to analyze secondary data for eleven years from 2001 to 2011 by comparing the profitability ratio to default rate, cost of per loan assets and capital adequacy ratio which was presented in descriptive. Correlation and regression models were used to analyze the data where the study revealed that all these parameters have an inverse impact on banks' financial performance. Observation of t-test indicated that there is significant negative relationship between return on assets and independent variable which are default rate and capital adequacy ratio. However, the default rate is the most predictor of bank

financial performance. Poudel recommended that banks should design and formulate strategies that will not only minimize the exposure of the banks to credit risk but will enhance profitability.

Onaolapo (2012) analyzed the relationship between the credit risk management efficiency and financial health in selected Nigerian commercial banking sector. Data collections are mainly secondary spanning a 6 years period before and after consolidation programme (2004 to 2009). The study hypothesized negative relationship between Efficiency of Credit Risk Management, bank performance and operational effectiveness. The study used regression analysis and unit root test was used verify order of integration for each time series data employed. Findings indicate minimal causation between Deposit Exposure (DE) and performance but greater dependency on operational efficiency parameters. In the study, test of stationary properties was conducted using Augmented Dickey Fuller (ADF) which indicated that all variables were non-stationary while the pair wise Granger causality suggested that Deposit Exposure performance influence does not hold for the Nigerian Commercial banking sector.

Fredrick (2012) analysed the impact of credit risk management determinants on the financial performance of commercial banks and also attempted to establish if there exists any relationship between the credit risk management determinants by use of CAMEL indicators and financial performance of commercial banks in Kenya. A causal research design was undertaken in this study which was facilitated by the use of secondary data was obtained from the Central Bank of Kenya publications on banking sector survey and the respective banks' financial statements for the period of analysis 2006-2010. The target population for this study constituted 42 commercial banks registered and operational as at 31st December, 2011. However, commercial bank(s) which were not in operation for the entire 5 year period or under receivership were dropped due to incompleteness of the records or missing data. The data analysis method used was based on Pearson correlation analysis and a multiple regression model. The study found out that there is a strong impact between the CAMEL components on the financial performance of commercial banks. The

study also established that capital adequacy, asset quality, management efficiency and liquidity had weak relationship with financial performance (ROE) whereas earnings had a strong relationship with financial performance. This study concludes that CAMEL model can be used as a proxy for credit risk management.

Ogboi and Unuafe (2013) carried the empirical evidence on the magnitude of the relationships between credit risk and bank's profitability in Nigeria. Their study used a time series and cross sectional data from 2004-2009 obtained from selected banks annual reports and accounts in Nigeria. Secondary data for the study were obtained from the published financial statement of six out of twenty one banks operating as at December 2009 which were selected by purposive sampling technique. They examined the impact of credit risk and capital adequacy on banks financial performance in Nigeria. Panel data model was used to estimate the relationship that exists among loan loss provisions (LLP), loans and advances (LA), non-performing loans (NPL) and capital adequacy (CA) which were the independent variables and return on asset (ROA) as the dependent variable to measure the profitability of the banks. The findings showed that sound credit risk management and capital adequacy impacted positively on bank's financial performance with the exception of loans and advances which was found to have a negative impact on banks' profitability during that period. By using panel data was possible to include time effects as well as to control for individual heterogeneity, which is captured by firm specific fixed or random effects components, that leads to biased results when neglected in cross section or time series estimations. However this study captured the other financial risk components such as interest rate, net stable funding and liquidity coverage among others variables and therefore a gap for more research.

Marshal and Onyekachi (2014) carried out an empirical investigation on the effect of credit risk and performance of banks in Nigeria over the period of 15 year (1997-2011). The study considered five banking firms that were selected from the twenty existing deposit money banks in Nigeria during the study period. They used judgmental sampling techniques. Data were sourced from the annual reports and accounts statements/sheets of

the banks in the sample. The data comprised of time- series and cross sectional data which were pooled into a panel data set and estimated using panel data regression techniques. The result shows that there is a positive relationship between Ratio of non- performing loans to loan and advances (LogNPL) and banks performance (LogROA). Their study indicated that banks in the study carry a very minimal level of non-performing loans in their loan portfolio and as such this does not conform to our apriori expectations. Their findings were also that there exist a positive relationship between ratio of loan and advances to total deposit (LogLA) and banks performance (LogROA). The conclusion was that increase in loan and advances increases banks performance through interest income generated from loan and advance. The study did not recognize the effect of other variables such loan loss provision which hypothetically known to affect profitability. The current study captures these variables and determine their effects both in short run and long run.

2.4.3 Market Risk and Financial Performance

Market risk is a dominant source of income fluctuations in financial institutions all over the world. According to the classification of banking risks introduced by foreign economists Koch and MacDonald (2006), market risk can be generally said to consist of three lesser risks: stock price risk, interest rate risk and foreign exchange risk. According to Worzala, (1995) form of market risk also arises where banks accept financial instruments exposed to market price volatility as collateral for loans. The price fluctuations or volatility increases and decreases in the day-to-day market. This type of risk mainly applies to both stocks and options and tends to perform well in a bull (increasing) market and poorly in a bear (decreasing) market. Generally, the more volatility within the market, the more probability there is that the investment will increase or decrease. Market risks may be divided into interest rate risk and exchange rate risk including gold, share price risks and commodity price risks which refer to respectively the risks created by any adverse change in interest rates exchange rates share prices and commodity prices.

Wachiaya (2011) carried a survey to identify the market risk management techniques used by commercial banks in Kenya and their suitability in mitigating financial loss. The research design adopted in the study was a census survey. The population used consisted of the 43 commercial banks licensed to operate in Kenya as listed by the Central Bank of Kenya. Primary data collection through the use of a questionnaire was used to gather information from the target population outlining issues relevant to the study. The results of the study showed that the main techniques used were Scenario analysis and Stress Testing to a very large extent. Mark-to-market of securities was used to some extent. The major finding was that limits ensured management of risk exposure within the bank's risk appetite. Other reasons were limits ensured banks took acceptable limits as approved by the shareholders and there was prudent management of market risk. Other minor reasons were to ensure prudent management of the bank's assets and liabilities and for monitoring purposes (Wachiaya, 2011). In light of the above findings, it's imperative that banks in Kenya pick out best practices from each in order to put market risk exposure under control to mitigate the effects of losses due to this risk. The study used the primary data only without showing the effect of market risk by use of balance sheet indicators. The current study is different from past studies because it investigated the effect of market risk on financial performance by use of financial indicators.

Nimalathasan *et al.,* (2012) examined the impact of systematic risk management on profitability of selected financial institutions in Sri Lanka from year 2007 to 2011. In their study, systematic risk management measured in Degree of Financial leverage (DFL) and Degree of Operating leverage (DOL) as independent variable and Profitability (i.e., Net Profit, Return on Capital Employed (ROCE) and Return on Equity (ROE) as the dependent variable. The study used secondary data. Operational hypotheses were formulated and results revealed that systematic risk management has a positive association ($r= 0.755$, $p<0.05$) with profitability. The study also indicated that systematic risk management is enhanced by DFL and DOL in the selected financial institutions where the beneficial impacts are observed on profitability. The study used the DFL and DOL as two independent variables to determine the effect on profitability. Though this relevant the

current study had to put degree of financial leverage into consideration.

Gatsi *et al.,* (2013) examined the effect of degree of financial and operating leverage on profitability of Insurance Firms in Ghana. The study used sample data of 18 insurance companies in the insurance sector. The secondary data was collected from their financial statements with the National Insurance Commission for period 2002 to 2011. Panel data regression technique was employed. The finding of their study was that degree of financial leverage was inversely related to profitability while operating leverage is positively related to profitability.

Abid and Mseddi (2004) also examined the degree of operating leverage and the degree of financial leverage for firm in USA for a period of 5 years and explored the association between the risky nature of the firms and the relative value. The study identified a positive effect on company value of both operating and financial leverage meaning that with the surge in the various degrees of leverage of the firms in USA the value of the company also increases which is obvious because of the benefit debt as a capital. The study also found that the excess return is a positive and increasing function of operating leverage, degree of financial leverage and systematic risk for sample firms that show a positive correlation of sales changes with market portfolio returns.

Wong *et al*., (2009) investigated the relationship between foreign exchange exposure and bank size. The study employed the panel dataset of equity price of 14 listed Chinese banks for the period 21 July 2005 to February 2008 to banks. The empirical results suggest that an appreciation of the renminbi will likely have a negative impact on the performance, and thus the equity values, of Chinese banks, with the impacts on larger banks being more pronounced. The findings indicate that decrease in equity values imply higher default risk.

Gachua (2011) also did a study on the effect of foreign exchange exposure on a firm's financial performance of a case of selected listed companies in the Nairobi Stock Exchange. The data analysed was for the period covering years 2001 to 2010. The research design was descriptive which involved the use of both qualitative and quantitative data.

The sample size of the study constituted of 38 firms except for financial and investment but the results of 32 firms were analysed after eliminating spoilt and inconsistent questionnaires. From the study it was found that listed firms use the income statement and the owner‘s equity account to record foreign exchange differences. The study concluded that unrealized foreign exchange gains/losses had an effect on the Net Income of listed companies as it was posted to either income statement or owners‘equity. For comprehensive analysis of market risk, the interest rate risk needed to be incorporated in the analysis. In addition, the current study also considered the degree of financial leverage which is applied to manage the systematic risks.

Mbubi (2013) observed the effect of foreign exchange rate on the financial performance of listed companies in the NSE for period 2002 and 2012. Descriptive analysis was carried out for both qualitative and quantitative data for 41 firms. From the findings unrealized foreign exchange gains/losses had an effect on the Net Income of multinational companies as it was posted to either income statement or owners‘equity reserves. The study also found that there had been significant percentage change in imports for firms listed in the Nairobi Securities Exchange; the study thus concludes that use of foreign exchange has an effect on import costs and accounts payables with the net effect on the Net Income of multinational companies.

Runo (2013) analyzed the relationship between foreign exchange risk and the profitability of two oil companies listed in the Nairobi Securities Exchange during the period 2002 to 2012. Descriptive analysis, correlation and regression analysis were used. Foreign exchange risk was measured by the foreign exchange gain/loss. The study found that there was a strong negative correlation between foreign exchange risk and profitability.

Ahmed (2015) evaluated the effect of foreign exchange exposure on the financial performance of selected listed commercial banks in Kenya. The study used both secondary and primary data which utilized descriptive design. The study found that foreign exchange exposure has negative effect on the performance of listed commercial banks in Kenya.

However interest rates have an insignificant positive effect on commercial bank performance.

Fapetu and Kolapo (2015) carried out the study on influence of interest rate risk on the performance of Deposit Money Banks (DMBs) in Nigeria between 2002 and 2011. The regression model specifies return on assets to measure bank performance as a function of interest rate risk indexed with loans to asset ratio, average lending ratio, and risk of interest diversity. The study employed fixed effect regression method, each measure of interest rate risk is found to have insignificant effect on bank performance. Hence It is was concluded that interest rate risk has no significant influence on the performance of DMBs in Nigeria.

Odeke and Odongo (2014) investigated the relationship between Interest rate risk exposure and financial performance of commercial banks in Uganda. The data longitudinal and secondary data was collected from period 2009 t0 2011 from the final accounts of banks. The approach was mainly quantitative technique. Long term data was analyzed, presented in descriptive and inferential statistics in order to draw conclusion. The overall analysis of interest rate risk exposure and bank performance showed generally a positive relationship except basis risk. The study indicated that maturity gaps contributed more to Bank performance, followed by assets and liabilities margins and basis risk with low influence in Bank financial performance.

Ngetich and Wanjau (2011) analyzed the effects of interest rate spread on the level of Non-Performing Assets in commercial banks in Kenya. The study adopted a descriptive research design on a sample of all 43 commercial banks in Kenya operating by 2008. The study used primary and secondary data collected from Bank Supervision Report. The study used both quantitative and qualitative techniques in data. The study concludes that interest rate spread affect performing assets in banks as it increases the cost of loans charged on the borrowers.

Ngalawa *et al.,* (2013) showed that bank's exposure to interest rate risk or income gap

determines the structure of the balance sheet. They analyzed interest rate sensitivity gaps obtained from financial reports for 10 commercial banks listed in the Nairobi securities exchange for the period 2008-2012. In particular, they found that in Kenya, commercial banks typically retain a large exposure to interest rates that can be predicted through the income gap. They also established the sensitivity of income gaps to market interest rates as determined by the CBK through treasury instruments. Quantitatively, a 200 basis point change in CBK rates would lead to a change of net income equivalent to 0.4% of total assets of the bank. They recommended further research on wider sample of banks over a longer time series period to establish a comprehensive effect of interest risk exposure on Kenyan financial performance.

The banking sector is the backbone of the Kenyan economy and it is a critical vehicle that links the Kenyan economy to the rest of the world. In the process of providing financial services, banks may face various kinds of financial risks among them is market risk. Market risks can lead to significant losses very quickly in volatile market conditions and also complete institutional collapse in severe situations. From the above divergent results there was need to determine the relationship between market risks and financial performance of commercial banks in Kenya.

2.4.4 Liquidity Risk and Financial Performance

Goodhart (2008) stated that there are two basic facets of liquidity risk. These are maturity transformation which is the maturity of a bank's liabilities and assets and the inherent liquidity of a bank's asset which is the extent to which an asset can be sold without incurring a significant loss of value under any market condition. Banks do not need to be worried about the maturity transformation if they have the assets that can be sold without bearing any loss. Whereas, banks having assets that are going to be matured in a shorter period may have a less need to keep the liquid assets (Ahmed *et al.*, 2015).

Liquidity mismatch risk or liquidity mismatch, it is one way of measuring the organization's level of financial risk (Central Bank of Barbados, 2008; Brunnermeier and

Yogo, 2009). Liquidity match is also called liquidity gap (Plochan, 2007). Liquidity gap is the difference between a bank's assets and a bank's liabilities (Falconer, 2001; Plochan, 2007). This gap can be positive or negative. It is depending on if the firm has more assets than liabilities or vice versa. A negative gap means that the bank is netting less income than the amount of liabilities assumed. When the gap is positive, the bank has liquid assets left over after all of the liabilities have been fulfilled.

Apart from the above maturity mismatch, liquidity risk arises due to recessionary economic conditions, causing less resource generation. This increases the demand of depositors creating liquidity risk. This may cause the failure of a given bank or even the entire banking system due to contagion effect (Diamond & Rajan, 2005). High liquidity increases the leverage and a highly leveraged bank may turn into the consumer of liquidity from the provider (Clementi, 2001). Liquidity risk may arise due to the breakdown or delays in cashflows from the borrowers or early termination of the projects (Diamond & Rajan, 2005).

Koziol *et al.,* (2008) provided a study in which they assessed the risk of bank failures. The major risks that were faced by these banks were amongst them liquidity risk. A regression model was used to elaborate the results which showed that risk identification, risk assessment and risk analysis were the most influencing variables and the Islamic banks in Brunei needed to give more attention to those variables to make their risk management practices more effective by understanding the true application of Basel-II Accord to improve the efficiency of Islamic Bank’s risk management systems.

Adolphus (2008) studied liquidity management practices of selected Nigerian banks by evaluating the relevance of treasury objectives in bank portfolio management, causes of asset-liability mismatch in banks, causes of liquidity crisis, incidence of treasury risk, adequacy or appropriateness of liquidity risk management techniques, liquidity planning practices of Nigerian banks, and extent of liquidity exposure in banks. The rampant reported cases of liquidity crisis and financial distress in the Nigerian banking industry

necessitated Adolphus to study on how to manage the bank's liquidity exposure. According to the study, firms with high liquidity have majority portion of their investments in short term assets, which have lower return than the long term assets. As a result high liquidity is expected to be associated with low profitability and vice-versa. Maintaining a proper liquidity indicates that funds are confined to liquid assets thereby making them unavailable for operational use or for investment purposes for higher returns. Thus, there is an opportunity cost associated with the maintenance of those liquid assets and this might affect the overall profitability of the firm. In other words, increasing profitability would tend to reduce firm's liquidity and too much attention on liquidity would tend to affect the profitability. Therefore, firms should always strike to maintain a balance between conflicting objectives of liquidity and profitability.

Bordeleau *et al.*, (2009) reviewed the impact of liquidity on bank profitability for 55 US banks and 10 Canadian banks between the period of 1997 and 2009. The study employed quantitative measures to assess the impact of liquidity on bank profitability. Results from the study suggested that a nonlinear relationship exists, whereby profitability is improved for banks that hold some liquid assets, however, there is a point beyond which holding further liquid assets diminishes a banks' profitability, all else equal. Conceptually, this result is consistent with the idea that funding markets reward a bank, to some extent, for holding liquid assets, thereby reducing its liquidity risk. However, this benefit can eventually be outweighed by the opportunity cost of holding such comparatively low yielding liquid assets on the balance sheet. At the same time, estimation results provided some evidence that the relationship between liquid assets and profitability depended on the bank's business model and the risk of funding market difficulties.

Bordeleau and Graham (2010) in its working paper on the impact of liquidity on bank profitability in Canada observed that liquidity was an instrumental factor during the 2008-2009 financial crises. Since liquid assets such as cash and government securities generally have a relatively low return, holding them imposes an opportunity cost on a bank. In the absence of regulation, it is reasonable to expect banks will hold liquid assets to the extent

they help to maximize the firm's profitability. The paper found evidence, based on a panel of Canadian and American banks from 1997 to the end of 2009, that profitability is improved for banks that hold some liquid assets. The study established that in managing their portfolios, the commercial banks have two main aims that may conflict. The first aim is maintenance of stock of liquid assets in case their cash is under pressure and the second one is the wish to earn high return on their assets in order to maximize profits.

Akhtar (2011) studied the association of liquidity risk with the solvency of a financial institution through a comparative analysis between conventional and Islamic banks of Pakistan. The study investigated the significance of size of the firm, networking capital, return on equity, capital adequacy and return on assets (ROA), with liquidity risk management in conventional and Islamic banks. Their study was based on secondary data that covers a period of four years (2006-2009). The study found positive but insignificant relationship of size of the bank and net-working capital to net assets with liquidity risks. In addition capital adequacy ratio in conventional banks and return on assets in Islamic banks is found to be positive and significant at 10% significance level. The current study covers the gap by considering the net stable funding for each commercial bank which is a measure of liquidity as per Basel III framework.

Ashraf *et al.,* (2015) studied the effectiveness of Basel III by linking the NSFR with overall financial stability by analyzing annual financial data from 948 banks from 85 countries (excluding banks from North America and Europe) from 2003 to 2013. The study considered financial crisis (2007-2009) where banks suffered huge financial and reputational consequences as a result of excessive risk taking, complicated securitization and an asset -liability mismatch. The study used generalized method of moments (GMM) model. The study found a positive and statistically significant relationship between the NSFR and Z -score as a proxy for financial stability of banks. These findings validated the regulatory framework under Basel III and favor its implementation.

Said (2014) analyzed the impact of net stable funding ratio (NSFR) on Malaysian commercial banks profitability as explained in the new liquidity framework proposed under Basel III. The study used panel data of eight commercial banks for the period 2005-2011. It also employed POLS and Fixed Effect estimations to analyse the data. The results show that this new liquidity coverage ratio is an important factor in affecting the sample banks' profitability. There exist positive relationships between NSFR and indicators of performance which were ROE, ROA and NIM. The study also indicated that there exists a positive relationship between equity and profit, and size of banks and profit, and a negative relationship between cost to income ratio and profit. The ability of banks in managing the stability of their funding sources as well as liquidity of its assets is an advantage to them and is translated into higher profitability.

Ogol (2011) did a research on liquidity risk management practices in microfinance institutions in Kenya. The emphasis of the study was on understanding the process of liquidity risk identification by MFIs, the extent to which MFIs are classified, monitor liquidity risks, liquidity risk exposure of MFIs and to identify the various practices that the MFIs adopt in managing the liquidity risks. Using a descriptive research design, primary data was collected through questionnaires distributed to MFIs operating in Nairobi City. Data collected was analyzed by use of descriptive statistics and SPSS version 17 was used for the purpose of the analysis. Results indicated that MFIs have in place liquidity risk management practices. This is the case when it involves understanding the liquidity risk, identification, analysis/assessment and monitoring.

Ahmed *et al.* (2012) examined liquidity risk and its effect on banks' profitability in Pakistani banks. Data was obtained from the balance sheets, income statements and notes of 22 Pakistani banks during 2004 to 2009. Multiple regressions were applied to assess the impact of liquidity risk on banks' profitability. Deposits, cash, liquidity gap and non-performing loans, NPLs were considered as the independent variables regressed with profitability as the dependent variable. The results of their multiple regressions showed that liquidity risk affects bank profitability significantly, with liquidity gap and non-

performing as the two factors exacerbating the liquidity risk as they have a negative relationship with profitability. The researcher recommended that economic factors contributing to liquidity risk should be considered for further studies. However the study fails to delve the effect of net stable funding on the financial performance of Kenyan banks.

Wambu (2013) investigated whether the profitability of commercial banks is affected by the liquidity levels of the bank. The population of the study was comprised of all 44 commercial banks in Kenya operating in the years 2008 to 2012. The study involved secondary data collection of the return on assets, to measure profitability and CBK liquidity coverage ratio and current ratio to measure liquidity during a specific year. The data was obtained from audited financial statements of the banks at the end of the years of study. The study used descriptive statistics and regression analysis to establish the relationship between the study variables. The study found out that there is a positive relationship between profitability and liquidity of commercial banks in Kenya.

Profitability of commercial bank is expected to be affected by the liquidity level. Based on previous studies (Giannotti *et al*., 2010; Angora, and Roulet, 2011; Giordana, and Schumacher, 2012), the net stable funding ratio and the liquidity coverage ratio are the two dependent variables considered, which are the two liquidity measures proposed in the Basel III framework. It is therefore evident that the current would act as a modest way to determine the effect of liquidity risk on the financial performance of commercial banks in Kenya.

2.4.5 Operational Risk and Financial Performance

If operational risk is not addressed systematically it can result in inconsistent performance and earnings surprises for the stakeholders. Thus, operational risk exposures can have an impact on banks' revenues and net worth. Operational risk, thus, generates operational losses and the losses generated are a cost to the bank. Hence, the pricing and the

consequent measurement of the operational risk capital charge has to be adequate to cover for these losses.

Tripe (1998) demonstrates how an operational risk capital charge (economic capital allocation) might be linked to volatility in the cost-to-income ratio, using a multiple of the standard deviation of the ratio. Tripe also shows how volatility in other measures, such as cost-to-assets, could be used to produce an economic capital charge. As explained by Tripe, different cost-based ratios produce significantly different capital charges. Further, the cost-to-assets ratio does not capture non-interest income though may be a leading indicator of operational risk in a bank. Operational risk may materialize directly, for instance in electronic fund transfer (transfer of funds to the wrong person) or could result indirectly as a credit or market loss. Since there is a close linkage of operational risk with other types of risks, it is very important for every institution to first have a clear understanding of the concept of operational risk before designing the appropriate operational risk measurement and management framework (Epetimehin and Obafemi , 2015).

Santomero (1997) explains that operational risk relates to the issues of precisely processing, settling and taking delivery on trades for the exchange of cash. It also involves the record keeping, processing system failures and fulfillment of the diversified regulations. So that, individual operating problem is small portion for a well-managed institution but causes effect which may be quite costly. Goldmann (2009) explained that research shows that internal fraud is committed by both employees and management and accounts for 50-80% of frauds committed in organizations. Employees have access to information, processes, systems and assets therefore making it easier for them to device ways of committing fraud without being detected.

Francis and Hess (2004) examined how cost income ratio benchmarking was used by ASB Bank, a New Zealand-based retail bank, between when reviewing its operational efficiency. The study was conducted between August to November 2002. The research revealed that though the cost income ratio was the principal metric used in this

benchmarking exercise, it sought to identify best practice not in terms of minimizing this ratio but rather in terms of identifying typical ratios and cost structures among successful banking institutions. The study observed that there is an inverse relationship between the cost income ratio and the bank's profitability.

Kimani (2011) assessed fraud risk for Barclays Bank of Kenya and found that bank's statistics show that the frequency of internal fraud is increasing drastically and has by far inflicted the most significant losses to the bank. This is because some dishonest employees and managers have found ways to override systems and or collude with outsiders to defraud the bank. According to the Bank's fraud unit, management fraud occurs less frequently but accounts for the greatest financial losses. Position equals power; managers and executives, having more access to more information and assets than regular employees and can commit fraud relatively easier without being noticed.

Mathuva (2009) examines the relationship between Capital Adequacy, Cost Income Ratio and the profitability of Kenyan Commercial Banks. The study used the return on assets and the return on equity as proxies for bank profitability for the period 1998 to 2007. The data was obtained from the annual financial statements for a selected sample of 41 out of the 44 licensed commercial banks in Kenya by CBK in year 2008. The study finds out that Kenyan banks are not competitive enough globally in terms of their efficiency as measured by the Cost-Income Ratio (CIR). The study reveals that the CIR is inversely related return on assets and return on equity. The study shows that the cost-income ratio is negative and strongly significant with profitability measures, indicating that more efficient banks generate higher profits. The study also reveals that the CIRs of Kenyan banks are higher than those of developed countries.

2.4.6 Bank Size and Financial Performance

Study carried out by Yoon and Jang (2005) on the relationship between return on equity (ROE), financial leverage and size of 62 restaurant firms in US for the period 1998 to 2003 using ordinary least squares (OLS) regressions. Results show that high leveraged

firms were less risky in both market and accounting-based performance measures. The results also found support for positive relationship between financial leverage and both measures of performance. Additionally, the results further indicate that firm size had a more dominant effect on ROE than debt, and regardless of the level of leverage, smaller firms were relatively more risky than larger firms

Said *et al*. (2008) investigated the performance and financial ratios of commercial banks in Malaysia and China. They investigated the impact of bank-specific factors which include the liquidity, credit, capital, operating expenses and the size of commercial banks on their performance, which was measured by return on average assets (ROAA) and return on average equity (ROAE). The study used income statement and balance sheet of commercial banks of Malaysia and People's Republic of China which were extracted from the BankScope database for the period 2001 to 2007. The empirical analysis of the study was based on panel data fixed effect model that incorporates balanced annual data series. The size of the bank was measured by real assets and squared real assets in logarithms. One of the finding of their study was that liquidity and size of banks somehow do not have any influence on the performance of banks for both countries.

Awojobi *et al*. (2011) empirically investigated the key determinants of bank risk management efficiency in Nigeria. Their study covers a period of 7 financial years from 2003 to 2009, taking 9 largest banks in terms of asset base which accounted for 78 percent of total assets in the Nigerian banking industry. They examined a long run equilibrium among financial ratios with uncertain coefficients, macroeconomic variables, and capital ratio which was the proxy for risk management efficiency. Panel regression methodology was employed to cover both bank-specific and macro-determinants. Empirical findings of their study showed that bank capital adequacy is positively associated with liquidity, bank size and market risk. Bank size from results was proven to be statistically insignificant.

Al Karim *et al*. (2013) carried out a research to determine whether bank size, credit risk,

asset management and operational efficiency have statistically significant impact on internal based performance (ROA) of Bangladeshi Private Sector commercial banks. Three indicators namely, Internal-based performance measured by Return on Assets, Market-based performance measured by Tobin's Q model (Price/Book ratio) and Economic-based performance measured by Economic Value were used to measure financial performance of the selected banks. Annual time series data from 2008-2012 of the selected banks from their respective audited annual reports were employed in multiple regression analysis to apprehend the impact of bank size, credit risk, operational efficiency and asset management on financial performance measured by the three indicators, and to create a good-fit regression model to predict the future financial performance of these banks. The findings were that Bank size, credit risk, operational efficiency and asset management have significant impact on financial performance of Bangladeshi commercial banks.

Generally, the relationship between bank size and bank performance is considered positive (Iannotta *et al.*, 2007 & Mercieca *et al*., 2007), but there are several studies where it was suggested that the impact of size could be non-linear with profitability growing with size and falling for bureaucratic and other reasons (Athanasoglou *et al.,* 2008). Considering the above studies, Said *et al.,* (2008) findings differ from that of Awojobi (2011) and Al Karim *et al.*, (2013).

2.5 Critique of the Existing Literature

Review of literature indicate that majority of past empirical studies have analyzed the effect of financial risk on the financial performance based on different indicators. The indicator the have been used in most studies is ROA to measure profitability. In as much as a lot of researches have been done on the impact of financial risk and financial performance of commercial banks, most of the local studies have leaned heavily towards the various tools and techniques of financial risk management, practices and strategies used by various institutions (Wanjira, 2010; Ochola, 2009; Ngare, 2008; Mwirigi, 2006; Simiyu, 2008).

Empirical evidences and results of various studies show a mixed trend on the effect of financial risk components on financial performance. There is also an evidence from review of literature that even in situations where similar indicators of financial performance have been employed, conflicting empirical results have been provided. Some of the studies have provided for significant or insignificant positive effect while others have shown significant or insignificant negative relationship. In the extreme are the studies have postulated no relationship between independent variables and dependent variable. This lack of convergence implies that the studies did not establish a clear relationship between financial risk and financial performance. Hence the manner in which financial risk influences financial performance is still inconclusive.

Also the reviewed studies seem not to recognize the dynamism that exist in the banking sector. Most of the studies carried out the analysis using the OLS or the long run models. In this study GMM was employed to check the dynamism and how the performance of the immediate previous period affects the current period performance. This is because it is presumed that the management of banks tend to protect the performance of the current period using the information of the previous period.

Considering the findings of Oloo (2011) and among other studies (Waweru and Kalani, 2009; Kithinji, 2010; Fredrick, 2012; Poudel, 2012; Karim *et al*., 2012 & Nimalathasan *et al*., 2012), studies done in Kenya are not exhaustive as they generalize the causes of financial performance and some analyzing how the credit risks management systems affect the performance of financial institutions. These studies did not capture the element of market risk as a component of financial risk. While most Kenyan researchers have shown the effects of credit risk management on bank performance, there seems to be a lack of studies investigating effects of other variables such as size of the bank as moderating variable.

2.6 Research Gaps

From the foregoing review of relevant literature, it is evident that research in the area of

bank risks has been done but not in a comprehensive approach. Most of the literature reviewed indicated that previous researchers only concentrated on credit risks leaving out the components of market risk. The current study has a wider scope by covering additional important variables of liquidity, market and operational risks that were omitted by previous studies. This makes the study more comprehensive. From survey of relevant literature, it has been found that there are few studies specific to Kenya on the link of financial risk and performance of commercial banks and they omitted moderating variables. This study therefore intended to fill these pertinent gaps in literature by studying the moderating effect of bank size on financial performance of commercial banks in Kenya. The studies also differs from others because GMM model was employed recognizing the dynamism in the banking sector. Hence, the current study sought to fill the existing gaps by establishing the effect of financial risk on the financial performance of commercial banks in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design, target population, data collection instrument, data collection procedure, data processing and analysis, measurement of study variables. The chapter also specifies the empirical models estimated by the study and provides the techniques of estimating and analyzing the model.

3.2 Philosophical Orientation

Research philosophy is the foundation of knowledge on which underlying predispositions of any study are based. The choice of a research philosophy determines the research design. Two philosophical traditions that guide social science research are positivism and social construction. Positivism is a philosophy that seeks real facts of social phenomena that are objective, neutral and predictable with little regard for the subjectivity of individuals. Phenomenological approach does not begin from an established theory. The researcher merely developed ideas through induction and was a participant observer, and tried to understand what is happening and investigates small samples in depth over time. The study adopted the ontology of objectivism portraying the position that social entities exist in reality to social actors concerned with their existence (Saunders *et al*., 2007).

The study reflected the Philosophy of Positivism which is an approach that seeks facts or causes of social or business phenomena, with little regard to the subjective state of the individual. Considering the purpose of this study, the type of investigation, the extent of researcher involvement, the time period over which data was collected and the type of analysis, the philosophical foundation guiding this study is positivism. This is because the researcher is independent from what is being observed. It is normally argued that research approaches are attached to different research philosophies (Saunders *et al*., 2007). By adopting a positivism view, this study focused on theory testing wherein theory was first

adopted as the framework for developing and testing hypotheses. This emphasizes the deductive orientation the study adopted.

3.3 Research Design

The study used quantitative research design. The financial ratios computed for each firm during the period of study were then transformed into panels. Time Series Cross Sectional (TSCS) data was used to show the effect of the financial risk on the financial performance of commercial banks in Kenya. (TSCS) research design is a quasi-experimental research design that Stimson (1985) explained that TSCS designs have long been considered as one of the best designs for the study of causation, next to a purely random experiment. Lempert (1966) states that TSCS designs are research designs "par excellence." In addition to their potential for detecting causal relationships, TSCS designs offer a number of distinct advantages. The study used financial ratio analysis and unbalanced panel data regression analysis to measure, describe and analyse the effect of the financial risk on the financial performance of commercial banks in Kenya during the period 2005-2014. The logic of selection of this period was to collect most recent data.

Panel data estimation technique was adopted because it takes care of heterogeneity associated with individual banks by allowing for individual specific variables. Also, by combining time series of cross sectional observations, panel data give more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency. Besides, panel data will minimize the bias that can result if individual banks are aggregated. It also enriches empirical analysis in such a way that may not be possible if either only time series data or cross sectional data is used (Ogboi & Unuafe, 2013).

3.4 Target Population

The target population of the study comprised of all the licensed commercial banks in Kenya. According to CBK (2014) report, the total number of commercial banks comprised of forty three commercial banks (appendix I) by December 2014. Central Bank of Kenya

is the major licensing institution of commercial banks in Kenya and hence was used as an authoritative source for banking sector information.

3.5 Data Collection Instrument

The study employed secondary data that was extracted from audited financial statements and annual reports of commercial banks over the 10-year period, 2005 to 2014. Secondary data collection instrument specified in Appendix II was used.

3.6 Data collection procedure

The researcher wrote to CBK requesting for an access of annual financial statements for ten years from 2005 to 2014. The banks supervision department provided the published reports from which the researcher extracted the data using the desk search techniques. The required data was input into Excel data collection instrument. Data collection was carried out in the month of November 2015. No research assistants involved in this process so as to make sure that the researcher collect the valid and correct data. The Panel data was employed because it helps to study the behavior of each bank over time and across space (Baltagi, 2005 & Gujarati, 2003). Polit and Beck (2010) also indicate that secondary analysis of existing data is efficient and economical because data collection is typically the most time-consuming and expensive part of a research project.

3.7 Data processing and analysis

This section discusses the techniques that were used to analyze data and test the variables. The data was organized and financial ratios computed using Excel program inorder to obtain the study variables. The unbalanced panel data collected was analyzed quantitatively using regression equations, which were solved using statistical tool STATA version 13.0 software was used.

3.7.1 Measurement of Study Variables

The study adopted financial performance as the dependent variable. Credit risk, market risk, liquidity risk and operational risk constituted the explanatory variables for the study. The moderating variable was bank size. This section provide details of how each of the study variables were measured and operationalized**.**

3.7.1.1 Financial performance

Financial performance was measured using return on equity (ROE) which value the overall profitability of the fixed income per dollar of equity (Saunders & Marcia, 2011, p. 23). The efficiency of the banks can be evaluated by applying ROE, since it shows that banks reinvest its earnings to generate future profit. The growth of ROE may also depend on the capitalization of the banks and operating profit margin. If a bank is highly capitalized through the risk weighted capital adequacy ratio (RWCAR) or Tier 1 capital adequacy ratio (CAR), the expansion of ROE will be retarded. However, the increase of the operating margin can smoothly enhance the ROE. ROE also hinges on the capital management activities. If the banks use capital more efficiently, they will have a better financial leverage and consequently a higher ROE. Because a higher financial leverage multiplier indicates that banks can leverage on a smaller base of stakeholder's fund and produce higher interest bearing assets leading to the optimization of the earnings. On the contrary, a rise in ROE can also reflect increased risks because high risk might bring more profits. This means ROE does not only go up by increasing returns or profit but also grows by taking more debt which brings more risk. Risk management becomes more and more significant in order to ensure sustainable profits in banks (Hosna, 2009). Because of these listed reasons the researcher used ROE to measure the financial performance of commercial banks in Kenya. It is measured by the ratio of net profit to total equity. It is defined as

$$Return\ on\ Equity = \frac{Net\ Income}{Shareholder's\ Equity\ Capital}$$

3.7.1.2 Banks credit risk

Independent variables which include capital to risk weighted assets, asset quality, loan loss provision and advance and loans ratio employed as the credit risks indicators.

a) Capital to risk weighted assets

The ratio of Core Capital to Total Risk Weighted Assets is a risk sensitive measure of capital that is used (Nasieku *et al*., 2013). The ratio measures the amount of a bank's capital in relation to the amount of its risk weighted credit exposures. The risk weighting process takes into account the relative riskiness of various types of credit exposures that banks have, and incorporates the effect of off-balance sheet contracts on credit risk. The higher the ratios a bank has, the greater the level of unexpected losses it can absorb before becoming insolvent. Risk-weighted asset (also referred to as RWA) is a bank's assets or off-balance-sheet exposures, weighted according to risk. The ratios were obtained from CBK's website.

$$Capital\ to\ Total\ Risk\ Weighted\ Assets = \frac{Core\ Capital}{Total\ Risk\ Weighted\ Assets}$$

b) Asset quality

Asset quality ratio also known as Non-performing loans ratio is measured by the ratio of Non-performing Loans to Gross Loans. Deterioration in asset quality is much more serious problem of bank unless the mechanism exists to ensure the timely recognition of the problem. It is a common cause of bank failure. Poor asset quality leads nonperforming loan that can seriously damage a banks' financial position having an adverse effect on banks operation (Epure & Lafuente, 2015). The banks performance and survival become distressed.

$$Non - Performing\ Loans\ Ratio = \frac{Non - Performing\ loans}{Total\ loans\ and\ advances}$$

Quality credit risk assessment, risk management and creation of adequate provisions for bad and doubtful debts can reduce the banks credit risk. When the level of non-performing assets is high, the assets provisions made are not adequate protection against default risk (Kwambai & Wandera, 2013, p. 169) .

c) Loan loss provision

Loan Loss provision to Gross Loans ratio (LLPR) is a measure of bank's credit quality that indicates how much of the total portfolio has been provided for but not charged off. Banks use loan loss provisions to create reserves in order to cover the expected (latent, inherent or incurred and not yet individually identified) losses embedded in their loan portfolios. In theory, the accrual of loan loss provisions in the income statement of banks should be exclusively dictated by credit risk considerations. It is hypothetical that a bank is likely to create higher loan loss provisions when discretionary earnings are high and lower loan loss provisions when there is an increase in discretionary risk-weighted assets.

$$LLPR = \frac{Loan\ loss\ provision}{Gross\ loans}$$

d) Measure of loan and advances ratio

Loan and advance ratio (LAR) is a ratio between the banks total loans and total deposits. If the ratio is lower than one, the bank relied on its own deposits to make loans to its customers, without any outside borrowing. If, on the other hand, the ratio is greater than one, the bank borrowed money which it relined at higher rates, rather than relying entirely on its own deposits. Banks may not be earning an optimal return if the ratio is too low. If the ratio is too high, the banks might not have enough liquidity to cover any unforeseen funding requirements or economic crises.

To measure banks credit risk this study employed Loan and advances to Deposit Ratio. This ratio indicates the ability of banks to withstand deposit withdrawals and willingness

of banks to meet loan demand by reducing their cash assets. When the banks are more liquid, they can reduce risk of insolvency.

$$\text{Loan Advance Ratio} = \frac{\text{Total Loan and Advance}}{Total\ Deposits}$$

3.7.1.3 Banks market risk

a) Degree of financial leverage

The degree of financial leverage measures the proportion of the earnings before interest and taxes against the earnings before taxes which shows the debt amount that a business is obligated to pay back. The degree of financial leverage (DFL) is practically a measure of the degree of financial risk, thus the higher the ratio is the more risky the business is considered to be as it relies too much on debts and any changes within the economic environment or in interest rates may have an extremely negative impact on how the business evolves.

A company is described as leveraged if it is financed partly through debt simply because of the tax shield element of debt. But debt carries a fixed cost, which means that if the company increases its debt the degree of financial leverage also increases. Based on previous literature, financial leverage of a company may be computed in different ways but for the purpose of the current study, the researcher used the ratio of earnings before interest and taxes (EBIT) to earnings before taxes (EBT) for calculating degree of financial leverage (DFL). This mode of computation has been adopted because it focuses directly on the impact of interest on income before taxes (Gatsi *et al.*, 2013).

$$DFL = \frac{EBIT}{EBIT - Interest}$$

b) Interest rate risk

The study captured the effect of interest rate as a measure of market risk since a change in interest rate could lead to a mismatch between interest paid on deposit and the interest received on loans. Fluctuations in net interest margins could be an important source of uncertainty in bank profitability and could surely have adverse effects for particular banks. Changes in interest rates seem unlikely to undermine sharply the health of the banking sector through their effects on net interest income (Ngalawa *et al.*, 2013). Net Interest Margin is a measure of the difference between the interest income generated by banks and the amount of interest paid out to their lenders (for example, deposits), relative to the amount of their interest-earning assets.

The interest rate risk is proxied by Net Interest Margin (log of NIM) and it is adjusted for change in interest rate as used by Aruwa and Musa (2014). Murthy and Rama (2003) as cited by Odeke and Odongo (2014) indicated that change of interest rates by banks has direct impact on the interest earned on loans and investments and the interest paid on deposits Interest rate risk exposures involves managing the net interest margin (interest income minus interest expense) and controlling the risk posed by changing interest rates while trying to take advantage of changing interest rates. Murthy and Rama (2003) stated that even when interest rates change a bank can control interest rate risk by matching the repricing maturities of assets and liabilities.

c) Foreign exchange exposure

Oxelheim (1995) defines foreign exchange risk as the risk of change (gain or loss) in the company`s future economic value due to adverse foreign exchange rate movements. A measure of the potential change in a firm's profitability, net cash flow, and market value because of a change in exchange rates. Profits, cash flow and market value are the key financial elements of how relative success or failure of a firm is viewed. Currency-related gains and losses can have destructive impacts on reported earnings which are fundamental to the markets opinion of that company. The foreign exchange rate exposure of a firm is

a measure of the sensitivity of its cash flows to changes in exchange rates. Since cash flows are difficult to measure, most researchers have examined exposure by studying how the firm's market value, the present value of its expected cash flows, responds to changes in exchange rates. Foreign exchange exposure is defined as the degree to which a company is affected by exchange rate changes. The magnitude of the gain or loss that results from a particular exchange rate change is: Transaction exposure refers to foreign exchange loss or gain on transaction already entered into and denominated in a foreign currency. The study applied the foreign exchange gains and losses as proxy of foreign exchange exposure as used by Gachua (2011).

3.7.1.4 Banks liquidity risk

a) Liquidity coverage ratio

Basel III describes that LCR requires that banks hold high quality liquid assets to meet liquidity needs over a 30-day time horizon under an acute liquidity stress scenario. The LCR is thus a constraint on how much short-run liquidity risk a bank is allowed to hold. It is supposed to "promote short-term resilience of a bank's liquidity risk profile by ensuring that it has sufficient high-quality liquid assets to survive a significant stress scenario lasting for one month

$$LCR = \frac{High\ Quality\ Liquid\ Assets}{Outflows - min(\text{Inflows}, 0.75 * \text{Outflow})}$$

b) Net stable funding ratio

Basel III defines net stable funding ratio (NSFR) as the amount of available stable funding relative to the amount of required stable funding. The standard requires a minimum amount of funding that is expected to be stable over a one year time horizon based on liquidity risk factors assigned to assets and off-balance sheet liquidity exposures. The NSF ratio is intended to promote longer-term structural funding of banks' balance sheets, off-balance sheet exposures and capital markets activities.

This ratio should be equal to at least 100% on an on-going basis. Available stable funding comprises of capital and liabilities expected to be reliable over the time horizon considered by the NSFR, which extends to one year. The amount of such stable funding required of comprised of Cash, Short-term unsecured traded instruments and as well as those of its off-balance sheet (OBS) exposures.

$$NSFR = \frac{\text{Available amount of stable funding}}{Required\ amount\ of\ stable\ funding}$$

3.7.1.5 Measure of operational risk

a) Cost Income Ratio

The cost to income ratio is also known as the Efficiency Ratio or Expense to Income Ratio. The components of the ratio are cost and income and, hence, the measure is indirectly related to bank profitability. A reduction in costs for a given level of income will reflect increased profits and vice versa. Increased profits, in turn, will result in improved return on equity and share prices of the bank which is of great interest to investors. Further, most bank costs have been reducing in response to margin squeezes, thus lowering both costs and income. Hence, volatility in a bank's cost to income ratio might be a better measure of volatility in a bank's cost performance. The cost to income ratio is the ratio of non-interest (operating) costs excluding bad and doubtful debt to the net interest income plus non-interest income of the bank. Non-interest costs are perceived as those costs which are most amenable to management decisions and considered to be that part of a bank's costs which can be controlled. The use of the net interest income term in the denominator will reduce the volatility that could arise from fluctuations in the general level of interest rates (Correa and Raju, 2008).

$$Cost\ Income\ ratio = \frac{Operating\ Cost}{Income}$$

3.7.1.6 Measure of Bank size

Bank size as measured by total assets Smirlock (1985). It is one of the moderating variable used in analyzing performance of the bank system. Bank size is represented by natural logarithm of total asset (LNTA). The effect of bank size on profitability is generally expected to be positive (Smirlock, 1985).

$$Bank\ size = Ln(Total\ assets)$$

3.7.2 Model specification and diagnostic tests

By using panel data, it is possible to include time effects as well as to control for individual heterogeneity, which is captured by firm specific fixed or random effects components, that leads to biased results when neglected in cross section or time series estimations (Baltagi, 1995). To estimate the results of the effect of the financial risk on the financial performance of commercial banks in Kenya, the study applied the long run (static) and short run (dynamic) panel models. The long run models assumed that previous period's performance did not affect present period's performance and therefore, no persistence (no lagged dependent explanatory variables) in the model. The short run models assumed that immediate previous period performance, lagged dependent explanatory variable, influences present period's performance. Therefore, the short run models assumed persistence due to incomplete adjustment in the performance process. For instance, in the short run banks can use their previous period's performance to protect their present period performance, hence partial adjustment in the short run model. Following these assumptions the long run and the short run models for the various study objectives are:

Panel model 1

Objective one was to establish whether credit risk affects the financial performance of the commercial banks in Kenya. Return on equity was considered as a measure for financial performance and therefore, was used as the dependent variable whereas capital to risk weighted assets, asset quality, loan loss provision and loan and advances were considered

as independent variables. The study assumed that the independent variables and the dependent variable had a general multiplicative Cobb Douglas functional relationship shown in equation 3.1.

$$ROE = f(CRWAR, LLPR, AQR, LAR) \quad (3.1)$$

Upon linearization and parametization the long run model was specified as:

$$ROE_{it} = \beta_0 + \beta_1 CRWAR_{i,t} + \beta_2 LLPR_{i,t} + \beta_3 AQR_{i,t} + \beta_4 LAR_{i,t} + \alpha_i + \varepsilon_{i,t} \quad (3.2a)$$

And the short run model as:

$$ROE_{it} = \beta_0 + \lambda ROE_{it-1} + \beta_1 CRWAR_{i,t} + \beta_2 LLPR_{i,t} + \beta_3 AQR_{i,t} + \beta_4 LAR_{i,t} + \alpha_i + \varepsilon_{i,t} \quad (3.2b)$$

Where i = 1,…….,43 t = 1,2……10

In which $ROE_{i,t}$ represents the performance of Bank i at time t, β_0 stands for the model constant or intercept, β_i stands for the coefficients of the independent variables. ROE_{it-1} is lagged bank performance, $CRWAR_{i,t}$ stands for capital to risk weighted assets ratio of bank i at time t, $LLPR_{i,t}$ is the Loan Loss Provision ratio of bank i at time t, $AQR_{i,t}$ is the Asset Quality ratio of bank i at time t, t and $LAR_{i,t}$ is the Loan and Advances ratio of bank i at time t. α_i is the bank specific effect that is assumed to be normally distributed with a constant variance and ε_{it} is the idiosyncratic error term which is assumed to have a normal distribution.

The linearization process involved logging the variables. Therefore, all the variables were to enter models 3.2a and 3.2b in log form. This inherently made the λ and the β_i's elasticities.

Panel model 2

Objective two was to establish whether market risk affects the financial performance of the commercial banks in Kenya. The study assumed that the independent variables and the dependent variable have a general multiplicative Cobb Douglas functional relationship shown in equation 3.3.

$$ROE = f(DFL, LNIM, FX) \tag{3.3}$$

Upon linearization and parametization the long run model for functional form 3.3 was specified as:

$$ROE_{it} = \alpha_0 + \alpha_1 DFL_{i,t} + \alpha_2 LNIM_{i,t} + \alpha_3 FX_{i,t} + \theta_i + \varepsilon_{i,t} \tag{3.4a}$$

And the short run model as:

$$ROE_{it} = \alpha_0 + \lambda ROE_{it-1} + \alpha_1 DFL_{i,t} + \alpha_2 LNIM_{i,t} + \alpha_3 FXE_{i,t} + \theta_i + \varepsilon_{i,t} \tag{3.4b}$$

In which $ROE_{i,t}$ represents the performance of Bank *i* at time *t*, α_0 stands for the model constant or intercept, α_i stands for the coefficients of the independent variables. ROE_{it-1} is lagged bank performance, $DFL_{i,t}$ is the Degree of Financial Leverage of bank i at time t, interest rate risk is proxied by log of Net Interest Margin (NIM), $LNIM_{i,t}$ for bank i at time t and $FXE_{i,t}$ foreign exchange risk is proxied by log of foreign exchange gains/loss. θ_i is the bank specific effect that is assumed to be normally distributed with a constant variance ε_{it} is the idiosyncratic error term which is assumed to have a normal distribution.

The linearization process involved logging the variables. Therefore, all the variables were to enter models 3.4a and 3.4b in log form. This inherently made the λ and the α_i's elasticities.

Panel model 3

Objective three was to establish whether liquidity risk affects the financial performance of the commercial banks in Kenya. The study assumed that the independent variables and the dependent variable have a general multiplicative Cobb Douglas functional relationship shown in equation 3.5.

$$ROE = f(LR, NSF) \tag{3.5}$$

Upon linearization and parametization the long run model for functional form 3.5 was specified as:

$$ROE_{it} = \lambda_0 + \lambda_1 LCR_{i,t} + \lambda_2 NSF_{i,t} + \theta_i + \varepsilon_{i,t} \tag{3.6a}$$

And the short run model as:

$$ROE_{it} = \lambda_0 + \beta ROE_{t-1} + \lambda_1 LCR_{i,t} + \lambda_2 NSF_{i,t} + \theta_i + \varepsilon_{i,t} \tag{3.6b}$$

In which $ROE_{i,t}$ represents the performance of Bank *i* at time *t*, λ_0 stands for the model constant or intercept, λ_i stands for the coefficients of the independent variables. ROE_{it-1} is lagged bank performance, $LCR_{i,t}$ is the Liquidity Coverage ratio of bank *i* at time t, $NSF_{i,t}$ is the Net Stable Funding ratio of bank *i* at time t, and $\varepsilon_{i,t}$ is the error term which is assumed to have a normal distribution. θ_i is the bank specific effect that is assumed to be normally distributed with a constant variance ε_{it} is the idiosyncratic error term which is assumed to have a normal distribution.

The linearization process involved logging the variables. Therefore, all the variables were to enter models 3.6a and 3.6b in log form. This inherently made the β and the λ_i's elasticities.

Panel model 4

Objective four was to establish whether operational risk affects the financial performance of the commercial banks in Kenya. The study assumed that the independent variable and the dependent variable have a general multiplicative Cobb Douglas functional relationship shown in equation 3.7.

$$ROE = f(CIR) \tag{3.7}$$

Upon linearization and parametization the long run model for functional form 3.7 was specified as:

$$ROE_{it} = \lambda_0 + \lambda_1 CIR_{i,t} + \theta_i + \varepsilon_{i,t} \tag{3.8a}$$

And the short run model as:

$$ROE_{it} = \lambda_0 + \beta ROE_{t-1} + \lambda_1 CIR_{i,t} + \theta_i + \varepsilon_{i,t} \tag{3.8b}$$

In which $ROE_{i,t}$ represents the performance of Bank *i* at time *t*, λ_0 stands for the model constant or intercept, λ_i stands for the coefficients of the independent variables. ROE_{it-1} is lagged bank performance, $CIR_{i,t}$ is the Cost to Income ratio of bank *i* at time t, and $\varepsilon_{i,t}$ is the error term which is assumed to have a normal distribution. θ_i is the bank specific effect that is assumed to be normally distributed with a constant variance ε_{it} is the idiosyncratic error term which is assumed to have a normal distribution.

To test the effect of financial risk, the choice of independent variables in the model 3.9 is made after considering the variables with the most impact in models 3.1, 3.3, 3.5 and 3.7 in both short run and long run. These variables are asset quality, degree of financial leverage, net stable funding and cost income ratios. The study assumed that the independent variables and the dependent variable have a general multiplicative Cobb Douglas functional relationship shown in equation 3.9.

$$ROE = f(AQR, DFL, NSF, CIR) \quad (3.9)$$

Upon linearization and parametization the long run and short run model for functional form 3.9 was specified as

$$ROE_{it} = \beta_0 + \beta_1 AQR_{i,t} + \beta_2 DFL_{i,t} + \beta_3 CIR_{i,t} + \beta_4 NSF_{i,t} + \theta_i + \varepsilon_{i,t} \quad (3.10a)$$

$$ROE_{it} = \beta_0 + \lambda ROE_{i,t-1} + \beta_1 AQR_{i,t} + \beta_2 DFL_{i,t} + \beta_3 CIR_{i,t} + \beta_4 NSF_9 + \theta_i + \varepsilon_{i,t} \quad (3.10b)$$

Panel Model 5

Objective five was to establish the moderating effect of bank size on the relationship between the financial risk and financial performance of commercial banks in Kenya. The study used Keppel and Zedeck (1989) analysis procedure to test whether bank size moderated the relationship between the financial risk and financial performance of commercial banks in Kenya. Keppel and Zedeck (1989) suggest that the perceived moderator has to be established as an explanatory variable and thereafter as an interaction term (moderator) as shown in models 3.11 through 3.14.

Assuming a multiplicative Cobb Douglas functional form between the dependent and the independent variables when bank size is introduced as an explanatory variable in the long run and in short run, the linearized and parametized models were specified as shown in 3.12 and 3.14 respectively.

$$ROE_{it} = \beta_0 + \beta_1 AQR_{i,t} + \beta_2 DFL_{i,t} + \beta_3 CIR_{i,t} + \beta_4 NSF_{i,t} + \beta_5 SIZE_{i,t} + \theta_i + \varepsilon_{i,t} \quad (3.11)$$

$$ROE_{it} = \beta_0 + \lambda ROE_{it-1} + \beta_1 AQR_{i,t} + \beta_2 DFL_{i,t} + \beta_3 CIR_{i,t} + \beta_4 NSF_{i,t} + \beta_5 SIZE_{it} + \theta_i + \varepsilon_{i,t} \quad (3.12)$$

The linearized and parametized long run and short run models introducing bank size as a moderator were specified as shown in 3.11 and 3.12 respectively.

$$ROE_{it} = \beta_0 + \sum_{j=1}^{4} \beta_j X_{it} + \sum_{j=5}^{8} \beta_j X_{it} SIZE_{it} + \theta_i + \varepsilon_{it} \quad (3.13)$$

$$ROE_{it} = \beta_0 + \lambda ROE_{it-1} + \sum_{j=1}^{4} \beta_i X_{it} + \sum_{j=5}^{8} \beta_j X_{it} SIZE_{it} + \theta_i + \varepsilon_{it} \quad (3.14)$$

Where

β_0 = Constant term,

β_j = Coefficients of the explanatory variables and interactive terms

λ_i = Coefficients of lagged performance

X_{it} = Vector of financial risk variables

$X_{it} SIZE_{it}$ = Vector of interactive variables (product of explanatory and moderating variables)

θ_i = bank individual heterogeneity

ε_{it} = Error term (the time-varying disturbance term is serially uncorrelated with mean zero and constant variance)

The decision making criteria is shown in table 3.3

Table 3.1: Moderation Decision Making Criteria

Scenario	Description	Conclusion
1.	β_5 in model 3.11 and 3.12 significant $\beta_5 - \beta_8$ in models 3.13 and 3.14 insignificant	Bank size is an explanatory variable
2.	β_5 in model 3.11 and 3.12 insignificant $\beta_5 - \beta_8$ in models 3.13 and 3.14 significant	Bank size is a Moderator

3.7.3 Estimation of Panel Data Regression Model

In the estimation of panel data, both static and dynamic specifications were checked using both fixed effect and random effects estimators. Other types of panel data analytic models of interest as are constant coefficients models and dynamic panel models. These models are explained as follows:

The Fixed Effects Model

This type of panel model has constant slopes but intercepts that differ according to the cross sectional (group) meaning there are no temporal effects. In this study there may be significant differences among banks in this type of model. While the intercept of cross-section (group) may differ from bank to bank, it may or may not differ over time.

Random Effect Model

Random effects model are used to handle ignorance or error by assuming that the intercept is a random outcome variable (Greene, 2008). This model assumes neither heteroskedasticity nor autocorrelation within the panels to avoid complicating the covariance matrix.

Dynamic Panel Models

Dynamic or lagged regression models are regression models that take into account time lags. Panel specific autocorrelation or autocorrelation across all panels may exist. An autoregression on lags of the residuals may indicate the presence or absence of autocorrelation and the need for dynamic panel analysis (Wooldridge, 2002). Ordinary Least Squares is not appropriate in the case there is the problem of multicollinearity meaning successive lagged values of a regressor are correlated.

The study estimated both the long run and the short run specified in equations 3.2a, 3.2b, 3.4a, 3.4b, 3.6a, 3.6b, 3.8a, 3.8b, 3.10a, 3.10b, 3.11, 3.12, 3.13 and 3.14. The long run specifications were estimated using the fixed effects or random effects models while the short run model was to be estimated using system GMM estimator as put forward by (Verbeek, 2004). The generalized method of moments (GMM) is a statistical method that combines observed economic data with the information in population moment conditions to produce estimates of the unknown parameters of this economic model. Roodman (2006) states that when the data feature a large numbers of countries (N) relative to the time period (T), the GMM-difference estimator proposed by Arellano and Bond (1991) and the GMM-system estimator by Arellano and Bover (1995) and Blundell and Bond (1998) work well. These two estimators are typically used to analyse micro panel datasets (Eberhardt, 2012). GMM was employed because of the dynamism of the short run (dynamic) specifications. GMM estimators also known to be consistent and efficient.

The Estimation of the short run model were preceded by the estimation of the naïve OLS and fixed effects models to establish the required bound for coefficient of lagged bank performance as put forth by (Roodman, 2006). To establish the satisfaction of pre-estimation assumptions of tolerable multicollinearity and normality of the one way error component models, correlation analysis and extended Bera-Jarque normality test by Galvao, Montes-Rojas, Sosa-Escudero and Wang (2013) were to be used. Multicollinearity is a typical phenomenon in time-series data that refers to the tendency

of the explanatory variables to co-vary and hence making it difficult to determine the statistical significance of each independent variable.

To establish the reliability of the estimates a number of post estimation diagnostics were to be interpreted. The fixed and random effect model involved interpretation of the F statistic, interclass correlation (rho), within and between R-square, chow test statistics, LM test statistic and Hausman test. The short run GMM specification involved the interpretation of Hansen J statistic and the Arrelano and Bond autocorrelation tests.

These pre and post estimation diagonistic tests are discussed in the succeeding paragraphs.

Correlation analysis

Correlation analysis were to be used as a pre estimation diagonistic test for multicollinearity and association between the dependent and independent variables. Correlation coefficients range between negative one and positive one and may be significantly different from zero or not. A significant positive correlation coefficient shows that the variables commove in the same direction and the signange of regression coefficients should be positive. A significant negative correlation coefficient shows that the variables commove in different directions and the signage of the regression coefficients is negative. A coefficient of zero shows no association between any two variables.

If the correlation coefficients are significant and near perfect (positive one) the data regression estimates are affected by multicollinearity. The variables with the near perfect correlation coefficient give the same information and one of the variables should be dropped in favour of the other to avoid multicollinearity. According to Guajarati (2003), pair-wise correlation coefficients less than 0.8 indicates that the problem of multicollinearity is not severe and is normally ignored. However, correlation coefficients in excess of 0.8 points to existence high degree of multicollnearity among the regressors and warrants a remedial action.

Residual Normality tests

The tests of significance such as the standard errors and t tests are anchored on the assumption that the error term is normally distributed and has constant variance. Therefore, the study had to establish a priori that the one way error component models were in the panel data sets and in objective four were normally distributed and had constant variance.

The extension of the Bera-Jarque normality test by Galvao, Montes-Rojas, Sosa-Escudero and Wang (2013) made the normality test of the residual a standard test that can be performed prior to the estimation of the model or even after the estimation of the model. The test has a null hypothesis that the components of the error term are normally distributed. Rejection of the null hypothesis implies that t tests and standard errors from the models cannot be used to test the significance of coefficients in the models.

F test and Wald Test

The F test and Wald test are post estimation diagnostic tests that are used to test whether the coefficients of independent variables are jointly significant in explaining variations in the dependent variables in the fixed effects and random effects model. The tests have a null hypothesis that all the coefficients are jointly equal to zero and an alternative that at least one of the coefficient is none zero. Rejection of the null hypothesis implies that the independent variables are jointly significant explaining variations in the dependent variable.

Chow and Lagrange Multiplier tests for Cross-sectional Dependence

Chow and Breusch and Pagan Lagrange multiplier (LM) tests are used to test whether the fixed effects model is better than pooled OLS model and the appropriateness of the random-effects model relative to the pooled OLS model respectively. The chow test has a null hypothesis that the bank fixed effects are equal to zero. Therefore, the rejection of the null hypothesis shows that the fixed effects model should be preffered over POLS

model. The LM test has a null hypothesis that bank random effects are jointly equal to zero that is the cross sections are not heterogeneous. The rejection of the null hypothesis therefore implies that the random effects model is preferred over the POLS model.

Within and between R-square

Panel data has the property that variations in a variable can be explained by changes in an individual overtime and changes between any two individuals. The within R square shows that proportion in the dependent variable variations that are explained by change in an individuals over time. The between R square shows the variations in the dependent variables due to variations between individuals. Therefore, the exploitations of this classification by study showed variations in the bank performance due to variations within individual banks overtime and those due to differences between the banks.

Hausman Test

Hausman test is used to discriminate between the random effects and fixed effects specification of the long run model. The test has a null hypothesis that regressors and individual heterogeneity are strictly exogenous. Based on the assumptions of the random and fixed effects model on the distribution and behavior of individual specific effects (heterogeneity) the null hypothesis implies consistency of fixed effects specification over random effects specification and vice versa.

Hansen J statistic

The Hansen J statistic test shows whether the overidentifying restrictions for the GMM instruments are valid or not. The test has a null hypothesis of the validity of the overidentifying restrictions for the instruments. Therefore, failure to reject the null hypothesis shows that the instruments employed by the model are appropriate and lead to precise consistent estimates (Roodman, 2006).

Arrelano and Bond autocorrelation test

Arrelano and Bond autocorrelation diagnostic test tests the presence of autocorrelation in the error term to inform the selection of instruments. Arrelano and Bond autocorrelation test assumes stationarity The test reports the AR(1) , first order autocorrelation, test statistic and the AR(2), second order, autocorrelation test. The test has null hypothesis of no serial correlation in both cases. A rejection of the null hypothesis therefore implies presence of the given order of serial correlation while the failure to reject the null hypothesis implies absence of serial order correlation. Depending on the finding appropriate selection of insturments from the second or fisrt lag and differences is made (Roodman, 2006).

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSION

4.1 Introduction

This chapter presents descriptive statistics of the data used in the analysis of each objective. The chapter also presents regression diagnostic checks, panel data specification tests and the interpretation of the panel regression results.

4.2 Findings of Descriptive Statistics

The population consisted of 43 commercial banks licensed by the Central bank of Kenya and operational in Kenya in the period between 2005 to 2014 and the data was collected from the financial statements of each commercial bank and annual reports from CBK database. Charterhouse Bank which is under statutory management has been excluded. Therefore, the study used panel data with 43 cross sections and a period of 10 years. This made the study to be a large N (cross sections) and a small T (period) study. Hence the study used the micro panel data. Therefore, panel data methods applicable for short run and long run specifications of large N but small T panel data sets were used in the study.

Some observations on the 10 variables used for analysis of the secondary data sections were missing. Therefore, instead of 4,300 (43×100) anticipated observations study used 4,106 observations. However, the unbalanced nature of the panel data set did not affect the methodology since the methods used for balanced panel data analysis are robust enough for application in unbalanced panels. Data obtained was transferred to STATA Version 13.0 for analysis.

The section that follows shows the descriptive statistics for the secondary data variables. Table 4.1 statistics shows that the Kenyan Commercial banking sector has changed significantly, with approximately 640 per cent increase in the profit before

tax from Ksh.19, 013.90 million in 2005 to Ksh. 141,149.00 million in 2014. Shareholders equity also increased by 530 per cent from Ksh. 79,688.00 million in 2005 to Ksh 501,734.00 million in 2014.The statistics show, loans and advances to customers have increased by 470 per cent from Ksh. 331,520.00 million in 2005 to Ksh1, 890,178.00 million in 2014. Gross Non-performing loans have increased by 60% per cent from Ksh. 68,139.00 million in 2005 to Ksh. 104,582.62 million in 2014.

Table 4.1: Annual Number of Banks, Profit before tax, Shareholders Equity, Total assets, Gross loans and Non-performing loans

Year	No. of Banks	Profit before Tax Kshs.M	Shareholders Equity Kshs.M	Total Assets Kshs M	Gross loans Kshs. M	Gross Non-performing loans Kshs. M
2005	40	19,013.90	79,688.00	620,936.00	331,520.00	68,139.00
2006	40	26,192.00	91,867.00	735,652.00	383,669.00	96,700.00
2007	40	33,990.00	122,677.00	935,413.00	479,293.00	53,600.00
2008	42	42,825.00	164,114.00	1,166,436.00	619,068.00	59,823.00
2009	43	48,641.00	194,570.00	1,329,787.00	710,135.00	57,974.00
2010	43	74,275.00	265,805.00	1,678,111.00	877,619.00	56,870.00
2011	43	75,372.49	318,420.00	2,022,669.00	1,173,081.00	48,359.00
2012	43	107,902.38	362,181.00	2,288,810.00	1,329,528.00	55,450.93
2013	43	125,756.00	432,178.00	2,729,805.00	1,536,370.00	82,340.55
2014	43	141,149.00	501,734.00	3,166,432.00	1,890,178.00	104,582.62
		640%	530%	410%	470%	60%

To achieve the study objectives, secondary data was used to test hypotheses. The summary statistics of the secondary are shown in table 4.2.

Table 4.2: Summary Statistics for the Secondary Data Set

Variables	N	Mean	Standard Deviation	Min	Max
ROE	416	0.178	0.170	-0.909	0.500
CRWAR	415	0.242	0.143	0.057	1.102
AQR	396	0.166	0.305	0.002	4.110
LLPR	406	0.061	0.154	0.001	2.669
LAR	411	0.747	0.278	0.205	3.102
DFL	416	3.042	4.700	2.340	54.85
LCR	414	0.461	0.281	0.188	4.590
NIM	413	0.520	6.678	0.224	127.0
FXE	405	6.446	0.768	5.314	11.40
NSFR	414	3.203	3.068	0.645	38.06
CIR	414	0.561	0.214	0.045	1.60

Table 4.2 shows that the number of observations per each variable varied. This may be explained by the unbalanced nature of the panel data used in the analysis. Table 4.2 additionally shows that on average the overall mean return on equity, core capital to risk weighted asset ratio, asset quality and loan loss provision were 17.8, 24.2, 16.6 and 6.08 per cent respectively. Therefore, over the period the banks were positively profitable, adequately capitalized and experienced some relatively high levels of deterioration in asset quality during the study period.

The mean of ROE of 17.8 per cent is an indication that banks are competing among them for making profit however their standard deviations of 17.0 percent evident that their profit making capacity is divergent from each other. The asset quality ratio among the commercial banks in Kenya is varied from 0.2 percent to 411.0 percent with the mean and standard deviation 16.6 and 30.5 respectively which indicates that there is a high volatility among the banks' ability in credit risk management. There is also moderate variation among the banks in loan loss provision ratios which is evident from standard deviation of the ratio of loan loss reserve to total loan which is 15.4 percent.

The mean loan and advance ratio, degree of financial leverage, liquidity coverage ratio and net stable funding ratio were 174.0, 304.2, 46.1 and 320.3 per cent respectively. Therefore on average the banks created more money from their deposits and sufficiently met liquidity requirements.

The Loan and advance to deposit ratio (LAR) is the most commonly used measure of bank liquidity. The ratio also indicates how far the bank used depositors fund on credit activity which is prone to default risk. From the table 4.4 the average LAR of Kenyan banks was 74.8 percent with standard deviation of 27.8 percent. The maximum and minimum values were 20.5 percent and 310.2 percent respectively, suggesting that the banks concentrate on lending business which is relatively riskier than other options to use depositor money. Though the finance literature states that there is a correlation between high risk and high return, concentration on lending could lead to accepting higher credit risk. This needs to be accompanied by a rigour credit risk management and strong effective loan service process.

From the table 4.2 the average liquidity coverage ratio of Kenyan banks was 46.1 percent with standard deviation of 28.1 percent. The maximum and minimum values were 18.8 percent and 459.0 percent respectively. This indicate high liquidity which could be attributed to the fact that commercial banks require higher liquidity levels in order to satisfy the customer cash needs which are commonly on random demand. High liquidity may result to low or high returns depending as to whether the liquidity assets are held exclusive or not. Jhingan (2004) indicated that a bank needs a high degree of liquidity in its assets portfolio in such a way that there is ease and certainty with which assets can be turned into cash. This is evident by Kenyan banks that must hold a sufficient large proportion of its assets in the form of cash and liquid assets for the purpose of profitability. The profit will be low if the bank keeps liquidity the uppermost. In the other hand, if it aims at earning more by ignoring liquidity and, it will be disastrous for it. The bank is required to manage its investment portfolio by

striking a balance between the objectives of liquidity and profitability. This balance must be achieved with a relatively high degree of safety

Degree of financial leverage (DFL) may be defined as the percentage change in earnings (EPS) that occurs as a result of a percentage change in earnings before interest and taxes (EBIT). DFL as a measure of financial risk was computed as EBIT divided by the difference between the EBIT and the Interest. From the table 4.2 the average DFL of Kenyan banks was 3.042 with standard deviation of 4.700. The maximum and minimum values were 2.340 and 54.854 respectively. There was high degree of financial level (DFL) during the study period which is an indication that employing heavy financial leverage, really goes to work, allowing the commercial banks to greatly expand earnings per share as a result of a change in earnings before interest and taxes.

Available amount of stable funding is much higher than the required amount of stable funding for the commercial banks during the period of the study. Available amount of Stable Funding comprises of the bank's capital, preferred stock and liabilities with maturities greater than or equal to one year while required amount of stable funding is calculated as the weighted sum of the value of assets held and funded by the entity including off-balance sheet exposures.

The study also used the net interest margin (NIM) as a proxy of interest rate risk which is defined as the net interest income expressed as a percentage of average earning assets. NIM reflects the profit obtained by a bank from interest-earning activities. Further table 4.2 shows that the mean net interest margin was 52.0 percent with a corresponding standard deviation of 6.678. Therefore, this implies the difference between the interest income and interest expenses are high for commercial banks and most of them are expected to be profitable. The mean of net foreign currency exposure was 6.446 percent with a corresponding standard deviation of 0.768.Therefore the

study indicates that there is risk of unexpected changes in foreign exchange currency rates on Kenyan commercial banks.

4.3 Panel data specification test

For insights into the association between the dependent variable and independent variables focus was on the correlation analysis which was conducted to see the existence of multicollinearity. In addition, correlation analysis informs which variables should be dropped for having the same information (near perfect correlation). The section is organized as per the domains of risk involved in each objective and hypothesis.

To establish the distribution of each of the one way error components for panel data models 3.1, 3.3, 3.5 and 3.7 an extension of the classical Bera-Jarque test by Galvao, Montes-Rojas, Sosa-Escudero and Wang (2013) was used. The test was used to verify whether the analysis of the variance of the error term could be used to test significance of the coefficient. The section first presents the correlation analysis of the components of risk measurement in each domain followed by the one way error component, Skewness, Kurtosis and normality test.

4.3.1 Pairwise correlation between Credit risk components

Credit risk had four dimensions namely; core capital to risk weighted assets (CRWAR), asset quality (AQR), loans loss provision (LLPR) as well as loans and advances (LAR). The correlation analysis between these dimensions themselves and return on equity is shown in table 4.3

Table 4.3: Correlation between Credit Risk Components and Return on Equity

	ROE	CRWAR	AQR	LLPR	LAR
ROE	1				
CRWAR	-0.251	1			
	(0.000)				
AQR	-0.521	0.163	1		
	(0.000)	(0.001)			
LLPR	-0.389	0.246	0.846	1	
	(0.000)	(0.000)	(0.000)		
LAR	-0.073	-0.181	-0.034	-0.031	1
	(0.159)	(0.000)	(0.499)	(0.531)	

Key: P-values in parenthesis

ROE represents Return on equity, CRWAR capital to risk weighted assets ratio, AQR represent Asset Quality ratio, LLPR represents loan loss provision ratio and

The results also indicate that return on equity is significantly negatively correlated with all the components of credit risk except for loans and advances. This is at variance with the findings of Kolapo *et al*., (2012) who found positive relationship between profitability and loan and advances. Therefore, in the regression analysis it was expected that the coefficients of core capital to risk weighted assets, asset quality and loan loss provision will be negative. However, from correlation analysis the study could not tell whether or not the coefficient of loans and advances will be significant and the nature of signage of its coefficient.

Asset quality is significantly negatively correlated with return on equity with correlation coefficient of 0.521 with a corresponding p-value of 0.000. Negative correlation coefficient between asset quality and return on equity was expected due to the fact that loan constitutes the largest share of assets that generate income for the

investment (equity). Asset quality ratio which is expressed as non-performing loans to total loans and the quality of loan portfolio determines the profitability of banks which is proxied by ROE. The loan portfolio quality has a direct bearing on bank profitability. Hence a decrease in non-performing loans may lead to a better performance of commercial banks. The deterioration of asset quality is an indication of higher credit risk which result to lower expected returns. Dang (2011) indicated that the highest risk facing a bank is the losses derived from delinquent loans.

There was also negative correlation coefficient between Loan Loss provision and return on equity of 0.389 with a corresponding p-value of 0.000. Loan Loss provision (reserves) to Gross Loans ratio (LLPR) is a measure of bank's credit quality that indicates how much of the total portfolio has been provided for but not charged off. Indicator shows that the higher the ratio the poorer the quality and therefore the higher the risk of the loan portfolio will be. In addition, Loan loss provisioning ratio indicates high credit quality by showing low figures. Increases in loan loss reserves generally reduce net income. Wall and Koch (2000) indicated that loan loss reserves represent capital that should be built up during good economic times in order to absorb losses during bad times. The reserves represent the recognition of losses in banks' loan portfolios that have not yet been realized. Thus, when a bank incurs actual cash flow losses upon defaults, it can draw down its reserves, as opposed to recognizing a decline in its net income. Increases in loan loss reserves via loan loss provisions recognized on the income statement would, by decreasing shareholders' equity, also result in lower Tier 1 capital. Thus, results imply that larger loan loss reserves are associated with higher bank failure risk and hence lower profit.

The above statistics indicate that loan loss provision is significantly positively correlated with core capital to risk weighted assets. The association has a positive correlation of 0.246 with a corresponding p-value of 0.000. Therefore, it's significantly different from zero at one per cent level of significance. The fact the correlation coefficient is positive shows that loan loss provision and core capital to

risk weighted assets act in same direction. In Basel I, capital framework considers that general loan loss reserves are tier 2 capital up to 1. 25% of risk-weighted assets. Therefore, bank managers might have incentives to use loan loss provisions to alter regulatory capital ratios.

The results show that loans and advances ratio is not significantly correlated with the other dimensions except for core capital to risk weighted assets. The association between loans and advances and core capital to risk weighted assets has a negative correlation coefficient of 0.181 with a corresponding p-value of 0.000. Therefore, it is significantly different from zero at one per cent level of significance. The fact that the correlation coefficient is negative shows that loans and advances and core capital to risk weighted assets act in different direction. This is expected because loan and advance ratio is the ratio of total loan and advances to customers' deposit. If the loans and advances increase the capital held by the banks decreases.

Additionally, correlation between asset quality and loan loss provision ratio is positive and near perfect. The correlation coefficient is 0.846 with a matching p-value of 0.000. Therefore, the correlation coefficient is significantly different from zero at one per cent level of significance. The findings of the study concur with results of Ahmed, Takeda and Shawn (1999) which they found that loan loss provision has a significant positive influence on non-performing loans. Therefore, an increase in loan loss provision indicates an increase in credit risk and deterioration in the quality of loans consequently affecting bank performance adversely. When variables are highly correlated they both express basically the same information as collinearity exists. Collinearity is the term used to explain the dependence of one variable to other. Statistically multicollinearity is not needed because if they exist, then independent variables are redundant and do not add any predictive value over each other. In general, independent variables having collinearity at 0.8 or greater would not be included in regression analysis. This is expected since deterioration in asset quality causes an increase in loan loss provision ratio. Besides, we also expect that the bad

loans ratio which describes Non Performing loans and loan loss preparation have significant positive-correlation, because where there is more bad loans, more loan loss provision should be prepared. Therefore, to avoid endogeneity problems loan loss provision was dropped from the regression analysis.

4.3.2 Correlation between Components of Market Risk Domain

Market risk had three consisted of degree of financial leverage (DFL), net interest margin (NIM) and foreign currency exchange exposure (FXE). The correlation between these dimensions themselves and return on equity is shown in table 4.4 below.

Table 4.4: Correlation between Market Risk Components and Return on Equity

	ROE	DFL	NIM	FXE
ROE	1			
DFL	-0.764	1		
	(0.000)			
NIM	-0.597	0.253	1	
	(0.000)	(0.000)		
FXE	-0.421	0.213	0.671	1
	(0.000)	(0.000)	(0.000)	

Key: P-values in parenthesis

ROE represents Return on equity, DFL represents degree of financial leverage, NIM represents net interest margin and FXE foreign currency exchange exposure

Table 4.4 shows that all the dimensions of market risk are significantly negatively correlated to return on equity. This implies that market risk is negatively associated with financial performance of commercial banks in Kenya. This is expected since changes in lending and foreign exchange rates move in different directions with bank performance. The fact that dimensions of market risk are negatively associated with

return on equity means that the coefficients of the dimensions in the regressions were expected to be negative.

The above statistics indicate that the correlation coefficient between ROE and net interest margin which is a proxy of interest rate risk was found to be significant and negative. The correlation coefficient is negative 0.597 with a corresponding p-value of 0.000. Therefore, it is significantly different from zero at one per cent level of significance. Increase in market interest rates causes the banks to increase their lending rates where the borrowers may default and hence low profits. Low interest rates may influence bank risk by affecting the valuation, cashflows and also the income streams of the banks. The banks also shift the cost on loan default to other customers in the form of higher interest rate on loans. Higher interest margin charged on loan by commercial banks due to weak credit risk management practices prevent customers and micro-enterprises from accessing loans. Such a situation prevents business expansion and affects the return expected by the shareholders.

The correlation coefficient between foreign exchange exposures with net interest margin is significant and positive. The correlation coefficient is 0.671 with a corresponding p-value of 0.000. Therefore, it is significantly different from zero at one per cent level of significance. This may be explained by the fact that changes in interest rates are used to stabilize the exchanges rate by the central bank in Kenya. Thus depreciation in the shilling is associated with a higher interest margin. The connection between foreign exchange exposure with net interest margin is purely interventional not causational.

The results indicate that there is positive correlation coefficient between Net interest margin and degree of financial leverage for the Kenyan banks. The correlation coefficient is 0.253 with a corresponding p-value of 0.000. Therefore, it is significantly different from zero at one per cent level of significance.

4.3.3 Pairwise correlation between components of Liquidity Risk Domain

Liquidity risk domain consisted of liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) dimensions. The correlations between these dimensions themselves and return on equity is shown in table 4.5.

Table 4.5: Correlation between Liquidity Risk Components and Return on Equity

	ROE	NSFR	LCR
ROE	1		
NSFR	-0.293	1	
	(0.000)		
LCR	0.050	-0.202	1
	(0.334)	(0.000)	

Key: P-values in parenthesis

ROE represent return on equity, LCR represents Liquidity

Coverage ratio and NSFR represents net stable funding ratio

Table 4.5 shows that only net stable funding ratio is significantly correlated with return on equity. The correlation coefficient is -0.293 with a p-value less than 0.01. Therefore the correlation coefficient is significant at one per cent level of significance. This implies that the coefficient of net stable funding in the regressions will be negative. The coefficient of liquidity coverage ratio is 0.050 with a p-value greater than 0.1. Therefore, the correlation coefficient is not significant at one per cent level of significance. Thus the study cannot tell a prior what signage the coefficient of liquidity coverage ratio will have and whether it will be significant.

There is also negative correlation coefficient between net stable funding ratio and liquidity coverage ratio. The correlation coefficient is -0.202 with a p-value less than

0.01. Therefore the correlation coefficient is significant at one per cent level of significance.

4.3.4 Skewness, Kurtosis and Normality Test of One Way Error Component for panel Models

The extension of the Bera-Jarque normality test by Galvao, Montes-Rojas, Sosa-Escudero and Wang (2013) made the normality test a standard test that can be performed prior to the estimation of the model or even after the estimation of the model. The normality test of each of the components in the error term is shown in table 4.6 for each model.

Table 4.6: Skewness Kurtosis and Normality of One way Error component for Panel Models

		Skewness		**Kurtosis**		**Normality**	
Model	**Error Component**	Z Statistic	P-Value	Z Statistic	P – Value	Chi Statistic	P-Value
3.1	e	-1.48	0.139	2.31	0.0871	7.53	0.0631
	u	-3.37	0.1243	2.91	0.1561	2.24	0.0732
3.3	e	-0.5	0.614	2.48	0.0873	6.4	0.0576
	u	0.09	0.93	-0.84	0.402	0.71	0.7008
3.5	e	-1.46	0.144	2.36	0.328	7.69	0.1214
	u	-2.2	0.078	1.57	0.116	7.33	0.0656
3.7	e	1.08	0.278	1.65	0.071	8.80	0.0623
	u	1.74	0.081	0.98	0.353	3.90	0.1421

Table 4.6 shows the distribution of the one way error component in the linear panel models 3.1 through 3.7. The individual specific heterogeneity component is u while the rest of the error term is e. u varies with banks only while e varies across banks and time. To use the variance of the combined error term to test the significance of the

coefficients in the estimates of the model requires that each component is normally distributed. Therefore, the skewness and kurtosis of the components should be symmetrical to that of the normal distribution.

Table 4.6 shows that the z statistic for the skewness of all the components in model 3.1 through 3.7 have z statistics with corresponding p-values that are greater than 0.01. Thus the Z statistics are less than the tabulated at five per cent level of significance. Therefore, the null hypothesis of symmetrical skewness with normal distribution is not rejected for any component in all the models. Thus the components are neither negatively nor positively skewed compared to the normal distribution.

Table 4.6 further shows that the z statistics for kurtosis of all the components of the error terms in all the models have p-values greater than 0.1. Therefore the z statistics are less than the tabulated statistics at five per cent level of significance. Thus the null hypothesis that each components kurtosis is symmetric to that of the normal distribution is not rejected at five per cent level of significance. Therefore the components of the error term are neither more nor less peaked than the normal distribution.

The overall normality test of each component of the error term in models 3.1, 3.3,3.5 and 3.7 has chi statistics with corresponding p-value that are greater than 0.1. Therefore, the chi statistics are less than the critical values at five per cent level of significance. Thus the null hypothesis that each component is normally distributed is not rejected at five per cent level of significance for all the models. Therefore the error components are normally distributed for each model.

The fact that the one way error component model is normally distributed in all the models implies that the study could reliably use the standard errors and t-statistics. The use of standard errors and t statistics to test for the significance of coefficients is based on Gaussianicity of the error term. An assumption satisfied by the errors from the panel data models 3.1, 3.3, 3.5 and 3.7.

4.4 Panel regression results

This section presented the study findings thematically based on the study objectives. The study presents the findings as follows; each long run model is presented separately and its post-estimation diagnostics discussed to establish the reliability of the findings, the study discriminates between the long run models using Hausman test and presents the naïve OLS and fixed effects estimates of the short run specification to establish the range where the coefficient of lagged return on equity should lie in the GMM specification. The study estimates and presents the GMM specification while presenting the instruments used and discussing the post-estimation diagnostics of the GMM model. Finally the study presents a comparative summary of all the models and tests the hypotheses both in the short and in the long run.

4.4.1 Effect of credit risk on financial performance of commercial banks

To test the first hypothesis the long run and the short run version of model 3.1 were estimated. The first long run specification of model 3.1 was the fixed effects model whose findings are shown in table 4.7.

Table 4.7: Fixed Effects Estimates for Model 3.1

Dependent variable		ROE
Explanatory Variable		Coefficient
CRWAR		-0.352***
AQR		-0.194***
LAR		-0.028
Constant		-2.826***
Post Estimation Diagnostics		
R square	Within	0.087
	Between	0.4181
	Overall	0.2897
	Rho	0.589
F test (3, 320)		10.18***
chow test	F(41, 320)	9.47***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

The analysis shows that the F statistic is 10.18 and is greater than the critical value at one per cent level of significance. Therefore, the variables which are the credit risk components are jointly significant in explaining the variations in return on equity. The interclass correlation (rho) is 58.9 per cent implying that 58.9 per cent of the variations in return in equity are due to differences across the banks. The within and between R-square is 8.7 per cent and 41.8 per cent respectively. Thus, 8.7 per cent of variations in the return on equity are due to differences within individual banks and 41.8 per cent of the variations are due to differences between the banks. The overall R^2 is 28.9 percent, indicating that the variables considered in the model account for about 29 percent change in the dependent variables, while about 71 percent change may be as a result of other variables not addressed by this model.

The chow test statistic is 9.47 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the fixed effects are equal to zero

is rejected at one per cent level of significance. Thus the option of specifying the model as a pooled OLS model over the Fixed effects specification is rejected at one per cent level of significance. The second alternative specification of model 3.1 is the random effects model whose findings are shown in table 4.8.

Table 4.8: Model 3.1 Random Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
CRWAR		-0.381***
AQR		-0.242***
LAR		-0.043
Constant		-3.051***
Post Estimation Diagnostics		
R square	Within	0.086
	Between	0.434
	Overall	0.301
	Rho	0.515
Wald test (3, 365)		55.69***
Lm test	Chibar2	252.02***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.8 shows that the Wald statistic is 55.69 and is greater than the critical value at one per cent level of significance. Therefore, the variables (credit risk components) are jointly significant in explaining the variations in return on equity in the random effects specification.

The interclass correlation (rho) is 55.7 per cent implying that 55.7 per cent of the variations in return in equity are due to differences across the banks as per the random effects model. The coefficient of determinations, R-square shows the within and between values of 8.6 per cent and 43.4 per cent respectively. Thus, 8.6 per cent of

variations in the return on equity are due to differences within individual banks and 43.4 per cent of the variations are due to differences between the banks.

The LM test statistic is 252.02 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the cross sections are not heterogeneous is rejected at one per cent level of significance. Thus the random effects specification is preferred over pooled OLS.

A comparison of the post estimation diagnostics between the Fixed and random effects specification reveals that the conclusions are comparable. For instance when POLS specification is compared with the estimated models it's rejected in both instances. In addition the overall explanatory powers of the specifications are not significantly different; the fixed effect specification explains an overall explanation 29 per cent while the random effects model has an overall explanation of 30 per cent. However, the consistency in post estimation diagnostics does not eliminate the need to discriminate between the models. The Hausman test statistics to discriminate between the specifications are shown in table 4.9.

Table 4.9: Model 3.1 Hausman Test

Test statistic Chi(3)	P-value
12.99	**0.005**

Table 4.9 shows that the test statistics have a chi statistic of 12.99 with three degrees of freedom and a corresponding p value of 0.005. Therefore, the null hypothesis that the regressors and individual heterogeneity are strictly exogenous is rejected at one per cent level of significance. Thus the FE specification is preferred over RE specification. Therefore, for the long run specification the fixed effects model should be interpreted.

To establish the bound where the coefficient of lagged profits would lie the naïve OLS was estimated. The OLS estimates overstate the coefficient of lagged profits by attributing to it some explanatory power of the error term. Thus the OLS estimate provides the upper bound of the coeffient. The OLS estimates are shown in table 4.10.

Table 4.10: OLS Estimates for credit risk components

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.604***
CRWAR	-0.199***
AQR	-0.137***
LAR	-0.091**
Constant	-1.344***
Post Estimation Diagnostics	
R square	0.628
F statistic (4, 314)	132.31***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.10 shows that the coefficient of lagged return on equity is 0.604. Therefore, the upper bound for the coefficient of lagged return on equity in the GMM specification of the short run model should be 0.604. To get the lower bound the fixed effect estimates of the short run specification are used. Fixed effect estimation understates the coefficient by denying the lagged dependent variable some of its explanatory power, thus providing the lower bound. The fixed effect estimates of the short run specification are shown in table 4.11.

Table 4.11: Fixed Effects Estimates for credit risk components

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.247***
CRWAR	-0.257**
AQR	-0.148***
LAR	-0.039
Constant	-2.075***
Post Estimation Diagnostics	
R square	0.164
F statistic (4, 314)	13.34***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.11 shows the fixed effects estimates of the short run specification of model 3.1. The coefficient of lagged return on equity is 0.247. Thus the lower bound of lagged return on equity in the GMM specification should be 0.247. Specifically if the estimate is λ , it should lie in the interval $0.247 \leq \lambda \leq 0.604$.

To obtain consistent estimates of the short run spefication one step system GMM is used. The estimates are shown in table 4.12.

Table 4.12: One Step System GMM Estimates

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.579***
CRWAR	-0.146
AQR	-0.086*
LAR	-0.168***
Constant	-1.187***
Post Estimation Diagnostics	
Hansen J test	40.5
AR (1)	-3.62***
AR (2)	-0.92
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.12 shows the one step system GMM estimates for the short run specification of model 3.1. The coefficient of the lagged return on equity is 0.579. The coefficient, therefore, lies in the acceptable range of $0.247 \leq \lambda \leq 0.604$ etablished by the naïve OLS estimates and fixed effects estimates of the short run model 3.1. This points to consistency of estimates.

Further it shows that the Hansen J statistic is 40.5 with a corresponding p-value greater than 0.1. Therefore, the null hypothesis of the validity of the overidentifying restrictions for the instruments is not rejected at one per cent level of significance. Therefore, the instruments employed by the model are appropriate and lead to precise consistent estimates.

In addition result shows that the test of autocorrelation in the error terms. The AR(1) , first order autocorrelation, test statistic is -3.62 and is greater than the critical value at one per cent level of significance. Therefore the null hypothesis that disturbance term (error terrm) has no first order serial correlation is rejected at one per cent level of significance. This is expected because of the dynamic specification of model 3.1

and therefore, points to correct specification. The test statistic for second order serial correlation in the error term is -0.92 with a coreresponding p-value that is greater than 0.1. Therefore, at one per cent level of significance the null hypothesis that there is no second order serial correlation in the disturbance term is not rejected at one per cent level of significance. This permits the use of insturments from the second lag and differences further supporting the argument of correct short run specification of model 3.1 using the one step GMM estimates.

To Summarize the findings necessary to test the first hypothesis in the short run and in the long run. The findings in table 4.7 through 4.12 are summarized in table 4.13.

Table 4.13: Effect of Credit Risk on Financial Performance of Commercial Banks in Kenya

	Long Run Model		Short Run Model		
Variables	Fixed Effects	Random Effects	OLS	Fixed Effects	GMM
ROE_{t-1}			0.604***	0.247***	0.579***
			(0.0384)	(0.0501)	(0.0661)
CRWAR	-0.353***	-0.381***	-0.199***	-0.257**	-0.146
	(0.107)	(0.0964)	(0.0618)	(0.110)	(0.0986)
AQR	-0.194***	-0.242***	-0.137***	-0.148***	-0.0859*
	(0.0413)	(0.0374)	(0.0291)	(0.0421)	(0.0436)
LAR	-0.0281	-0.0489	-0.0907**	-0.0386	-0.168***
	(0.0426)	(0.0422)	(0.0367)	(0.0376)	(0.0560)
Constant	-2.826***	-3.051***	-1.344***	-2.075***	-1.187***
	(0.209)	(0.200)	(0.167)	(0.247)	(0.285)
Observations	365	365	319	319	318
R-squared	0.2897		0.628	0.164	
Hausman Chi (3)	12.99***				
Wald statistic		55.69***			
F statistic	10.18***		132.31***	13.34***	44.01***

KEY: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
ROE represents Return on equity, CRWAR capital to risk weighted assets ratio, AQR represent Asset Quality ratio, LLPR represents loan loss provision ratio and LAR represents loan and advances ratio

Table 4.13 shows that the signage of the coefficients is comparable be it in the short run or in the long run. The magnitude of the coefficients is comparable for the long run model but significantly differs in the short run specification as expected. Based on the post estimation diagnostics and theory, only the fixed effects model and the GMM specification results should be interpreted in the long run and short run respectively.

It shows that in the long run the coefficient of capital to risk weighted assets is -0.353 with a p-value less than 0.01. Thus, the coefficient is significantly different from zero

at one per cent level of significance. Therefore, the hypothesis that core capital to risk weighted assets has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.353. Since the dependent variable, ROE, as well as core capital to risk weighted assets ratio enter equation 3.1 in log form, a one per cent increase in the risk weighted assets ratio reduces return on equity by 35.3 percentage points in the long run holding other factors constant.

Capital to risk weighted assets ratio, CRWAR, explains strength of the bank. It improves the solvency of the bank and capacity to absorb the loan loss when CRWAR is high. The ratio is expected to increase when the banks increase the capital and reduce when the banks increase the risk weighted assets. According to the study the former will reduce the return on equity as a result of holding excess capital. The latter will reduce the ratio as risk weighted assets comprise of the high loans that may result to increase in profitability of the commercial banks.

In the short run the coefficient of core capital to risk weighted assets is -0.146 with a p-value greater than 0.1. Therefore, the coefficient is not significant at either 10, five or one per cent. Thus in the short run the hypothesis that core capital to risk weighted assets has a significant negative effect on financial performance of commercial banks in Kenya is rejected at one per cent level of significance. Thus in the short run growth in core capital to risk weighted assets does not influence financial performance of commercial banks.

It further shows that in the long run the coefficient of asset quality is -0.194 with a p value less than 0.01. Thus, the coefficient is significantly different from zero at one per cent level of significance. Therefore, the hypothesis that asset quality has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.194. Since the dependent variable, ROE, as well as asset quality enter equation 3.1

in log form, one per cent deterioration in asset quality reduces return on equity by 19.4 percentage points in the long run holding other factors constant.

In the short run the coefficient of asset quality is -0.0859 with a p-value less than 0.1. Therefore, the coefficient is significant at 10 per cent. Thus in the short run the hypothesis that asset quality has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at 10 per cent level of significance. The magnitude of the coefficient is 0.0859. Thus in the short run deterioration in asset quality by one per cent causes a decline in return in equity of 8.6 percentage points holding other factors constant. These results indicate a significant negative relationship between non-performing loans to total loans and commercial banks' profitability revealing that, there are higher loan losses which causes declines in banks' profit.

These results are expected as banks take deposits and use the same to advance loans and the costs associated with these loans such as insurance costs reduces the profitability margins of the bank. Increase in the portfolio at risk may be caused by increase in loan books and hence an upward increase in insurance costs. Return on equity (ROE) is the reward to the shareholders for the funds they have invested with the banks after other financiers and costs, including liabilities such as taxes have been paid. Therefore increased portfolio at risk will reduce the revenue aspect and increase the cost associated as indicated by the analysis of non-performing loans. The correlation between non-performing loans and return on equity cannot be ignored.

From the findings asset quality affects the financial performance negatively in both short run and long run. This is in line with the results by Hosna *et al*.,(2009) and Kargi (2011) that banks' profitability is inversely influenced by the non-performing loans which is an indicator of asset quality. However, Afriyie (2011) and Ogboi (2013) found that there is a positive relationship between the two variables. The results of this study indicate that lower NPLR is related with the lower risk. An increase in high-

risk loans might enhance the probability of higher NPLR. This means that banks risk management is required due deligence in credit analysis and appraisal. NPL is also a probability of loss which requires provision. Thus high NPL increases the provision while reduces the profit. Non-performing loan over total loans shows the level of banks' exposure to credit risk. If the ratio goes above 25%, is an indication that the bank is getting into the zone of weak credit risk control system (Agborade 2002).

An increase in the doubtful assets, which does not accumulate income, obliges financial entities to assign a significant portion of its gross margin to provisions in order to cover expected credit losses, consequently profitability is expected to affected. The results are also consistent with (Kolapo *et al.,* 2012) & Ruziqa, 2013). Claudine and Felix (2008) findings that return on equity (ROE) measuring profitability was inversely related to the ratio of non-performing loan to total loan of financial institutions thereby leading to a decline in profitability. This indicates that, Kenyan commercial banks are required to improve on sound and effective management practices on default.

With respect to loan and advances table 4.16 shows that in the long run the coefficient of loans and advances is -0.0281 with a p-value greater than 0.1. Therefore, the coefficient is neither significant at 10, five nor one per cent. Thus in the long run, the hypothesis that loans and advances have a significant negative effect on financial performance of commercial banks in Kenya is rejected at one per cent level of significance. Therefore, other things being equal in the long run changes in loans and advances do not influence financial performance of commercial banks in Kenya.

In the short run the coefficient of loans and advances is -0.168 with a p-value less than 0.01. Therefore, the coefficient is significant at either one per cent. Thus in the short run the hypothesis that loans and advances have a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.168. Thus in the short run

a one per cent increase in loans and advances causes a decline in return on equity of 16.8 percentage points holding other factors constant.

These results are expected because loans and advances are risky assets and their large share in bank's assets means a growth of the bank's exposure to risks. Thus, a high value of this indicator could also mean a possible weakening of the bank's assets quality with a negative effect upon profitability which is proxied by ROE. The effect of loan loss reserve to gross loan on profitability is negative as earlier literature by Kolapo *et al*., (2012) and Sufian (2009) which indicated that profitability will be reduced as banks use more profit as buffer against their loan loss. Inorder to reduce loan loss so as to reduce reserve ratio and increase the profitability, prudential credit management is required.

To jointly test whether the components of credit risk negatively influence the financial performance of commercial banks in Kenya F test was used. The test has a null hypothesis that all the coefficients of the components of credit risk are jointly equal to zero. Table 4.16 shows that in the Long run the F statistic is 10.18 and is greater than the critical value at one per cent level of significance. Therefore, in the long run hypothesis one that credit risk has a significant negative effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance.

In the short run the F statistic is 44.01 and is greater than the critical value at one per cent level of significance. Thus in the short run hypothesis one that credit risk has a significant negative effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. Thus credit risk influences financial performance of commercial banks in Kenya both in the short run and in the long run.

The results of the first objective are consistent with the finding are in line with the study's prior expectation, credit risk is negatively and significantly related to

bank performance. This implies that bank increased exposure to credit risk reduces profits. This may result by the fact that health of a bank's loan portfolio may be reflected by changes in credit risk and affect the performance of the institution as indicated by Cooper *et al.,* (2003). The findings of this study concur with studies by (Afriyie, 2011; Hosna *et al*., 2009; Ogboi & Unuafe,2013; Marshal & Onyekachi, 2014) explained that there exist a significant negative association between credit risk components and financial performance. The study by Kithinji (2010) gives evidence that profits of commercial banks are not influenced by the amount of credits or loans. This divergence may be explained by increase in non-performing losses during the period of the current study.. CBK supervision annual report 2013 indicated that the ratio of non-performing loans to gross loans increased from 4.7 percent in December 2012 to 5.2 percent in December 2013. Later the ratio increased from 5.2 per cent in December 2013 to 5.6 per cent in December 2014 and CBK was monitoring closely institutions that were experiencing deteriorating asset quality difference in the study period. This explains that as the loan portfolio increases for the commercial banks, the non-performing loans also increase.

The results may also be explained since an asset or loan become irrecoverable, in case of outright default or the risk of delay in servicing of loans and advances. Thus, when this occurs or becomes persistent, the performance, profitability, or net interest income of banks is affected. Duca and McLaughlin (1990) conclude that variations in bank profitability are largely attributable to variations in credit risk, since increased exposure to credit risk is normally associated with decreased firm profitability. These triggers a discussion concerning commercial banks that are exposed to high-risk loans tend to have higher the accumulation of unpaid loans and the lower the profitability. From the study a conclusion can be made that not the volume of but the quality of loans made.

The whole data analysis may be highly affected by the period between 2007 and 2008 when the country experienced the post-election violence and the non-performing

loans increased resulting to decrease in return on equity. Many businesses and bank branches in affected areas closed during that period. The last two years analysis indicates increased ROE and a decrease in non-performing loans in banking sector caused by improved environment in banking sector and investor confidence in these institutions

4.4.2 Effect of Market risk on financial performance on commercial banks

To test the second hypothesis the long run and the short run version of model 3.3 were estimated. The long run specification consisted of the fixed and random effects model. The fixed effects estimates are shown in table 4.14.

Table 4.14: Model 3.3 Fixed Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
DFL		-0.626***
NIM		-0.174***
FXE		-0.139***
Constant		-0.886***
Post Estimation Diagnostics		
R square	Within	0.5951
	Between	0.7860
	Overall	0.7155
	Rho	0.6084
F test (3, 322)		157.74***
chow test	F(41, 322)	8.19***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.14 shows that the F statistic is 157.74 and is greater than the critical value at one per cent level of significance. Therefore, the variables (market risk components) are jointly significant in explaining the variations in return on equity.

The interclass correlation (rho) is 60.84 per cent implying that 60.84 per cent of the variations in return in equity are due to differences across the banks. The within and between R-square is 59.51 per cent and 78.60 per cent respectively. Thus, 59.51 percent of variations in the return on equity are due to differences within individual banks and 78.60 per cent of the variations are due to differences between the banks.

The chow test statistic is 8.19 and is greater than the critical value at one per cent level of significance. Therefore, the hypothesis that the fixed effects are equal to zero is rejected at one per cent level of significance. Thus the option of specifying the long run version of model 3.4a as a pooled OLS model over the fixed effects specification is rejected at one per cent level of significance.

The alternative long run specification of model 3.3 were the random effects model. The estimates for this specification are shown in table 4.15.

Table 4.15: Model 3.3 Random Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
DFL		-0.643***
NIM		-0.257***
FXE		-0.120***
Constant		-3.182***
Post Estimation Diagnostics		
R square	Within	0.5931
	Between	0.7976
	Overall	0.7260
	Rho	0.5010
Wald test (3, 365)		606.91***
Lm test	Chibar2	172.63***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.15 shows that the Wald statistic is 606.91 and is greater than the critical value at one per cent level of significance. Therefore, the variables (market risk components) are jointly significant in explaining the variations in return on equity in the random effects specification.

The interclass correlation (rho) is 50.10 per cent implying that 50.10 per cent of the variations in return in equity are due to differences across the banks as per the random effects model. The within and between R-square is 59.31 per cent and 79.76 per cent respectively. Thus, 59.31 per cent of variations in the return on equity are due to differences within individual banks and 79.76 per cent of the variations are due to differences between the banks.

The LM test statistic is 172.63 and is greater than the critical value at one per cent level of significance. Therefore, the hypothesis that the cross sections are homogeneous is rejected at one per cent level of significance. Thus the random effects specification is preferred over POLS.

A comparison of the fixed and random effects specification reveals that the two long run models lead to similar conclusions. For instance, POLS specification is rejected when compared to the fixed and random effects specification. In addition, the overall explanatory powers of the fixed and random effects specifications are not significantly different; the fixed effect specification explains an overall explanation 71.55 per cent while the random effects model has an overall explanation of 72.60 per cent. However, Hausman test is conducted to determine which model should be interpreted in the long run. The test statistic for this test is shown in table 4.16.

Table 4.16: Model 3.3 Hausman Test

Test statistic Chi(3)	P-value
15.95	0.0012

Table 4.16 shows that the test statistics have a chi statistic of 15.95 with three degrees of freedom and a corresponding p value of 0.001. Therefore, the null hypothesis that the regressors and individual heterogeneity are strictly exogenous is rejected at one per cent level of significance. Thus the FE specification is preferred over RE specification. Therefore, for the long run specification the fixed effects model should be interpreted.

To establish the bound where the coefficient of lagged profits would lie in the short run specification of model 3.3 the naïve OLS was estimated to establish the upper bound of the coeffient. The OLS estimates are shown in table 4.17.

Table 4.17: Short run OLS Estimates for Model 3.3

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.277***
DFL	-0.572***
NIM	-0.368***
FXE	-0.581***
Constant	-2.778***
Post Estimation Diagnostics	
R square	0.7954
F statistic (4, 320)	310.94***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.17 shows that the coefficient of lagged return on equity is 0.277. Therefore, the upper bound for the coefficient of lagged return on equity in the GMM specification of the short run model should be 0.277.To get the lower bound the fixed effect estimates of the short run specification of model 3.3 are used. The estimates of the short run specification are shown in table 4.18.

Table 4.18: Short run Fixed Effects Estimates for Model 3.3

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.078**
DFL	-0.665**
NIM	-0.198***
FXE	-0.429***
Constant	1.030
Post Estimation Diagnostics	
R square	0.6186
F statistic (4, 314)	113.14***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.18 shows the fixed effects estimates of the short run specification of model 3.3. The coefficient of lagged return on equity is 0.078. Thus the lower bound of lagged return on equity in the GMM specification should be 0.078. Specifically if the estimate is λ, it should lie in the interval $0.078 \leq \lambda \leq 0.277$. The one step system GMM consistent estimates of the short run spefication are shown in table 4.19.

Table 4.19: Model 3.3 One Step System GMM Estimates

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.138***
DFL	-0.646***
NIM	-0.447***
FXE	-0.658***
Constant	3.290***
Post Estimation Diagnostics	
Hansen J test	40.21
AR (1)	-1.54**
AR (2)	-2.27
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.19 shows the one step system GMM estimates for the short run specification of model 3.3. The table shows that the coefficient of the lagged return on equity is 0.138. The coefficient, therefore, lies in the acceptable range of $0.078 \leq \lambda \leq 0.277$ etablished by the naïve OLS estimates and fixed effects estimates of the short run model 3.3. This points to consistency of estimates.

It further shows that the Hansen J statistic is 40.21 with a corresponding p-value greater than 0.1. Therefore, the null hypothesis of the validity of the overidentifying restrictions for the instruments is not rejected at one per cent level of significance. Therefore, the instruments employed by the model are appropriate and lead to precise consistent estimates.

In addition table 4.19 shows that the test of autocorrelation in the error terms. The AR(1) , first order autocorrelation, test statistic is -1.54 and is greater than the critical value at five per cent level of significance. Therefore, the null hypothesis that disturbance term (error terrm) has no first order serial correlation is rejected at one

per cent level of significance. This is expected because of the dynamic specification of model 3.4b and therefore, points to correct specification. The test statistic for second order serial correlation in the error term is -2.27 with a coreresponding p-value that is greater than 0.1. Therefore, at one per cent level of significance the null hypothesis that there is no second order serial correlation in the disturbance term is not rejected at one per cent level of significance permiting the use of insturments from the second lag and differences. This further supports the argument of correct short run specification of model 3.3 using the one step GMM estimates.

To Summarize the findings necessary to test the second hypothesis in the short run and in the long run. The findings in table 4.14 through 4.19 are summarized in table 4.20.

Table 4.20: Effect of Market Risk on Financial Performance of Commercial Banks in Kenya

	Long Run Estimates		**Short Run Estimates**		
Variables	Fixed Effects	Random Effects	Naïve OLS	Fixed Effects	GMM
ROE_{t-1}			0.278***	0.0777**	0.138**
			(0.036)	(0.0360)	(0.057)
DFL	-0.626***	-0.643***	-0.572***	-0.665***	-0.646***
	(0.031)	(0.030)	(0.036)	(0.035)	(0.062)
NIM	-0.174***	-0.257***	-0.368***	-0.198***	-0.447***
	(0.0575)	(0.050)	(0.0471)	(0.064)	(0.085)
FXE	-0.139***	-0.120***	-0.581***	-0.429	-0.658**
	(0.045)	(0.042)	(0.198)	(0.310)	(0.322)
Constant	0.886**	1.361***	2.778***	1.030	3.290***
	(0.359)	(0.312)	(0.599)	(0.844)	(1.020)
Observations	367	367	325	325	325
R-squared	0.595		0.795	0.622	
Hausman Chi(3)	15.95**				
Wald statistic		606.91***			
F statistic	157.74***		310.94***	113.14***	110.73***

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

ROE represents Return on equity, DFL represents degree of financial leverage, NIM represents net interest margin and FXE foreign currency exchange exposure

Table 4.20 shows the long run and short run estimates on the effect of market risk on financial performance of commercial banks in Kenya. The estimates are comparable in terms signage but differ on the magnitude of coefficients. It shows that in the long run the coefficient of degree of financial leverage is -0.626 with a p value less than 0.01. Thus, the coefficient is significantly different from zero at one per cent level of significance. Therefore, the hypothesis that degree of financial leverage has a negative significant effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.626. Since the dependent variable, ROE, as well as degree of financial leverage enter equation 3.3 in log form, a one per cent increase in degree of financial leverage decreases return on equity by 62.6 percentage points in the long run holding other factors constant.

In the short run the coefficient of degree of financial leverage is -0.646 with a p-value less than 0.01. Therefore, the coefficient is significant at one per cent and negative. Thus in the short run the hypothesis that degree of financial leverage has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficients is 0.646. The fact that return on equity and degree of financial leverage enter the equation in log form implies that the coefficient is an elasticity. Thus in the short run a one per cent increase in degree of financial leverage causes a 64.6 percentage points decrease in the financial performance of commercial banks in Kenya holding other factors constant.

Degree of financial leverage is profits before interest and tax divided by tax to profits before tax. Therefore as interest increases, financial leverage will increase. Interest, in turn, being the cost of borrowed funds, will increase with increase in the proportion of debt used for financing assets. The higher the degree of financial leverage of a firm, the greater is the sensitivity of its profits before tax to changes in profits before interest and tax. This evidence is consistent with the Pecking Order Theory, which postulates

a negative correlation between the profitability and the degree of the financial leverage (Myers 1984; Myers and Majluf, 1984). The results are also consistent with that of Gatsi *et al.*, (2013), which is an indication that commercial banks in Kenya continue to enjoy such small profit margins. And that banks using higher proportion of debt in their capital structure were still more profitable than banks using lower proportion of debt due to the tax shield component of debt capital. This result is different from findings of Abid and Mseddi (2004) and Nimalathasan *et al.*, (2012) that there exist a moderate positive association between degree of financial leverage and return on equity. The discrepancies in results may be explained by different economies which is USA and Sri Lanka respectively while the debt level of the banks in Kenya is very high.

Table 4.20 additionally shows that in the long run the coefficient of net interest margin is -0.174 with a p value less than 0.01. Thus, the coefficient is significantly different from zero at one per cent level of significance. Therefore, the hypothesis that net interest margin has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.174. Since the dependent variable, return on equity, as well as net interest margin enter equation 3.4a in log form, one per cent increase in net interest income decreases return on equity by 17.4 percentage points in the long run holding other factors constant.

In the short run the coefficient of log of net interest margin is -0.447 with a p-value greater than 0.01. Therefore, the coefficient is significant at one per cent. Therefore, the hypothesis that net interest margin has a significant negative effect on financial performance of commercial banks in Kenya in the short run is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.447. Since the dependent variable, return on equity, as well as net interest margin enter equation 3.4b in log form, one per cent increase in net interest income decreases return on equity by 44.7 percentage points in the long run holding other factors constant. Hence the results

indicate that there is a negative association between the interest rate risk and return on equity.

The results indicate that there is a negative association between the interest rate risk which is measured by net interest margin and return on equity. This association is expected because fluctuations of interest rate lend to fluctuations in net interest margins which may cause low bank profitability. The result is in line with results by (Aruwa & Musa, 2014; Ngalawa *et al.*, 2013; Ngetich & Wanjau, 2011) that interest rate risk affects the bank profitability negatively. This result may be due to that where floating rate assets and liabilities that reprice at similar times and have base rates of similar maturity still may involve interest rate risk. The bank is expected to be subjected to basis risk reflecting the possibility if the instruments have different base rates. This is because the two base rates will diverge unexpectedly owing to differing credit risk or liquidity characteristics that affect the bank profitability. High interest rate increases the cost of loans and the type of interest rates adopted by banks influences the non- performing assets. A rise in the interest rate leads to higher interest payments for the variable rate loan and more expensive follow-up financing which results to decrease of the company's earnings. As earlier results, increase of non-performing loans affects the bank profitability negatively.

Kenyan banks also strategise to reduce the exposure level to interest rate risk. However, due to frequent mismatch of assets and liabilities, it is very unlikely that the banks would hedge interest rate risk. A common case is the habitual nature of the banks to finance loans and advances of long-term nature with demand deposits, implying that short-term liabilities are matched with long-term assets. This further heightens the exposure to interest rate risk which might affect the profitability.

Conversely, Fapetu and Kolapo (2015) found that there is no significant influence between interest rate risk and profitability. Odeke and Odongo (2014) found positive and significant relationship between the two variables. The discrepancies may be explained that most banks in Nigeria and Uganda selected floating interest rate

exposure which would have significantly lower interest costs, at least in the short term, than banks with fixed exposure.

Table 4.20 also shows that in the long run foreign exchange exposure (FXE) has a coefficient of -0.139 with p-values less than 0.01. Therefore, the coefficient is significant at one per cent. Therefore, the hypothesis that foreign exchange risk has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.139. Since the dependent variable, return on equity, as well as foreign exchange risk enter equation 3.4b in log form, one per cent increase in foreign exchange risk decreases return on equity by 13.9 percentage points in the short run holding other factors constant.

In the short run the coefficient of foreign exchange exchange is -0.658 with a p-value greater than 0.01. Therefore, the coefficient is significant at one per cent. Therefore, the hypothesis that foreign exchange risk has a significant negative effect on financial performance of commercial banks in Kenya in the short run is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.658. Since the dependent variable, return on equity, as well as foreign exchange exposure enter equation 3.4b in log form, one per cent increase foreign exchange risk decreases return on equity by 65.8 percentage points in the short run holding other factors constant.

The findings indicate that foreign exchange risk affects financial performance both in short run and long run. The results are consistent with (Ahmed, 2015; Gachua, 2011; Mbubi, 2013 & Runo, 2013) that foreign exchange exposure has a significant effect on profitability. Exchange rates can affect banks indirectly through their influence on the extent of foreign competition, the demand for loans, and other aspects of banking conditions. Just as the prior expectation fluctuations in foreign exchange rates affect the customer's income. This would lead to decrease in customer deposits and lower the returns. Negative effect may be as a result of collateral for loans being affected by

fluctuations of the foreign exchange rates. Fluctuations in the foreign exchange rate may directly bring in uncertainty to banks' un-hedged foreign assets and liabilities (Wong *et al*., 2009).

To jointly test whether the components of market risk influenced the financial performance of commercial banks in Kenya F test was used. The test has a null hypothesis that all the coefficients of the components of market risk are jointly equal to zero. Table 4.25 shows that in the long run the F statistic is 157.74 and is greater than the critical value at one per cent level of significance. Therefore, in the long run hypothesis one that market risk has a significant effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. In the short run the F statistic is 110.73 and is greater than the critical value at one per cent level of significance. Thus in the short run hypothesis two that market risk has a significant effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance.

The finding is that market risk influences financial performance of commercial banks in Kenya both in the short run and in the long run. The results concur with the findings of studies by Gachua (2011) and Ngalawa *et al*., (2013) that foreign exchange exposure and interest rate risk have effect on net income. Lower exchange rate reduces the value of exchange cash assets which creates changes of exchange ratio risk, and on the other hand reduces the income from exports for a facility receiver customer, reduces his expected income and thus reduces his repayment ability and therefore credit risk is created.

4.4.3 Effect of liquidity risk on financial performance of commercial banks

To test the third hypothesis that Liquidity risk has a significant effect on the financial performance of commercial banks in Kenya the long run and the short run versions of model 3.5 were estimated. The first long run specification of model 3.5 was the fixed effects model whose findings are shown in table 4.21.

Table 4.21: Model 3.5 Fixed Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
NSFR		-0.213***
LCR		-0.042***
Constant		-1.610***
Post Estimation Diagnostics		
R square	Within	0.0213
	Between	0.1854
	Overall	0.0887
	Rho	0.6548
F test (2, 337)		3.67***
chow test	F(41, 337)	14.49***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.21 shows that the F statistic is 3.67 and is greater than the critical value at one per cent level of significance. Therefore, the variables (liquidity risk components) are jointly significant in explaining the variations in return on equity. The interclass correlation (rho) is 65.5 per cent implying that 65.5 per cent of the variations in return in equity are due to differences across the banks. The within and between R-square is 2.1 per cent and 18.5 per cent respectively. Thus, 2.1 per cent of variations in the return on equity are due to differences within individual banks and 18.5 per cent of the variations are due to differences between the banks.

The chow test statistic is 14.5 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the fixed effects are equal to zero is rejected at one per cent level of significance. Thus the option of specifying the long run version of model 3.5 as a pooled OLS model over the fixed effects specification is rejected at one per cent level of significance.

The alternative long run specification of model 3.5 were the random effects model. The estimates for this specification are shown in table 4.22.

Table 4.22: Model 3.5 Random Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
NSFR		-0.260***
LCR		-0.045***
Constant		-1.620***
Post Estimation Diagnostics		
R square	Within	0.0213
	Between	0.1843
	Overall	0.0885
	Rho	0.6235
Wald test (3, 365)		12.08***
Lm test	Chibar2	437.28***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.22 shows that the Wald statistic is 12.08 and is greater than the critical value at one per cent level of significance. Therefore, the variables (liquidity risk components) are jointly significant in explaining the variations in return on equity in the random effects specification.

The interclass correlation (rho) is 62.4 per cent implying that 62.4 per cent of the variations in return in equity are due to differences across the banks as per the random effects model. The within and between R-square is 2.13 per cent and 18.43 per cent respectively. Thus, 2.13 per cent of variations in the return on equity are due to differences within individual banks and 18.43 per cent of the variations are due to differences between the banks.

The LM test statistic is 437.28 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the cross sections are homogeneous is rejected at one per cent level of significance. Thus the random effects specification is preferred over POLS. A comparison of the fixed and random effects specification reveals that the two long run models lead to similar conclusions. For instance, the overall prediction of both models is 8.9 per cent. However, Hausman test is conducted to determine which model should be interpreted in the long run. The test statistic for this test is shown in table 4.23.

Table 4.23: Model 3.5 Hausman Test

Test statistic Chi(2)	P-value
4.36	**0.1130**

Table 4.23 shows that the test statistics have a chi statistic of 4.36 with two degrees of freedom and a corresponding p value of 0.1130. Therefore, the null hypothesis that the regressors and individual heterogeneity are strictly exogenous is not rejected at one per cent level of significance. Thus the RE specification is preferred over FE specification. Therefore, for the long run specification the random effects model should be interpreted.

To establish the bound where the coefficient of lagged profits would lie in the short run specification of model 3.5 the naïve OLS was estimated to establish the upper bound of the coeffient. The OLS estimates are shown in table 4.24.

Table 4.24: Short run OLS Estimates for Model 3.5

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.700***
NSFR	-0.139**
LCR	-0.103
Constant	-0.445***
Post Estimation Diagnostics	
R square	0.5940
F statistic (3, 330)	160.97***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.31 shows that the coefficient of lagged return on equity is 0.700. Therefore, the upper bound for the coefficient of lagged return on equity in the GMM specification of the short run model should be 0.700. To get the lower bound the fixed effect estimates of the short run specification of model 3.5 are used. The estimates of the short run specification are shown in table 4.25.

Table 4.25: Short run Fixed Effects Estimates for Model 3.5

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.285**
NSFR	-0.133*
LCR	-0.096
Constant	-1.169***
Post Estimation Diagnostics	
R square	0.5831
F statistic (3, 289)	13.36***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.25 shows the fixed effects estimates of the short run specification of model 3.5. The coefficient of lagged return on equity is 0.285. Thus the lower bound of lagged return on equity in the GMM specification should be 0.285. Specifically if the estimate is λ, it should lie in the interval $0.285 \leq \lambda \leq 0.700$. The one step system GMM consistent estimates of the short run spefication are shown in table 4.26.

Table 4.26: Model 3.5 One Step System GMM Estimates

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.529***
NSFR	-0.2201***
LCR	-0.135
Constant	-0.696***
Post Estimation Diagnostics	
Hansen J test	41.53
AR (1)	-3.31**
AR (2)	-1.37
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.26 shows the one step system GMM estimates for the short run specification of model 3.5. The table shows that the coefficient of the lagged return on equity is 0.529. The coefficient, therefore, lies in the acceptable range of $0.285 \leq \lambda \leq 0.700$ etablished by the naïve OLS estimates and fixed effects estimates of the short run model 3.5, demonstrating consistency of estimates.

The results further shows that the Hansen J statistic is 41.53 with a corresponding p-value greater than 0.1. Therefore, the null hypothesis of the validity of the overidentifying restrictions for the instruments is not rejected at one per cent level of

significance. Therefore, the instruments employed by the model are appropriate and lead to precise consistent estimates.

It also shows that the test of autocorrelation in the error terms. The AR(1) , first order autocorrelation, test statistic is -3.31 and is greater than the critical value at five per cent level of significance. Therefore the null hypothesis that disturbance term (error terrm) has no first order serial correlation is rejected at one per cent level of significance. This is expected because of the dynamic specification of model 3.5 and therefore, points to correct specification. The test statistic for second order serial correlation in the error term is -1.37 with a coresponding p-value that is greater than 0.1. Therefore, at one per cent level of significance the null hypothesis that there is no second order serial correlation in the disturbance term is not rejected at one per cent level of significance permiting the use of insturments from the second lag and differences. This further supports the argument of correct short run specification of model 3.5 using the one step system GMM estimates.

To Summarize the findings necessary to test the third hypothesis in the short run and in the long run. The findings in table 4.21 through 4.26 are summarized in table 4.27.

Table 4.27: Effect of Liquidity Risk on Financial Performance of Commercial Banks in Kenya

	Long Run Model		Short Run Model		
VARIABLES	Fixed Effects	Random Effects	Naive OLS	Fixed Effects	GMM
ROE_{t-1}			0.700***	0.285***	0.530***
			(0.0348)	(0.0486)	(0.0777)
NSFR	-0.213***	-0.260***	-0.139**	-0.133*	-0.221***
	(0.0786)	(0.0748)	(0.0563)	(0.0763)	(0.0663)
LCR	-0.0423	-0.0454	-0.103	-0.0959	-0.135
	(0.120)	(0.115)	(0.0847)	(0.119)	(0.0828)
Constant	-1.607***	-1.619***	-0.445***	-1.169***	-0.696***
	(0.126)	(0.153)	(0.0918)	(0.149)	(0.111)
Observations	381	381	334	334	334
R-squared	0.021		0.594	0.122	
Hausman Chi (2)	4.36				
Wald statistic		12.08***			
F statistic	3.67**		160.97***	13.36***	38.20***

KEY: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
ROE represent return on equity, LCR represents Liquidity Coverage ratio and NSFR represents net stable funding ratio

Table 4.27 shows the long run and short run specifications of model 3.5. The long run specification has both the fixed and random effects models. A comparison of the estimates from the two models reveals that the signage as well as the magnitude of coefficients is relatively the same for the long run models but different for the short run models.

It also show that in the long run coefficient of net stable funding ratio is -0.260 and has a corresponding p-value that is less than 0.01. Therefore, the coefficient is significant different from zero at one per cent level of significance. Thus in the long run the hypothesis that net stable funding ratio has a significant negative effect on the financial performance of commercial banks in Kenya is not rejected at one per cent

level of significance. The magnitude of the coefficient is 0.260. All the variables enter equation 3.5 in log form. Therefore the coefficients are elasticities. Thus a one per cent increase in net stable funding reduces return on equity by 26.0 percentage points holding other factors constant.

In the short run the coefficient of net stable funding ratio is -0.221 with a p-value that less than 0.01. Hence the coefficient is significant and negative at one per cent level of significance. The magnitude of the coefficient is 0.221. Therefore, in the short run an increase in the net stable funding ratio reduces return on equity by 22.1 percentage points holding other factors constant.

The results for this study show that net stable funding ratio has a negative impact on banks profitability. Net stable funding ratio ("NSFR") was introduced in the Basel III framework so as to ensure that banks hold a minimum amount of stable funding based on the liquidity characteristics of their assets and activities over a one year horizon. This reduces maturity mismatches between the asset and liability items on the balance sheet and thereby reduces funding and rollover risk. The results are inconsistent with results of Said (2014) that there exist positive relationship between NSFR and financial performance. Ashraf *et al.,* (2015) also indicated a positive and statistically significant relationship between the NSFR and financial stability of banks.

However, Dietrich, Hess and Wanzenried (2014) stated that short-term investments and reduced maturity should reduce profitability as the longer-term investment and the mismatch of maturity are positively related to the banks' profitability. This might be the case with Kenyan commercial banks where they largely rely on short-term investments and reduced maturity assets which affect profitability negatively. If higher available stable funding which consist of capital and retail deposits is required competitive pressures will constrain banks to some extent resulting in competition for loans, deposits and even the sources of equity and debt investments. This competition will lead to higher costs of doing business resulting in instability.

The coefficient of liquidity coverage ratio is -0.045 in the long run with a p-value greater than 0.1. Therefore, the coefficient is neither significant at 10, five nor one per cent. In the short run the coefficient is -0.105 and has a p-value greater than 0.1 and is therefore not significantly different from zero at one per cent level of significance. As such either in the long run or in the short run liquidity coverage ratio does not influence the financial performance of commercial banks in Kenya holding other factors constant.

To jointly test whether the components of liquidity risk influenced the financial performance of commercial banks in Kenya Wald test was used to test the joint significance of the coefficients in the random effects model in the long run and the F test was used in the short run. The test has a null hypothesis that all the coefficients of the components of liquidity risk are jointly equal to zero. Table 4.34 shows that in the Long run the Wald statistic is 12.08 and is greater than the critical value at one per cent level of significance. Therefore, in the long run hypothesis three that liquidity risk has a significant effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance.

In the short run the F statistic is 13.36 and is greater than the critical value at one per cent level of significance. Thus in the short run hypothesis three that liquidity risk has a significant effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. Thus liquidity risk influences financial performance of commercial banks in Kenya both in the short run and in the long run.

These results are in line with the results of studies by Adolphus (2008) and Ahmed *et al*., (2012), that the there is a negative relationship between bank liquidity and profitability. The results are attributed to the fact that banks hold liquid assets as an obligation to the requirements imposed by the authorities. Holding money for these purposes may lead to low bank profitability as low returns are expected. Liquidity risk is created mismatch of assets and liabilities and differences between their maturities.

It refers that current assets value is not enough to fulfill current obligations, from this point of view liquidity is the protection of the banks. When a bank has inadequate liquidity, it cannot obtain sufficient funds, either by increasing liabilities or by converting assets promptly, at a reasonable cost, thereby affecting profitability. There is also opportunity cost incurred by liquid assets which might affect profitability negatively. This indicated that, the existence of high liquidity risk may force banks to borrow emergency funds at excessive cost that can adversely affect their profitability. However the results differ with those of studies by Akhtar (2011) and Wambu (2013) that liquidity risk has a positive relationship with profitability. The discrepancies may be explained by the two different economies that Pakistan and Kenya operates. Differences in Wambu (2013) may be explained the periods of study as the current study has a wider scope.

4.4.4 Effect of operational risk on financial performance of commercial banks

To test the fourth hypothesis the long run and the short run version of model 3.7 were estimated. The first long run specification of model 3.7 was the fixed effects model whose findings are shown in table 4.28.

Table 4.28: Model 3.7 Fixed Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
CIR		-0.337***
Constant		0.090***
Post Estimation Diagnostics		
R square	Within	0.3759
	Between	0.4093
	Overall	0.3719
	Rho	0.6901
F test (1, 338)		203.61***
chow test	F(41, 320)	19.64***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.28 shows that the F statistic is 203.61 and is greater than the critical value at one per cent level of significance. Therefore, the variable is significant in explaining the variations in return on equity. The interclass correlation (rho) is 69.01 per cent implying that 69.01 per cent of the variations in return on equity are due to differences across the banks. The within and between R-square is 37.59 per cent and 40.93 per cent respectively. Thus, 37.59 per cent of variations in the return on equity are due to differences within individual banks and 40.93 per cent of the variations are due to differences between the banks. The overall R^2 is 37.19 percent, indicating that the variable (CIR) considered in the model account for about 37 percent change in the dependent variables, while about 63 percent change may be as a result of other variables not addressed by this model.

The chow test statistic is 19.64 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the fixed effects are equal to zero is rejected at one per cent level of significance. Thus the option of specifying the model as a pooled OLS model over the Fixed effects specification is rejected at one

per cent level of significance. The second alternative specification of model 3.7 is the random effects model whose findings are shown in table 4.29.

Table 4.29: Model 3.7 Random Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
CIR		-0.345***
Constant		0.082***
Post Estimation Diagnostics		
R square	Within	0.3759
	Between	0.4093
	Overall	0.3719
	Rho	0.6732
Wald test (1, 338)		228.83***
Lm test	Chibar2	700.06***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.29 shows that the Wald statistic is 228.83 and is greater than the critical value at one per cent level of significance. Therefore, the independent variable is significant in explaining the variations in return on equity in the random effects specification.

The interclass correlation (rho) is 67.32 per cent implying that 67.32 per cent of the variations in return in equity are due to differences across the banks as per the random effects model. The coefficient of determinations, R-square shows the within and between values of 37.59 per cent and 40.93 per cent respectively. Thus, 37.59 per cent of variations in the return on equity are due to differences within individual banks and 40.93 per cent of the variations are due to differences between the banks.

The LM test statistic is 700.06 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the cross sections are not

heterogeneous is rejected at one per cent level of significance. Thus the random effects specification is preferred over pooled OLS.

A comparison of the post estimation diagnostics between the Fixed and random effects specification reveals that the conclusions are comparable. For instance when POLS specification is compared with the estimated models it's rejected in both instances. In addition the overall explanatory powers of the specifications are not significantly different; both fixed and random effect specifications explain an overall explanation 37 per cent. However, the consistency in post estimation diagnostics does not eliminate the need to discriminate between the models. The Hausman test statistics to discriminate between the specifications are shown in table 4.30.

Table 4.30: Model 3.7 Hausman Test

Test statistic Chi(1)	P-value
1.75	0.1855

Table 4.30 shows that the test statistics have a chi statistic of 1.75 with one degree of freedom and a corresponding p value of 0.1130. Therefore, the null hypothesis that the regressors and individual heterogeneity are strictly exogenous is not rejected at one per cent level of significance. Thus the RE specification is preferred over FE specification. Therefore, for the long run specification the random effects model should be interpreted.

To establish the bound where the coefficient of lagged profits would lie the naïve OLS was estimated. The OLS estimates over state the coefficient of lagged profits by attributing to it some explanatory power of the error term. Thus the OLS estimate provides the upper bound of the coeffient. The OLS estimates are shown in table 4.31.

Table 4.31: OLS Estimates for operational risk component

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.434***
CIR	-0.254***
Constant	0.034***
Post Estimation Diagnostics	
R square	0.626
F statistic (2, 343)	287.08***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.31 shows that the coefficient of lagged return on equity is 0.434. Therefore, the upper bound for the coefficient of lagged return on equity in the GMM specification of the short run model should be 0.434. To get the lower bound the fixed effect estimates of the short run specification are used. Fixed effect estimation understates the coefficient by denying the lagged dependent variable some of its explanatory power, thus providing the lower bound. The fixed effect estimates of the short run specification are shown in table 4.32.

Table 4.32: Fixed Effects Estimates for operational risk component

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.115***
CIR	-0.308**
Constant	0.079***
Post Estimation Diagnostics	
R square	0.5115
F statistic (2, 302)	93.83***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.41 shows the fixed effects estimates of the short run specification of model 3.7. The coefficient of lagged return on equity is 0.115. Thus the lower bound of lagged return on equity in the GMM specification should be 0.115. Specifically if the estimate is λ, it should lie in the interval $0.115 \leq \lambda \leq 0.434$. To obtain consistent estimates of the short run spefication one step system GMM is used. The estimates are shown in table 4.33.

Table 4.33: One Step System GMM Estimates

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.210***
CIR	-0.446***
Constant	0.009***
Post Estimation Diagnostics	
Hansen J test	38.22
AR (1)	-3.60***
AR (2)	-0.60
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.33 shows the one step system GMM estimates for the short run specification of model 3.7. The table shows that the coefficient of the lagged return on equity is 0.210. The coefficient, therefore, lies in the acceptable range of $0.115 \leq \lambda \leq 0.434$ etablished by the naïve OLS estimates and fixed effects estimates of the short run model 3.7. Hence consistency of model estimates.

Table 4.33 further shows that the Hansen J statistic is 38.22 with a corresponding p-value greater than 0.1. Therefore, the null hypothesis of the validity of the overidentifying restrictions for the instruments is not rejected at one per cent level of significance. Therefore, the instruments employed by the model are appropriate and lead to precise consistent estimates.

In addition table 4.33 shows that the test of autocorrelation in the error terms. The AR(1) , first order autocorrelation, test statistic is -3.60 and is greater than the critical value at one per cent level of significance. Therefore the null hypothesis that disturbance term (error terrm) has no first order serial correlation is rejected at one per cent level of significance. This is expected because of the dynamic specification of model 3.7 and therefore, points to correct specification. The test statistic for second order serial correlation in the error term is -0.60 with a coreresponding p-value that is greater than 0.1. Therefore, at one per cent level of significance the null hypothesis that there is no second order serial correlation in the disturbance term is not rejected at one per cent level of significance. This permits the use of insturments from the second lag and differences further supporting the argument of correct short run specification of model 3.7 using the one step GMM estimates.

To Summarize the findings necessary to test the forth hypothesis in the short run and in the long run. The findings in table 4.28 through 4.33 are summarized in table 4.34.

Table 4.34: Effect of Operational risk on Financial Performance of Commercial Banks in Kenya

	Long Run Model		Short Run Model		
Variables	Fixed Effects	Random Effects	OLS	Fixed Effects	GMM
ROE_{t-1}			0.434***	0.115***	0.210**
			(0.0286)	(0.0298)	(0.0896)
CIR	-0.337***	-0.345***	-0.254***	-0.308***	-0.446***
	(0.0237)	(0.0228)	(0.0233)	(0.0246)	(0.0766)
Constant	0.090***	0.0821***	0.0345***	0.0787***	0.009***
	(0.009)	(0.0142)	(0.009)	(0.0106)	(0.0298)
Observations	381	381	346	319	346
R-squared	0.376		0.626	0.383	
Hausman Chi(1)	1.75				
Wald statistic		228.83***			
F statistic	203.61***		287.08***	93.83***	31.53***

KEY: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
ROE represent return on equity, CIR represents Cost Income ratio

The long run and short run estimates on the effect of operational risk on financial performance of commercial banks in Kenya are shown in table 4.34. It shows that in the long run the coefficient of cost to income ratio (CIR) is -0.345 with a p value less than 0.01. Thus, the coefficient is significantly different from zero at one per cent level of significance. Therefore, the hypothesis that CIR has a negative significant effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.345. This means that one per cent increase in CIR decreases return on equity by 34.5 percentage points in the long run holding other factors constant. In the long run the Wald statistic is 228.83 and is greater than the critical value at one per cent level of significance. Therefore, in the long run hypothesis that operational risk has a significant effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance.

In the short run the coefficient of CIR is -0.446 with a p-value less than 0.01. Therefore, the coefficient is significant at one per cent and negative. Thus in the short run the hypothesis that CIR has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficients is 0.446. Thus in the short run a one per cent increase in CIR causes a 44.6 percentage points decrease in the financial performance of commercial banks in Kenya holding other factors constant. In the short run the F statistic is 31.53 and is greater than the critical value at one per cent level of significance. Thus in the short run hypothesis four, CIR has a significant effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. Thus operational risk influences financial performance of commercial banks in Kenya both in the short run and in the long run.

Consistent with (Al-Tamimi *et al.*, 2015; Mathuva, D. M., 2009 and Said, 2014) that CIR has a negative and strongly significant effect of profitability. This is an indication that operational efficiency in commercial banks is low. The income comprises net interest income, fee income, trading income, and other non-interest income. The cost comprises staff, rental, information technology, and other operating expenses. Thus reduction in CIR means lowering the costs or increasing the income will translate to greater efficiency. However, there should be some critical threshold at which the relationship between costs and income as embodied in the ratio as such operational risk cannot be fully eliminated. For instance, considering reducing the cost income ratio from reporting period can result in a bank reducing discretionary expenditures in audit, personnel, marketing and monitoring systems which they all impact operational risk directly and adversely. Alternatively, non-interest income sources, such as insurance and funds management impact cost-to-income ratio positively. Lack of skills and product knowledge may also increase the cost income ratio. Frauds have increased drastically in Kenyan commercial banks and inflicted the most significant losses to the bank (Kimani, 2011). Also bank supervision annual report 2014 from CBK indicates that cases relating to computer, mobile and internet banking are on the

rise. Other fraud cases such as card fraud have also been attributed to computer-based on line transactions which do not have effective preventive and detective controls. Hence more research on operational risks are required so as to help the banks put in place effective operational risk management and control processes.

4.4.5 Effect of financial risk on financial performance of commercial banks

To test the effect of financial risk on financial performance the long run and the short run version of model 3.9 were estimated. The first long run specification of model 3.9 was the fixed effects model whose findings are shown in table 4.35

Table 4.35: Model 3.9 Fixed Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
AQR		-0.001
DFL		0.052***
CIR		-0.247***
NSFR		-0.018***
Constant		0.180***
Post Estimation Diagnostics		
R square	Within	0.5651
	Between	0.6052
	Overall	0.5735
	Rho	0.6683
F test (4, 315)		102.33***
chow test	F(41, 315)	16.31***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.35 shows that the F statistic is 102.33 and is greater than the critical value at one per cent level of significance. Therefore, the variables (financial risk components) are jointly significant in explaining the variations in return on equity.

The interclass correlation (rho) is 66.83 per cent implying that 66.83 per cent of the variations in return on equity are due to differences across the banks. The within and between R-square is 56.51 per cent and 60.52 per cent respectively. Thus, 56.51 per cent of variations in the return on equity are due to differences within individual banks and 60.52 per cent of the variations are due to differences between the banks. The overall R^2 is 57.35 percent, indicating that the variables considered in the model account for about 57.35 percent change in the dependent variables, while about 42.65 percent change may be as a result of other variables not addressed by this model.

The chow test statistic is 16.31 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the fixed effects are equal to zero is rejected at one per cent level of significance. Thus the option of specifying the model as a pooled OLS model over the Fixed effects specification is rejected at one per cent level of significance.

The second alternative specification of model 3.9 is the random effects model whose findings are shown in table 4.36

Table 4.36: Model 3.9 Random Effects Estimates

Dependent variable		ROE
Explanatory Variable		Coefficient
AQR		-0.002
DFL		0.053***
CIR		-0.245***
NSFR		-0.020***
Constant		0.176***
Post Estimation Diagnostics		
R square	Within	0.5647
	Between	0.6100
	Overall	0.5772
	Rho	0.6434
Wald test (4)		468.21***
Lm test	Chibar2	572.69***
KEY		
p-value <0.01		***
P-value <0.05		**
P –value<0.1		*

Table 4.36 shows that the Wald statistic is 468.21 and is greater than the critical value at one per cent level of significance. Therefore, the variables (financial risk components) are jointly significant in explaining the variations in return on equity in the random effects specification.

The interclass correlation (rho) is 64.34 per cent implying that 64.34 per cent of the variations in return in equity are due to differences across the banks as per the random effects model. The within and between R-square is 56.47 per cent and 61 per cent respectively. Thus, 56.47 per cent of variations in the return on equity are due to differences within individual banks and 61 per cent of the variations are due to differences between the banks.

The LM test statistic is 572.69 and is greater than the critical value at one per cent level of significance. Therefore, the null hypothesis that the cross sections are not

heterogeneous is rejected at one per cent level of significance. Thus the random effects specification is preferred over POLS.

A comparison of the post estimation diagnostics between the Fixed and random effects specification reveals that the conclusions are comparable. For instance when POLS specification is compared with the estimated models it's rejected in both instances. In addition the overall explanatory powers of the specifications are not significantly different; the fixed effect specification explains an overall explanation 57.35 per cent while the random effects model has an overall explanation of 64.34 per cent. However, the consistency in post estimation diagnostics does not eliminate the need to discriminate between the models. The Hausman test statistics to discriminate between the specifications are shown in table 4.37.

Table 4.37: Model 3.9 Hausman Test

Test statistic Chi(4)	P-value
5.39	0.2496

Table 4.37 shows that the test statistics have a chi statistic of 5.39 with four degrees of freedom and a corresponding p value of 0.2496. Therefore, the null hypothesis that the regressors and individual heterogeneity are strictly exogenous is not rejected at one per cent level of significance. Thus the RE specification is preferred over FE specification. Therefore, for the long run specification the random effects model should be interpreted.

To establish the bound where the coefficient of lagged profits would lie in the short run specification of model 3.9 the naïve OLS was estimated to establish the upper bound of the coeffient. The OLS estimates are shown in table 4.38.

Table 4.38: Model 3.9 OLS Estimates

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.324***
AQR	-0.004
DFL	0.043***
CIR	-0.181***
NSFR	-0.017***
Constant	0.123***
Post Estimation Diagnostics	
R square	0.6901
F statistic (5, 322)	143.40***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*
P-value <0.05	**
P –value<0.1	*

Table 4.38 shows that the coefficient of lagged return on equity is 0.324. Therefore, the upper bound for the coefficient of lagged return on equity in the GMM specification of the short run model should be 0.324.

To get the lower bound the fixed effect estimates of the short run specification are used. Fixed effect estimation understates the coefficient by denying the lagged dependent variable some of its explanatory power, thus providing the lower bound. The fixed effect estimates of the short run specification are shown in table 4.39.

Table 4.39: Model 3.9 Fixed Effects Estimates

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.067***
AQR	-0.0004
DFL	0.050***
CIR	-0.235***
NSFR	-0.017***
Constant	0.173***
Post Estimation Diagnostics	
R square	0.6166
F statistic (5, 281)	67.58***
KEY	
p-value <0.01	***
P-value <0.05	**
P –value<0.1	*

Table 4.39 shows the fixed effects estimates of the short run specification of model 3.9. The coefficient of lagged return on equity is 0.067. Thus the lower bound of lagged return on equity in the GMM specification should be 0.067. Specifically if the estimate is λ , it should lie in the interval $0.067 \leq \lambda \leq 0.324$.

To obtain consistent estimates of the short run spefication one step system GMM is used. The estimates are shown in table 4.40.

Table 4.40: Model 3.9 One Step System GMM Estimates

Dependent variable	ROE
Explanatory Variable	Coefficient
ROE_{t-1}	0.303***
AQR	-0.004
DFL	0.046***
CIR	-0.191***
NSFR	-0.016***
Constant	0.125***
Post Estimation Diagnostics	
Hansen J test	33.97
AR (1)	-2.95***
AR (2)	-0.48
KEY	
KEY: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1	

Table 4.40 shows the one step system GMM estimates for the short run specification of model 3.9. The table shows that the coefficient of the lagged return on equity is 0.303. The coefficient, therefore, lies in the acceptable range of $0.067 \leq \lambda \leq 0.324$ established by the naïve OLS estimates and fixed effects estimates of the short run model 3.9. This points to consistency of estimates.

Hansen J statistic is 33.97 with a corresponding p-value greater than 0.1. Therefore, the null hypothesis of the validity of the overidentifying restrictions for the instruments is not rejected at one per cent level of significance. Therefore, the instruments employed by the model are appropriate and lead to precise consistent estimates.

Test of autocorrelation in the error terms was also carried out. The AR(1) , first order autocorrelation, test statistic is -2.95 and is greater than the critical value at one per cent level of significance. Therefore the null hypothesis that disturbance term (error terrm) has no first order serial correlation is rejected at one per cent level of significance. This is expected because of the dynamic specification of model 3.9 and

therefore, points to correct specification. The test statistic for second order serial correlation in the error term is -0.48 with a coreresponding p-value that is greater than 0.1. Therefore, at one per cent level of significance the null hypothesis that there is no second order serial correlation in the disturbance term is not rejected at one per cent level of significance. This permits the use of instruments from the second lag and differences further supporting the argument of correct short run specification of model 3.9 using the one step GMM estimates.To Summarize the findings necessary to test the fourth hypothesis in the short run and in the long run. The findings in table 4.35 through 4.40 are summarized in table 4.41.

Table 4.41: Effect of financial Risk on Financial Performance of Commercial Banks in Kenya

	Long Run Model		Short Run Model		
VARIABLES	Fixed Effects	Random Effects	Naive OLS	Dynamic Fixed Effects	One step GMM
ROE_{t-1}			0.324***	0.0672**	0.303***
			(0.0311)	(0.0286)	(0.0924)
AQR	-0.000724	-0.00237	-0.00383	0.000413	-0.00379
	(0.00396)	(0.00378)	(0.00418)	(0.00442)	(0.00849)
DFL	-0.0520***	-0.0532***	-0.043***	-0.0495***	-0.0455***
	(0.00536)	(0.00527)	(0.00682)	(0.00583)	(0.00942)
CIR	-0.247***	-0.245***	-0.181***	-0.235***	-0.191***
	(0.0233)	(0.0226)	(0.0247)	(0.0244)	(0.0420)
NSFR	-0.0178**	-0.0200***	-0.0165**	-0.0174**	-0.0156
	(0.00749)	(0.00713)	(0.00720)	(0.00782)	(0.0111)
Constant	0.180***	0.176***	0.123***	0.173***	0.125***
	(0.0171)	(0.0188)	(0.0182)	(0.0192)	(0.0329)
Observations	361	361	328	328	328
R-squared	0.565		0.690	0.546	
F statistics	102.33***		143.40***	67.58***	68.07***
Wald statistics		468.21***			
Hausman Chi(4)	5.39			42	42

KEY: Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
ROE represent return on equity, AQR represents Asset Quality ratio, DFL Degree of Financial Leverage ratio and CIR represents Cost Income ratio

Table 4.41 show that the coefficient of asset quality ratio is -0.00237 in the long run with a p-value greater than 0.1. Therefore, the coefficient is neither significant at 10, five nor one per cent. In the short run the coefficient is -0.00379 and has a p-value greater than 0.1 and is therefore not significantly different from zero at one per cent level of significance. Thus in this case, asset quality ratio does not influence the financial performance of commercial banks in Kenya either in the long run or in the short run holding other factors constant. The result is that asset quality which is a

measure of credit risk has negative but unexpectedly insignificant effect on financial performance when combined with other bank risks. These results differ from the results of model 3.1 where asset quality was has significantly affect the financial performance. This is an indication that other bank risks such as market, liquidity and operational risks have more impact on financial performance than credit risk.

In the long run the coefficient of degree of financial leverage is -0.0532 with a p-value less than 0.01. Thus, the coefficient is significantly different from zero at one per cent level of significance. Therefore, the hypothesis that degree of financial leverage has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.0532. Hence one percent increase of degree of financial leverage reduces return on equity by 5.32 percent points deterioration in the long run holding other factors constant.

In the short run the coefficient of degree of financial leverage is -0.0455 with a p-value less than 0.01. Therefore, the coefficient is significant at one per cent. Thus in the short run the hypothesis that degree of financial leverage has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.0455. The fact that return on equity and degree of financial leverage enter the equation in log form implies that the coefficient is an elasticity. Thus in the short run a one per cent increase in degree of financial leverage causes a 4.5 percentage points decrease in the financial performance of commercial banks in Kenya holding other factors constant. The results are in line with the results of model 3.3.

From the analysis degree of financial leverage has a significant negative effect on financial performance of commercial banks in Kenya both in short run and long run. DFL has the most impact on the bank profitability. These results are expected because increase in DFL increases if the company increases its debts. The ratio of EBT to

EBIT focuses on the impact of interest on income before taxes since interest is a cost of borrowed money by the bank. Increase in debt proportion increases the bank liability as well as the financial risk. This result differ from Nimalathasan *et al*., (2012) findings that there exist a moderate positive association between DFL and profitability. The discrepancies of the results between the two studies may explained by the reason that Kenyan banks have more debts in their leverage.

Table 4.41 also shows that in the long run cost to income ratio (CIR) has a coefficient of -0.245 with p-values less than 0.01. Therefore, the coefficient is significant at one per cent. Therefore, the hypothesis that operational risk has a significant negative effect on financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.245. Since the dependent variable, return on equity, as well as CIR enter equation 3.7a in log form, one per cent increase in operational risk decreases return on equity by 24.5 percentage points in the long run holding other factors constant.

In the short run the coefficient of CIR is -0.191 with a p-value less than 0.01. Therefore, the coefficient is significant at one per cent. Therefore, the hypothesis that operational risk has a significant negative effect on financial performance of commercial banks in Kenya in the short run is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.191. Since the dependent variable, return on equity, as well as foreign exchange exposure enter equation 3.7b in log form, one per cent increase CIR reduces return on equity by 19.1 percentage points in the short run holding other factors constant. These findings are consistent with the earlier results of model 3.7.

The analysis shows that in the long run coefficient of net stable funding ratio is -0.02 and has a corresponding p-value that is less than 0.01. Therefore, the coefficient is significant different from zero at five per cent level of significance. Thus in the long run the hypothesis that net stable funding ratio has a significant negative effect on the

financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. The magnitude of the coefficient is 0.02. All the variables enter equation 3.10a in log form. Therefore the coefficients are elasticities. Thus a one per cent increase in net stable funding reduces return on equity by 2.0 percentage points holding other factors constant. In the short run the coefficient of net stable funding ratio is -0.0156 with a p-value that greater than 0.01. Therefore, the coefficient is neither significant at 10, five nor one per cent.

To jointly test whether the components of financial risk negatively influence the financial performance of commercial banks in Kenya Wald test was used in long run and F test in the short run. The test has a hypothesis that all the coefficients of the components of financial risk are jointly equal to zero. Table 4.50 shows that in the long run the Wald statistic is 468.21 and is greater than the critical value at one per cent level of significance. Therefore, in the long run hypothesis that financial risk has a significant negative effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance. In the short run the F statistic is 68.07 and is greater than the critical value at one per cent level of significance. Thus in the short run hypothesis that financial risk has a significant negative effect on the financial performance of commercial banks in Kenya is not rejected at one per cent level of significance.

In this study financial risk influences financial performance of commercial banks in Kenya both in the short run and in the long run. This result is consistent with the earlier hypothesis that financial risk affect financial performance of a bank negatively. The estimated coefficient values are as expected negative. However, the variables were statistically significant at the 1 percent level except credit risk (AQR) which was statistically insignificant. This observation is similar to the findings of Al-Tamimi *et al.,* (2015) and Amin *et al*., (2014).The variable of financial risk that has the most impact is cost income ratio which means that operational risk severely reduces return on equity capital. This is consistent with Mathuva (2009) that cost-income ratio is

negative and strongly significant with profitability measures. The operational risk is then followed by financial leverage risk. The banks are required to lower the financial leverage and its interest payment, thus reducing the insurance cost and interest expenses so as to improve profitability and increase return on equity holders.

4.5.6 Moderating effect of bank size on the relationship between the financial risk and financial performance of commercial banks

The fifth objective sought to establish the moderating effect of bank size on the relationship between financial risk and financial performance of commercial banks in Kenya. To achieve this objective hypothesis five was tested. To test the hypothesis interaction terms between the explanatory variables and bank size were generated and two regression models estimated.

The first regression introduced bank size as an explanatory variable while the second introduced it as a moderator which is according to Keppel and Zedeck (1989). The findings for each regression are shown in table 4.42 and 4.43 respectively.

Table 4.42: Introduction of Bank Size as an Explanatory Variable

	Long Run Model		Short Run Models		
VARIABLES	Fixed effects	Random effects	Naive OLS	Dynamic Fixed effects	One Step GMM
ROE_{t-1}			0.310***	0.108***	0.264***
			(0.0362)	(0.0358)	(0.0431)
AQR	0.0406	0.0356	0.0333	0.0161	0.00858
	(0.0290)	(0.0269)	(0.0245)	(0.0304)	(0.0386)
DFL	0.616***	0.619***	0.457***	0.559***	0.449***
	(0.0349)	(0.0344)	(0.0420)	(0.0402)	(0.0884)
NSFR	0.00381	0.00228	-0.00144	0.00663	-0.00174
	(0.00860)	(0.00835)	(0.00859)	(0.0105)	(0.00970)
CIR	-0.996***	-1.002***	-0.838***	-1.041***	-0.878***
	(0.157)	(0.151)	(0.139)	(0.151)	(0.178)
SIZE	1.029	1.049	1.222	0.0788	1.680
	(1.009)	(0.968)	(0.921)	(1.141)	(1.515)
SIZE SQUARE	-0.0642	-0.0590	-0.0662	-0.00889	-0.0949
	(0.0688)	(0.0659)	(0.0619)	(0.0771)	(0.100)
Constant	-5.608	-6.069*	-6.424*	-1.568	-8.401
	(3.693)	(3.542)	(3.392)	(4.223)	(5.715)
Observations	361	361	318	318	318
R-squared	0.662		0.786	0.638	
F statistic	102.23***		162.80***	67.69***	110.39***
Wald statistic		711.01***			
Hausman chi(7)	17.94***				

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

The analysis shows the introduction of bank size as an explanatory variable. Bank size enters in linear (Size) and non-linear (size squared) form. This is informed by literature and moderation decision making criteria table 3.3. It shows that the coefficient of size is not significant either in the long run or the short run. However, the square of size has a p-value less than 0.1 in the long run and therefore, weakly significant. In the short run the coefficient of size has a p-value less than 0.05. Thus the coefficient is significant at five per cent level of significance. The signage of size

squared is negative both in the long run and the short run implying that growth in size of a bank is associated with rise in ROE up to a certain point. Therefore, the square of bank size is an explanatory variable both in the short run and the long run. The introduction of bank size as a moderator yields the findings in table 4.43

Table 4.43: Introduction of Bank Size as a Moderator

	Long Run Model		**Short Run Models**		
VARIABLES	Fixed Effects	Random Effects	Naive OLS	Dynamic Fixed Effects	One step GMM
ROE_{t-1}			0.212***	0.0679**	0.210***
			(0.0303)	(0.0285)	(0.0698)
AQR	0.0937**	0.0651	-0.00385	0.0916**	-0.00385
	(0.0420)	(0.0405)	(0.0448)	(0.0456)	(0.0410)
DFL	-0.0674	-0.123*	-0.229***	-0.0559	-0.229***
	(0.0732)	(0.0716)	(0.0802)	(0.0816)	(0.0774)
CIR	-1.222***	-1.372***	-1.628***	-1.253***	-1.628***
	(0.307)	(0.302)	(0.352)	(0.327)	(0.405)
NSFR	0.0692	0.107	0.0715	0.0315	0.0715
	(0.0808)	(0.0777)	(0.0827)	(0.0874)	(0.117)
SIZE	0.0515*	0.105***	0.163***	0.0364	0.163***
	(0.0291)	(0.0262)	(0.0260)	(0.0315)	(0.0357)
SIZE*AQR	-0.0126**	-0.00844	0.00149	-0.0125**	0.00149
	(0.00576)	(0.00560)	(0.00628)	(0.00625)	(0.00576)
SIZE*DFL	0.0164	0.0243**	0.0373***	0.0141	0.0373***
	(0.0105)	(0.0103)	(0.0115)	(0.0116)	(0.0113)
SIZE*CIR	0.132***	0.154***	0.192***	0.137***	0.192***
	(0.0413)	(0.0407)	(0.0472)	(0.0440)	(0.0525)
SIZE*NSFR	-0.0121	-0.0174	-0.0117	-0.00685	-0.0117
	(0.0110)	(0.0106)	(0.0112)	(0.0119)	(0.0158)
Constant	-0.196	-0.580***	-1.036***	-0.104	-1.036***
	(0.210)	(0.189)	(0.187)	(0.228)	(0.259)
Observations	361	361	328	328	328
R-squared	0.586		0.762	0.565	
F statistic	48.85***		101.43***	35.80***	48.45***
Wald statistic		555.48***			
Hausman Chi(9)	18.60***				
KEY:	Standard errors in parentheses				
	*** p<0.01, ** p<0.05, * p<0.1				
	SIZE*X interaction of size with variable X				

Table 4.43 shows that in the long run and short run coefficients of AQR are 0.0406 and 0.00858 respectively. They are positive and insignificant. However, the results in table 4.52 indicate that the coefficient of interaction between AQR and size in long run is -0.0126 which is negative and significant p-value less than 0.05. The coefficient of interaction of the two variables is positive and insignificant in short run. This is an indication that bank size does influence the effect of AQR on financial performance in long run only.

It shows that in the long run and short run coefficients of degree of financial leverage are 0.616 and 0.449 respectively. They are positive and significant both in short run and long run with a p-value less than 0.01. However, table 4.52 shows that the coefficient of interaction between the DFL and bank size is 0.0373. It is positive and significant with a p-value less than 0.01. The results indicate that bank size does influence the effect of DFL on financial performance in short run.

The coefficient of Net stable funding ratio is positive in long run but negative in short run and insignificant in both. Table 4.52 indicates that the coefficient of interaction between the NSFR and bank size is negative and insignificant in both short run and long run. The results indicate that bank size does not influence the effect of Net stable funding on financial performance in long run and short run.

The long run and short run coefficients of CIR are -0.996 and -0.878 respectively. They are negative and significant with a p-value less than 0.01. Table 4.52 indicates that the coefficients of interaction between the CIR and bank size are 0.132 and 0.192 respectively. They are positive and significant in both short run and long run. The results indicate that bank size does influence the effect of CIR on financial performance in long run and short run.

The analysis shows that three interaction terms are significant, that of asset quality, degree of financial leverage and cost income ratio. In the long run, the coefficient of the interaction between size and asset quality is -0.0126 with a p-value less than 0.05.

Therefore the coefficient is significant at 5 per cent. The coefficient of cost income ratio is -0.132 with a p-value less than 0.01. Therefore, the coefficient is significant at one per cent level of significance.

In the short run only two interaction terms are significant, that of degree of financial leverage and cost income ratio. The coefficient of interaction of degree of financial leverage and bank size in the short run is 0.0373 with a p value less than 0.01. Therefore, the coefficient is significant at one per cent level of significance. The coefficient of interaction of cost income ratio and bank size in the short run is 0.192 with a p value less than 0.01. Therefore, the coefficient is significant at one per cent level of significance.

These results were expected as Biekpe (2011) suggests that economies of scale enjoyed by larger Ghanaian banks enable them to benefit from reduced risk. Bank size is proxied as the natural logarithm of total bank assets. However, while large banks are assumed to have better risk management techniques, which ensure proper screening of loan applicants and lower default rate, it is also hypothesized that as banks become too large, monitoring and evaluation become difficult as they take on increased risk.

Overall the hypothesis that bank size has a significant moderating effect on the relationship between the financial risk and financial performance of commercial banks in Kenya is not rejected at one per cent level of significance in the short run and long run. In the short run bank size strongly enhances the influence of degree of financial leverage and cost income ratio on financial performance of commercial banks in Kenya. In the long run bank size strongly enhances the influence of degree of financial leverage and asset quality on financial performance of commercial banks in Kenya.

From the analysis, bank size moderates the effect of asset quality on profitability. This may be explained that though large and small banks make similar types of loans with

similar lending terms (such as collateral, information) the but small sized banks simply have smaller asset risk than large than larger banks. Also the higher the loan portfolio which is included in the total assets may lead to high non-performing loans which are used to measure the asset quality. This will affect the bank profitability negatively. On the other hand, small banks which is the largest number (Appendix I) may not have established mechanisms for loan appraisal and credit analysis. Consequently, small banks may lend to similar sectors and asset types as large banks but they make more risky loans. They may require more collateral per loan or have superior information on borrower risk. This will increase the asset quality ratio which reduces the profitability. As a result the bank size affects the strength between the asset quality and financial performance.

Bank size also is considered to enhance the effect of DFL on financial performance positively. Explanation of this phenomenon is that larger banks may increase the financial leverage which a positive impact on profitability. Yoon and Jang (2005) found that smaller firms are more risky than larger firms regardless of the level of leverage. This may have contributed to Kenyan commercial banks since a higher percentage are banks classified in tier 3 (Appendix I).

Also bank size strongly enhances the influence of cost to income ratio, operational risk on financial performance. This can be explained by most large Kenyan banks (tier 1) establishing many branches during the period of the study. Although this may increase the risk, there is an indication that as the costs increases, the bank profitability increases. Studies by Alexiou and Sofoklis (2009), Iannotta *et al.*, (2007) and Mercieca *et al.*,(2007) adopt the evidence that larger size bank obtain economies of scale. However, there is consensus in the literature that the average cost curve in banking has a relatively flat U-shape, with medium-sized banks being slightly more scale efficient than either large or small banks are. Only small banks appear to have the potential for scale efficiency gains (Berger & Humphrey, 1994). On the other hand, larger size may also imply economies of scope for the bank resulting from the

joint provision of related services which may be explained by banks selling to their customers' life and/or home insurance together with mortgage loans using their branch networks. Although Elsas *et al.,* (2010) conclude that economies of scope are pronounced in banking, increasing its profitability, Barros *et al.,* (2007) find that bigger and more diversified banks are more likely to perform poorly, suggesting that smaller and specialized banks can reduce asymmetric information.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of major findings of the study, relevant discussions, conclusions and the necessary recommendations. The summary is done in line with the objectives of the study based on the output of statistical analyses guided to test the research hypothesis of the study. The chapter also suggests areas for further research.

5.2 Summary of findings

Evidence from previous studies on whether financial risk affect the bank financial performance showed that there were mixed results based on the level of risk management. The findings of the study revealed that the combined effect of bank financial risk influenced bank performance negatively.

5.2.1 Effect of credit risk on financial performance of commercial banks in Kenya

The first objective of the study was to set to establish whether credit risk affects the financial performance of the commercial banks in Kenya. The findings revealed that bank credit risk has a significant negative effect on the financial performance of commercial banks in Kenya both in the short run and in the long run. This implies that bank increased exposure to credit risk reduces profits. It may result by the fact that health of a bank's loan portfolio may be reflected by changes in credit risk and affect the financial performance of the commercial banks. When bank size was introduced as the moderator between the asset quality and return on equity, the effect was positive and insignificant in short run but negative and significant in the long run.

5.2.2 Effect of market risk on financial performance of commercial banks in Kenya

The second objective of the study was set to establish whether market risk affects the financial performance of the commercial banks in Kenya. The market risk negatively influences financial performance of commercial banks in Kenya both in the short run and in the long run. Degree of financial leverage being the dimension of market risk with most impact was used to test the moderating effect of bank size. The finding was that bank size does influence the effect of degree of financial leverage on financial performance in short run.

5.2.3 Effect of liquidity risk on financial performance of commercial banks in Kenya

The third objective of the study was set to establish whether liquidity risk affects the financial performance of the commercial banks in Kenya. Liquidity risk domain consisted of liquidity coverage ratio and net stable funding ratio dimensions. The results for this study show that net stable funding ratio is negatively associated with bank profitability both in long run and short run. Liquidity coverage ratio does not significantly influence the financial performance of commercial banks in Kenya both in long run and short run holding other factors constant. However, the overall effect was that liquidity risk has a negative effect on financial performance. Net stable funding being the dimension of liquidity risk with most impact was used to test the moderating effect of bank size. The finding was that bank size does not significantly influence the relationship between net stable funding and financial performance in both short run and long run.

5.2.4 Effect of operational risk on financial performance of commercial banks in Kenya

The fourth objective sought to determine the effect of operational risk on financial performance of commercial banks in Kenya. The finding of the study was that the cost income ratio which is a proxy of operational risk exert the most significant negative impact on the profitability across the banking firms. Thus operational risk influences financial performance of commercial banks in Kenya both in the short run and in the long run. This therefore calls for better management of operational risks in a manner that boosts depositors' confidence. However, unexpected phenomenon was found when bank size enhances the positive effect of operational risk on financial performances.

5.2.5 Moderating effect of bank size on the relationship between the financial risk and financial performance of commercial banks in Kenya.

The fifth objective sought to establish the moderating effect of bank size on the relationship between financial risk and financial performance of commercial banks in Kenya. From the analysis, findings were that in the short run bank size weakly enhances the influence of degree of financial leverage on financial performance of commercial banks in Kenya. In the long run bank size strongly enhances the influence of degree of financial leverage and asset quality on financial performance of commercial banks in Kenya.

5.3 Conclusions

5.3.1 Credit risk and financial performance

The study investigated the impact of credit risk on the financial performance of Kenyan banks considering mainly variables related to lending activities. The coefficients of the financial ratios of Capital to Risk Weighted Assets, Asset Quality as well as loan and advances in the regression model which are indicators of the level

of credit risk have negative effect on profitability. This indicates that poor asset quality or high non-performing loans to total asset related to poor bank performance. Thus, it is possible to conclude that banks with high asset quality and low non-performing loan are more profitable than the others. In addition the variables are significant in explaining the effect of credit risk on the return on equity of Kenyan commercial banks. Loan and Advances ratio (LA) coefficient exerts most significant negative effect on the profitability across the banking firms. Bank size enhances the relationship between the credit risk and financial performance in long run.

5.3.2 Market risk and financial performance

The study also investigated the impact of market risk on the financial performance of Kenyan banks by considering degree of financial leverage, net interest risk and foreign currency exchange exposure as independent variables. The analysis of the market risk shows the degree in which changes in the degree of financial leverage, interest rate risk and currency exchange exposure can have an adverse impact on the bank's incomes. Positive influence of bank size on degree of financial leverage and financial performance may be explained by the fact that larger banks may increase the financial leverage. In view of these findings, the study concludes that market risk requires adequate management and analysis systems to assess each significant risk element.

5.3.3 Liquidity risk and financial performance

The study also investigated the impact of liquidity risk on the financial performance of Kenyan banks by checking the liquidity coverage and net stable funding ratio dimensions. Liquidity risk has a negative significant effect on the financial performance. The conclusion of the study is that liquidity problems if unchecked may adversely affect a given bank’s profitability, capital and under extreme circumstances, it may cause the collapse of an otherwise solvent bank. In addition, a bank having liquidity problems may experience difficulties in meeting the demands of depositors, however, this liquidity risk may be mitigated by maintaining sufficient cash reserves,

raising deposit base and decreasing the liquidity gap. Adequate available and required of stable funding will improve the bank's profitability.

5.3.4 Operational risk and financial performance

The study found that operational risk has the most impact on the financial performance of Kenyan banks. The study indicated that there existence operational risk which is mainly related to costs leading to uncertainty regarding a financial bank's earnings. This is as a result of failures in computer systems, error, misconduct by employees, or risk of loss due to operating expenses. This brings a great concern to the society, the government and the bank itself. Giving the pivotal roles banks play in the nation's economy, it is therefore critical for measures to be taken to prevent the occurrence of operational risks in Kenyan banks. Larger commercial banks incur high costs which may lead to high profitability. For instance, improvement of technology and systems may increase the cost as well as the profitability.

5.3.5 Bank size and financial performance

The study also investigated the influence of bank size on financial risk and the financial performance of Kenyan banks. The moderating role of bank size on the financial performance of commercial banks was significant. Thus it is possible to conclude that the interaction of effect of bank size on the financial performance was signification during the period of study. In general, it can be concluded from this empirical study that asset quality, degree of financial leverage and cost income ratio are enhanced by the bank size in affecting the financial performance. This is an indication that the banks with high total assets are expected to manage their risks through asset quality and financial leverage management techniques.

5.4 Recommendations

Based on the objectives of the study, the following recommendations were reached.

5.4.1 Credit risk

From findings, it is recommended that management of Kenyan commercial banks should enhance their capacity in credit analysis and loan administration. Clear credit policies and lending guidelines should be established. Management also is required to make sure that the terms and conditions are adhered to in loans approval. Hence lending guidelines should be approved by senior management and made aware to all staffs. This will reduce loss on nonperforming loans and improve the asset quality management which raises banks' expenses and consequently increase profitability. It is also recommended that the bank need to monitor the loan and advances to total deposits ratio frequently since it also affect profitability. As finance distress theory states that credit risk is one of the component that financial distress emanates from, the shareholders wealth may be affected by increase of returns on their equity at a decreasing rate.

5.4.2 Market risk

The study also recommends that commercial banks should explore avenues to enhance capacities within banks for managing market risks. Commercial banks especially locally owned are required to consider finding ways of mitigating the market risks such use of financial derivatives and asset securitization which will reduce their interest rate and foreign currency risk exposure. This can be done by use of generally accepted financial concepts and techniques for risk measurement. The government and regulators of the banks ought to control not only inflation rates and interest rates but also off balance sheet items and other factors by setting a standard for the maximum amount of risks and benchmark for the minimum amount of overall return for each determinant of risk and return respectively.

5.4.3 Liquidity risk

The study also recommends that it is vital for the management of the Kenyan bank to be aware of its liquidity position in different product segment. This will help in

enhancing their investment portfolio and providing a competitive edge in the market. It is the utmost priority of a bank's management to pay the required attention to the liquidity problems. These problems should be promptly addressed, and immediate remedial measures should be taken to avoid the consequences of the bank becoming illiquid. The findings of this support the shiftability theory of liquidity that banks manage their liquidity. Banks need to monitor liquidity since holding more cash affects the returns of the shareholder. As the theory purports, highly marketable assets may be also help in controlling liquidity.

5.4.4 Operational risk

In the view that operational risk has the most significant impact on financial performance, the recommendation is that each Kenyan bank must tailor and permanent improve its risk management process and it is essential to make all employees aware on risk issues. This is in line with the proposal in the new Basel Capital Accord, banks are required to provide capital for operational risk. Banks are enjoined to develop viable internal approaches to the measurement of operational risks and to put in place operational risk management and control processes, which should cover the design, implementation and review of operational risk methodology. The banks' internal audit groups are expected to conduct regular reviews of the operational risk management involvement of the board of directors, and senior management of banks are expected in risk management. Hence guidelines and procedures provided by the CBK on operational risk management should be fully adhered into to ensure the risk is well mitigated and improvement in financial performance.

5.5 Suggestions for further research

This study helped to analyze the effect of financial risk on the financial performance of commercial banks. The study did not include all the bank risks and there is need to analyze effect of other bank risks which includes compliance and legal, technological, reputational and strategic risks. This study also captured the only available secondary

data for the period 2005 to 2014 which are in CBK records and a further study is recommended to include longer period for the time series data. This would help in capturing the potential effects across the economic cycles. While this study provides some insights of the NSFR and liquidity coverage ratio, implications of the new liquidity frameworks proposed by BASEL III warrant further research. Also, Advanced Management Approach would be the best approach for pricing of operational risk because it would require a bank to review its history of operational loss events and create a database wherein every loss event, the frequency of its occurrence, and the size of the loss is recorded. This approach could result in developing key risk indicators that could signal the occurrence of a loss event and banks would have the discretion to use their own internal loss data and be encouraged to develop effective risk measurement and risk management techniques.

Further study is also recommended to be carried out of other deposit taking financial institutions such as microfinance banks, mortgage firms and SACCOs since the banking sector faces many challenges including stiff competition from these institutions.

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APPENDICES

Appendix I: Study Population

List of Commercial Banks in Kenya and Market Share-December 2014

BANKING SECTOR MARKET SHARE-DECEMBER 2014												
		Market share index	Net Assets	% of the market	Total Deposits	% of the market	Total Shareholders Funds	% of the market	Total number of Deposit Accounts (Millions)	% of the market	Total number of Deposit Accounts (Millions)	% of the market
			KShs.M		KShs.M		KShs.M		KShs.M		Kshs.	
	Weighting		033		0.33		0.33		0.005		0.005	
	Large Peer Group>5%											
1	Kenya Commercial Bank Ltd	12.69%	379,969	11.8%	276,750	12.1%	72,165	14.4%	2.324	8.17%	0.278	6.38%
2	Co-operative Bank of Kenya	8.91%	282,689	8.8%	216,174	9.4%	42,351	8.4%	2.575	9.06%	0.428	9.84%
3	Equity Bank Ltd	8.7%	277,116	8.7%	202,485	8.8%	40,733	8.1%	8.437	29.67%	0.897	20.62%
4	Barclays Bank of Kenya Ltd	7.27%	226,043	7.1%	164,779	7.2%	38,111	7.6%	1.374	4.83%	0.289	6.65%
5	Standard Chartered Bank (K)Ltd	7.19%	222,636	7.0%	154,067	6.7%	40,450	8.1%	0.215	0.76%	0.060	1.39%
6	Commercial Bank of Africa Ltd	5.12%	175,809	5.5%	122,044	5.3%	17,857	3.6%	9.350	32.88%	1.850	42.54%
	Sub total	49.88%	1,561,262	48.80%	1,136,299	49.6%	251,667	50.2%	24.276	85.36	3.802	87.42%
	Medium Peer Group>1% &<5%											
7	CFC Stanbic Bank Ltd	4.92%	171,347	5.4%	96,830	4.2%	26,644	5.3%	0.114	0.40%	0.041	0.94%
8	Diamond Trust Bank ltd	4.63%	141,176	4.4%	101,594	4.4%	25,784	5.1%	0.582	2.05%	0.012	0.28%
9	NIC Bank Ltd	4.92%	137,087	4.3%	92,791	4.0%	22,618	4.5%	0.079	0.28%	0.027	0.61%
10	I & M Bank Ltd	4.10%	139,299	4.3%	86,621	3.85	21,814	4.3%	0.082	0.29%	0.010	0.23%
11	National Bank of Kenya Ltd	3.60%	122,865	3.8%	104,734	3.5%	12,114	2.4%	0.572	2.01%	0.125	2.88%
12	Chase Bank Ltd	2.98%	107,112	3.3%	79,124	3.5%	11,066	2.2%	0.055	0.19%	0.023	0.53%
13	Citibank Kemya	2.76%	79,398	2.5%	51,150	2.2%	18,359	3.7%	0.004	0.02%	0.001	0.02%
14	Family Bank Ltd	2.06%	61,813	1.9%	47,186	2.1%	10,621	2.1%	1.538	5.41%	0.149	3.42%
15	Bank of Baroda(K) Ltd	1.99%	61,945	1.9%	48,683	2.1%	9,867	2.0%	0.044	0.15%	0.002	0.05%
16	Bank of Africa (K) Ltd	1.77%	62,212	1.9%	41,671	1.8%	7,913	1.6%	0.056	0.20%	0.020	0.47%
17	Imperial Bank Ltd	1.76%	56,599	1.8%	47,148	2.1%	7,469	1.5%	0.052	0.18%	0.012	0.28%
18	Prime Bank Ltd	1.72%	54,918	1.7%	44,940	2.0%	7,735	1.5%	0.023	0.08%	0.004	0.08%
19	HFCK Ltd	1.56%	60,491	1.9%	36,310	1.6%	6,276	1.3%	0.068	0.24%	0.006	0.14%
20	Ecobank Kenya	1.46%	45,934	1.4%	32,414	1.4%	7,828	1.6%	0.053	0.19%	0.010	0.22%
21	Bank of India	1.11%	34,370	1.1%	24,668	1.1%	6,075	1.2%	0.016	0.06%	0.001	0.02%
22	Guaranty Trust Bank Ltd	1.07%	32,992	1.0%	17,734	0.8%	7,165	1.4%	0.017	0.06%	0.002	0.04%
	Sub-Total	**41.7%**	**1,367,559**	**42.7%**	**953,598**	**41.6%**	**209,348**	**41.7%**	**3,357**	**11.80%**	**0.444**	**10.21%**

23	Gulf African Bank Ltd	0.64%	19,754	0.6%	15,795	0.7%	3,147	0.6%	0.059	0.21%	0.006	0.14%
24	ABC Ltd	0.63%	21,439	0.7%	16,050	0.7%	2,623	0.5%	0.031	0.11%	0.003	0.06%
25	Victoria Commercial Bank Ltd	0.54%	17,244	0.5%	12,289	0.5%	2,876	0.6%	0.003	0.01%	0.000	0.01%
26	K-Rep Bank Ltd	0.51%	15,799	0.5%	12,065	0.5%	2,432	0.5%	0.343	1.20%	0.036	0.83%
27	Giro Commercial Bank Ltd	0.49%	15,082	0.5%	12,451	0.5%	2,422	0.5%	0.010	0.03%	0.002	0,05%
28	Fidelity Commercial Bank Ltd	0.48%	16,515	0.5%	13,559	0.6%	1,715	0.3%	0.009	0.03%	0.002	0.03%
29	Development Bank of Kenya	0.48%	16,954	0.5%	8,465	0.4%	2,764	0.6%	0.002	0.01%	0.001	0.03%
30	Jamii Bora Bank Ltd	0.47%	13,118	0.4%	8,485	0.4%	3,105	0.6%	0.072	0.25%	0.021	0.49%
31	Equatorial Commercial Bank Ltd	0.45%	16,589	0.5%	14,306	0.6%	1,155	0.2%	0.019	0.07%	0.007	0.16%
32	First Community Bank Ltd	0.45%	15,278	0.5%	13,339	0.6%	1,518	0.3%	0.104	0.37%	0.003	0.06%
33	Guardian Bank Ltd	0.45%	14,571	0.5%	12,643	0.6%	1,755	0.3%	0.010	0.03%	0.001	0.02%
34	Consolidated Bank of Kenya Ltd	0.41%	15,077	0.5%	10,642	0.5%	1,568	0.3%	0.048	0.17%	0.007	0.17%
35	Habib Bank A.G.Zurich	0.40%	12,147	0.4%	8,948	0.4%	2,243	0.4%	0.006	0.02%	0.000	0.01%
36	Trans-National Bank Ltd	0.34%	10,240	0.3%	7,666	0.3%	1,915	0.4%	0.046	0.16%	0.007	0.15%
37	Habib Bank Ltd	0.32%	9,449	0.3%	6,399	0.3%	1,942	0.4%	0.004	0.01%	0.000	0.01%
38	Paramount Universal Bank Ltd	0.31%	10,402	0.3%	8,048	0.4%	1,378	0.3%	0.007	0.02%	0.003	0.06%
39	Oriental Commercial Bank Ltd	0.28%	7,858	0.2%	6,231	0.3%	1,596	0.3%	0.005	0.02%	0.001	0.02%
40	Credit Bank Ltd	0.27%	8,865	0.3%	7,213	0.3%	1,152	0.2%	0.013	0.05%	0.002	0.05%
41	Middle East Bank (K) Ltd	0.20%	5,937	0.2%	4,127	0.2%	1,234	0.2%	0,002	0.01%	0.000	0.01%
42	UBA Kenya Ltd	0.18%	4,756	0.1%	3,576	0.2%	1,139	0.2%	0.005	0.02%	0.000	0.01%
43	Dubai Bank Ltd	0.10%	3,502	0.1%	4	0.0%	1,040	0.2%	0.007	0.02%	0.000	0.01%
44	Charterhouse Bank Ltd	0.00%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.00%
	Sub-Total	8.41%	270,576	8.5%	202,301	8.8%	40,718	8.1%	0.806	2.83%	0.103	2.37%
	Grand Total	100%	3,199,396	100%	2,292,198	100%	501,733	100%	28,438	100%	4,349	100%

Market share index is the composite of net assets, deposits, total shareholders' funds, number of loan accounts and number of deposit account

Source: Banks Published financial statements

Appendix II: Secondary Data collection instrument

Secondary data for the all the registered banks as at 2010 was collected as follows:

Name of the Bank …….

Variable	Description	Years									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
ROE	Net Income before tax										
	Total equity Capital										
Bank size	Total assets										
Capital to Risk Weighted assets CRWAR	Core Capital/ Total Risk Weighted Assets										
Asset quality Ratio	Non-performing Loans and advances										
	Total Loans										
Loan Loss Provision Ratio	Loan loss provision										
	Total loans										
Loan and Advance ratio	Loan and advances										
	Total Deposits										
Degree of financial Leverage	EBIT										
	EBT										
Net Interest Margin	Log of Net Interest Margin										
Net foreign currency exposure	Foreign exchange Gains/Losses										
Liquidity Coverage	Liquidity coverage ratio										
Net stable funding	ASF= (Capital + liabilities)										
	RSF= Cash+Short-term Unsecured traded instruments+off-balance sheet exposures										

NOTES:ASF=Available amount of stable funding, RSF= Required amount of stable funding