

**EFFECT OF OPERATION RISK EXPOSURE ON FINANCIAL
PERFORMANCE OF COMMERCIAL BANKS IN KENYA**

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**A Research Project Presented to the Institute of Postgraduate Studies of Kabarak
University in Partial Fulfillment of the Requirements for the Award of the Master
of Science Degree in Finance (Finance & Investment Analysis)**

KABARAK UNIVERSITY

NOVEMBER, 2018

DECLARATION

The research project is my own work and to the best of my knowledge it has not been presented for the award of a degree in any university or college.

Signature

.....Date.....

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GMF/NE/ 0161/01/17

RECOMMENDATION

To the Institute of Postgraduate Studies:

The research project entitled “**Effect of Operation Risk Exposure on Financial Performance of Commercial Banks in Kenya**” and written by **Andrew Toroitich** is presented to the Institute of Postgraduate Studies of Kabarak University. We have reviewed the research project and recommend it be accepted in partial fulfillment of the requirement for award of the degree of Master of Science in Finance (Finance & Investments).

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ACKNOWLEDGEMENT

I would like to thank the almighty God for giving me the strength during the entire compilation of this proposal. I would like to recognize the tireless efforts by my able lecturer Dr. Simon Kiprop and Dr. John Tanui for their invaluable time.

ABSTRACT

Operational risk is a fast emerging area in banking industry. Awareness of operational risk as a separate risk category has been relatively recent in most banks. It is therefore important to examine the effect of this risk on financial performance of the commercial banks. Unlike market, the operational risk factors are largely linked to internal policies and procedures of the bank. Operational risk in the banks come from different causes, including transaction and execution errors, fraud, improper business practices, product flaws, technology failures, employment discrimination, natural disasters. 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. The aim of this study was to examine effect of operation risk exposure on financial performance of commercial banks in Kenya. Specifically the study examined effect of credit risk exposure, liquidity exposure, operation expenses exposure and operation efficiency exposure on performance of the licensed commercial banks in Kenya. The target population for the study comprised of 42 licensed Commercial Banks in Kenya. The study used secondary panel data captured from the audited annual financial reports covering 2008 to 2017. The relationship between the operation risk exposure and banks performance was done using panel data regression analysis. The analyzed data was presented using tables and figures. First, the study established insignificant and also negative relationship between credit exposure and Return on Asset. An increase in 1 unit of credit exposure resulted into a decrease in Return on Asset by -4.0810. Second, the study established significant relationship between operating expense exposure and Return on Asset. An increase in 1 unit in operating expense exposure resulted into a decrease in Return on Asset by -9.2208. Third, the study established significant relationship between operating efficiency exposure and Return on Asset. An increase in 1 unit of operating efficiency exposure resulted into an increase in Return on Asset by .2115709. Four, the study established significant relationship between operating efficiency exposure and Return on Asset. An increase in 1 unit of operating efficiency exposure resulted into an increase in Return on Asset by .2115709. Five, the study established that when interest and inflation rates were introduced in the model, they affected the relationship between operating efficiency exposure with Return on Asset making it insignificant. Interest and inflation rates as macroeconomic factors made the bank to be more exposed making it difficult to streamline their operating efficiency making them more exposed to operational risk as far as their operating efficiency was concerned. This was supported operating efficiency exposure ($0.053 > 0.05$) which was an insignificant relationship with Return on Asset when interest and inflation rates were introduced compared to the relationship $r=0.2115709$, $p=0.049 < 0.05$ before the introduction of Interest and inflation rates as macroeconomic factors.

Key words: Financial Management, Risk Management, Financial Performance, Return on Asset

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LIST OF ABBRIVIATIONS AND ACRONYMS

ADF	- Augmented Dickey Fuller
CAR	- Capital Adequacy Ratio
CBK	- Central Bank of Kenya
DE	- Deposit Exposure
FDI	- Foreign Direct Investment
GDP	- Gross National Product
LLP	- Loan Loss Provision
NIM	- Net Interest Margin
NLPR	- Non-Performing Loans Ratio
ROA	- Return on Asset
ROCE	-Return on Capital Employed
ROE	- Return on Equity

OPERATIONAL DEFINITION OF TERMS

Credit Risk	Possible risk of loss resulting from a borrower's failure to repay loan or meet contractual obligations. Interest payments from the borrower or issuer of a debt obligation are a lender's or investor's reward for assuming credit risk (CBK, 2013).
Liquidity volatility	Liquidity is the degree to which debts obligations coming due in the next 12 months can be paid in cash or assets that will be turned into cash Dang (2011).
Operating Expenses Exposure	This is exposure that comes with the banks expenses activities affected by exchange rates and inflation (Athanasoglou et al, 2008).
Financial performance	This is measure of how well a firm can use assets from its primary mode of business and generate revenue measured in terms of income divided by total asset (ward and price.2006)
Operation Risk Exposure	Risk of loss resulting from inadequate or failed internal processes, people and systems or from external events Moosa (2007)

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The Banking industry in Kenya operates in volatile business environment; intense competition, rapid changes in customer expectations, increasing regulatory requirements, technological innovation and mounting competition and interest rate capping. Such environment come along with operation risk challenges such as failures in processing activities as a result of human errors, fraud and system failures brings significant losses to banks. Stringent corporate governance, regulatory standards and investor expectations are increasingly making operational risk management a focus for the banking industry today. In view of the rising competition within the industry in respect of customer satisfaction and retention, corporate reputation and reward maximization, there is the need for banks to critically align their business objectives with the possible operation risk and control information to enhance their financial performance (Nyarko, 2015).

Operational risk is a fast emerging area in banking. Awareness of operational risk as a separate risk category has been relatively recent in most banks. Unlike market, the operational risk factors are largely linked to internal policies and procedures of the bank. Losses arising from a bank's operational risks may, on occasion, exceed those stemming from credit losses. It is, therefore, a vital focus for management in ensuring a properly controlled approach to the risks inherent in their business. The processes of identifying and measuring operational risks are at a very nascent stage. The banks are only in the early stages of developing an operational risk management framework (Marliana et al., 2011)

Operational risk management in banks has been increasingly emphasized in the past decade. Big financial scandals, frauds and information technology system failures are important drivers for the greater attention both inside and outside banking institutions to their exposures to and internal handling of such risk. The exposure to different kinds of operational risk is nothing new for the individual bank, but as Moosa (2007). PWC (2014) defined operational risk as the risk of direct or indirect loss resulting from inadequate or failed internal processes, people, and systems or firm external events. Such events can lead to financial losses through error, fraud, fire or other disaster (Basel, 2010). Commercial Banks have explicitly dealt with risk throughout their existence. The very nature of banking activities requires these institutions to assume financial risks while providing innovative products to meet the needs of their clients. Institutions will continue to rely on gap management, credit scoring, and risk based capital requirements to cope with risk. However, new approaches must be developed and implemented to cope with the new financial products and services brought on by rapidly changing technology, the availability of real-time information, and increased competition Bankers Magazine (1997).

On 30 June 2011, the Kenyan banking sector comprised of 43 commercial banks, 1 mortgage finance company, 6 deposit taking microfinance institutions, 2 credit reference bureaus, 3 representative offices and 124 foreign exchange bureaus (CBK, 2011). Commercial banks branch network has grown from 530 in 1999 to 1,102 branches by end of June 2011, ATMs increased from 262 to 2,021, number of deposit accounts from approximately 1million with 16,673 staff to 12.8million with 28,846 staff over the same period (CBK, 2011). Consequently, the banking sector productivity score continued to

improve where the staff to customers' ratio was 1:444 in June 2011 compared to 1:60 in 1999. Total assets increased from Ksh. 387,371 million in December 1999 to Ksh. 1.9 trillion in June 2011 while customer deposits from Ksh. 235billion to Ksh. 1.4 trillion in June 2011 (CBK, 2011).

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 and Levine, 2009).

1.1.2 Financial Performance

Performance may be defined as the reflection of the way in which resources of a company (Bank) are used in the form which enables it to achieve its objectives. Financial performance is the employment of financial indicators to measure the extent of objective achievement, contribution to making available financial resources and support of the Bank with investment opportunities (Heremans, 2007). 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 (Pandey, 2008).. Financial performance of a firm is the measure of the level of the organization's profit or losses within a specified period of time. Several measures have been used to measure the financial performance of Banks. These measures include: - Return on Equity

(ROE), Return on Asset (ROA) and Net Interest Margin (NIM) (Murthy & Sree, 2003; Alexandru et al., 2008).

Return on Equity (ROE) which is a financial ratio that refers to how much profit a company earns compared to the total amount of shareholder equity invested or found on the balance sheet. ROE is what the shareholders look in return for their investment. A business that has a high return on equity is more likely to be one that is capable of generating cash internally. Thus, the higher the ROE the better the company is in terms of profit generation. It is further explained by Khrawish (2011) that ROE is the ratio of Net Income after Taxes divided by Total Equity Capital. It represents the rate of return earned on the funds invested in the bank by its stockholders. ROE reflects how effectively a bank management is using shareholders' funds. Thus, it can be deduced from the above statement that the better the ROE the more effective the management in utilizing the shareholders capital.

Return on Asset (ROA) a major ratio that indicates the profitability of a bank. It is a ratio of Income to its total asset (Khrawish, 2011). It measures the ability of the bank management to generate income by utilizing company assets at their disposal. In other words, it shows how efficiently the resources of the company are used to generate the income. It further indicates the efficiency of the management of a company in generating net income from all the resources of the institution (Khrawish, 2011). Wen (2010) suggests that a higher ROA shows that the company is more efficient in using its resources.

Net Interest Margin (NIM) 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. It is usually expressed as a percentage of what the financial institution earns on loans in a specific time period and other assets minus the interest paid on borrowed funds divided by the average amount of the assets on which it earned income in that time period (the average earning assets). The NIM variable is defined as the net interest income divided by total earnings assets (Gul et al., 2011). Net interest margin measures the gap between the interest income the bank receives on loans and securities and interest cost of its borrowed funds. It reflects the cost of bank intermediation services and the efficiency of the bank. The higher the net interest margin, the higher the bank's profit and the more stable the bank is. Thus, it is one of the key measures of bank profitability. However, a higher net interest margin could reflect riskier lending practices associated with substantial loan loss provisions (Khrawish, 2011).

1.1.3 Commercial Banks in Kenya

Commercial banks are those institutions that are licensed by the Central bank to take deposits and advance credit. As at December 2017; there are 42 licensed commercial banks and 1 mortgage finance company. Out of the 43 institutions, 30 Commercial Banks and 1 mortgage Financial Institutions are locally owned and 13 are foreign owned. The locally owned financial institutions comprise 3 banks with significant shareholding by the Government and State Corporations, 27 commercial banks and 1 mortgage finance institution (CBK, 2017).

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 (GOK, 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 (PwC, 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).

1.2 Statement of the problem

Operational risk events stem from varied causes, including transaction and execution errors, fraud, improper business practices, product flaws, technology failures, employment discrimination, natural disasters (or 'acts of god') and terrorism (Cruz, 2002). Most of the operational losses encountered in practice are frequent and relatively small, however, of real concern to regulators and risk officers are the less frequent/high-impact losses. Examples of operational risk events that occur frequently are equipment failures, losses due to ineffective management processes, employee errors, internal and external fraud, IT system disruptions and natural disasters. Such low probability/high impact events are referred to as *black swan* events, that is, rare events but ones whose impact on financial markets can lead to extremely high losses. These losses place considerable emphasis on the effective determination of economic capital by financial companies and are of paramount concern in operational risk and regulators in their attempt to stabilize the international financial system. Risk management is a cornerstone of prudent banking practice. Undoubtedly all banks in the present-day volatile environment are facing a large number of risks such as credit risk, liquidity risk, foreign exchange risk, market risk and interest rate risk, among others – risks which may threaten a bank's survival and success. For this reason, efficient risk management is absolutely required. Carey (2001) indicates in this regard that risk management is more important in the financial sector than in other parts of the economy. Studies that have been done on risk exposure in commercial banks

either singly addresses credit risk and liquidity risks. For example, Chase Bank irregularly advanced Sh16.6 billion to various entities, many of them associated with insiders, without proper security putting billions of shillings belonging to its 55,000 depositors at risk. Operational errors are common in a banking environment which people can easily manipulate to steal money from such banks, a reason that justifies the study. There is no study that have combined the four key operation risk exposures in banking sector; credit, liquidity, operation and operation efficiency risks necessitating the current study that will examine effect of operation risk exposure on financial performance of commercial banks in Kenya by combining these four operation risk exposures.

1.3 Objectives of the study

1.3.1 General Objective

The general objective of the study was to examine effect of operation risk exposure on financial performance of commercial banks in Kenya.

1.3.2 Specific Objectives

- i. To establish effect of credit exposure on financial performance of commercial banks in Kenya.
- ii. To analyze effect of liquidity volatility exposure on financial performance of commercial banks in Kenya.
- iii. To assess effect of operating expense exposure on financial performance of commercial banks in Kenya.
- iv. To establish effect of operation efficiency exposure on financial performance of commercial banks in Kenya.

- v. To ascertain the moderating effect of macroeconomics on the relationship between operational risk and financial performance of the licensed commercial banks in Kenya.

1.4 Research Hypotheses

HO₁: Credit exposure does not significantly affect financial performance of commercial banks in Kenya.

HO₂: Liquidity volatility does not significantly affect financial performance of commercial banks in Kenya.

HO₃: Operating expense exposure does not significantly affect financial performance of commercial banks in Kenya.

HO₄: Operating efficiency exposure does not significantly affect financial performance of commercial banks in Kenya.

HO₅: Interest and inflation rates do not moderate the relationship between operational risk and financial performance of the licensed commercial banks in Kenya.

1.5 Significance of the Study

The findings of this research will be important to the: Managers of commercial banks in providing guidance on the framework of management and identification of operational risks by decision makers within the banking industry in Kenya. Commercial banks staff members who involved in the day to day operational risk management will learn how credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure affect performance of commercial banks and use the recommendations from the study to reduce such risks.

This study will provide an empirical knowledge to the Central Bank of Kenya on credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure by commercial banks in Kenya. Such knowledge will help the regulator review the existing policies and come up with stringent policy that can protect banks operations. Scholars in financial operations, risks and audit will find this study important as a basis for conducting further research on the subject. The study will add to the body of knowledge in the finance discipline. Also to the management consultants as they will ponder on the development tool for the management and the quantification of operational risks.

1.6 Scope of the Study

The study covered effect of operation risk on the Licensed Commercial Banks in Kenya. The operation risks to be studied include; credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure. Banks' performance was measured in terms of Return on Asset (ROA) and Return on Equity (ROE). He study collected data from audited financial reports from the 42 Licensed Commercial Banks in Kenya covering 2003 -2017. This period covers two government administrations.

1.7 Limitation and Delimitation of the Study

The study was limited from attaining its objective and testing the research hypotheses because of the sampled size of selected 42 Licensed Commercial Banks which may be small so as to enable generalization of the finding to whole banks in Kenya. To address this limitation, 42 Licensed Commercial Banks was very representative and are all exposed to operational risk. The study suffered from lack of all the data elements set in the objectives. The researcher used data trends over years to fill such gaps.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter review relevant literature on effect of operation risk exposure on financial performance of commercial banks in Kenya. This section is divided into the theories informing the study, empirical review, knowledge gaps and conceptual framework.

2.2 Empirical Review

2.2.1 Operational Risk

Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk (Basel Committee on Banking Supervision, 2006). By this, all major drivers of operational risk are covered. People (human factor) can produce operational risk events through unintentional errors during work, criminal activities, insufficient training or number of employees, and bad management. External events, as a source of operational risk, comprise numerous events that result in physical damages on the bank property such as natural disasters (earthquakes, floods, volcanoes etc.) or catastrophes like wars, robberies or losses incurred by third parties. Risk events that are connected with IT system are relatively easy to detect although they vary from hardware malfunctioning to abuses of databases.

Basel II defines Operational risk as the risk of loss resulting from inadequate or failed processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk. Legal risk includes, but is not limited to,

exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements (Bank for International Settlements 2011). To manage this risk effectively, institutions should apply a top-down risk based view, assigning clear responsibility for all key operational risks. Effective governance also requires that sufficient talent is in place, covering all key operational risk and without impeding business execution (Mckinsey work paper on risk 2012). Health and Safety Authority, Dublin (2013), argues that to successfully control the risks associated with the storage and handling of dangerous goods. The filling station owners must involve their employees and any other people who are engaged to carry out work at the station when planning and implementing risk control measures that are likely to be affected by the dangerous goods.

The most difficult to identify and detect are potential operational risks embodied into internal processes and procedures. Unlike other mentioned major operational risk drivers, weaknesses of internal processes are still in a way ignored. All improvements in managing operational risk are mostly connected with countable and easily detected events. Internal processes weaknesses are less noticeable and strong commitment and willingness of management is required to recognize them and later on to solve. Special challenge regarding this type of risk driver is to recognize weaknesses that results from moral hazard problem and some authors propose changes in definition of operational risk in order to include it as integral part (Savic Ana, 2012, 18). Moral hazard is the consequence of existing information asymmetry on the financial markets. It occurs when the lender is subjected to the hazard in which the borrower has an incentive to engage in activities that are undesirable (immoral) from the lender's point of view, that is, activities

that make it less likely that the loan will be repaid (Mishkin Frederic S. 2006). Special type of moral hazard risk is principal agent problem which occurs because managers (agents) have more information about investments than principals (owners) so they could have incentives to engage in activities that are not desirable for owners and expose the firm to the higher risk in order to make more profit and personal gains through bonuses for example.

Operational risk is described as the risks of loss that arise from poor or failed in-house processes, workmanship and systems or external procedures. While the main component of risk management is to measure the scope and extent of an institutions risk exposures (Lopez, 2002), operational risk entails all risks, not covered by market and credit risk but have a measurable financial impact on the organization (Rippel & Teplý, 2011). Most operational risks arise from people incompetency and misuse of powers, failed processes during processing of information, transmission, and retrieval of data, and inaccuracy output. Information Technology and systems may also lead to operational risk when there is a failure of the system, hacking, and programming errors thus causing losses to the institution (Strachnyi, 2016). Internal causes of operational risks include issues of insufficient processes, existing systems failures, poor hardware and software maintenance as well as errors in communication. External factors however, pertain to issues such as natural disasters, political disturbances, fraud as well as weak financial policies within the institutions (Barakat, 2014).

In larger banks, risk committee that specializes in the management of the bank's risks, and internal control system is set up for the role of observance of the risk, state of affairs and approaches taken for comprehensive risk identification, and maintenance of an

efficient internal control system. Such a centralized risk-controlling unit has the authority to lay down pointers and strategies of risk management (Bank For International Settlement, 2011). The forms of internal operational risks involve issues of human error in processing, fraud, missing a control step, disruption or system failures (software, hardware, telecommunications), act of sabotage or vandalism, noncompliance with law and regulatory requirements, external dispute with employee as a result of discrimination or harassment, new service or change in the current processes (Weber, 2014)

2.3 Credit Exposure and Commercial Banks Performance

Principally, the credit risk of a bank is the possibility of loss arising from non-repayment of interest and the principle, or both, or non-realization of securities on the loans (CBK, 2013). Knowledge of the Customer means that Credit shall be granted only to those Customers' whom the Commercial Bank fully understands their business operations. Knowledge of the Customer must extend beyond data relating to the Customer alone and cover all aspects which can influence credit risk, both qualitative and quantitative in nature (CBK, 2013).

The Central Bank of Kenya developed risk management guidelines for the purpose of providing minimum direction to banks on risk management and create a working framework befitting international best practices which require banks to have a fully independent credit risk management responsible for capital adjustment and provision for escalating nonperforming loans (CBK, 2013). According to CBK Prudential Guideline (2013), the minimum regulatory capital adequacy requirement that are measured by the ratio of Core Capital and Total Capital to Total Risk weighted Assets are 8.0% and 12.0% respectively. Capital adequacy is the level of capital required by the banks to

enable them withstand the risks such as credit, market and operational risks they are exposed to in order to absorb the potential losses and protect the bank's debtors.

The highest risk facing a bank is the losses from reprobate loans (Dang, 2011). In this manner, nonperforming loan proportions are the best intermediaries for Asset quality. It is the concern of every bank to keep the measure of nonperforming loans to low level. This is so in light of the fact that high NPLs influence the profitability of the bank. Accordingly, low NPLs to total up to loans demonstrates that the great wellbeing of the portfolio a bank. The lower the proportion the better the bank performing (Sangmi and Nazir, 2010).

Mohammad (2008) completed an investigation on risk management in Bangladesh Banking Sector. His main objective was to investigate the contribution of credit risk on non-performing loans. He discovered that, the core of the issue lies in the collection of high level of non-performing loans over a significant lot of time. According to him except if NPL proportion of the nation can be brought down generously they will lose aggressive edge in the rush of globalization of the managing an account benefit that is occurring all through the world. Since they have had a two-decade long involvement in managing the NPLs issue and much is thought about the causes and cures of the issue, he reasoned that it is essential for the banks, borrowers and policy makers to learn from the past experience and act appropriately.

Waweru and Kalani (2009) conducted a study on commercial banking crises in Kenya in Kenya. They discovered that a portion of the reasons for non-performing loans in Kenyan banks were national economic downturn, reduced consumer, buying ability and legal

issues. This current examination recognizes that the nonperforming loan and loan delinquency concepts are comparable. This study disagree with that of Waweru and Kalani (2010) regarding area of study, and study technique. Muasya (2009) investigated the effect of non-performing loans on the performance of the managing an account segment in Kenya in the season of worldwide money related emergencies. The discoveries affirmed that nonperforming loans do influence commercial bank in Kenya. Encourage examination of individual saves money with more than Ksh. 25 billion worth of benefit demonstrated that while the effects are negative, the greatness of non-performing loans to both premium pay and profitability are not unfriendly for 7 of the 13 investigated banks and that assets quality of the entire banking sector has been improving to settle at 7.17%.

Wanjiram (2010) conducted a study on the connection between non-performing loan management practices and financial performance of commercial bank in Kenya. The investigation inferred that there is a requirement for commercial bank to receive non-performing loan management practices. Such practices incorporate guaranteeing adequate guarantees, restricting loaning to different sorts of organizations, loan securitization, guaranteeing clear appraisal structure of loaning offices and utilization of methods in settling on risksous loans among others. The investigation additionally presumed that there was a positive connection between non-performing loan management practices and the financial performance of commercial bank in Kenya which suggests that the selection of non-performing loan management practices prompts enhanced financial performance of commercial bank in Kenya.

Aboagye and Otioku, (2010) led an investigation on Credit Risk Management and Profitability in financial institutions in Sweden. The fundamental goal was to find out whether the management of the risks identified with that credit influences the profitability in financial institutions. They discovered that credit chance management in financial institutions has turned out to be more critical not just in light of the budgetary emergency that the world is encountering these days yet in addition the presentation of Basel II. They concluded that since giving credit is one of the primary wellsprings of pay in financial institutions, the management of the risks identified with that credit influences the profitability of the budgetary organizations (Aboagye and Otioku, 2010).

Mutua (2014) directed an exploration to research the impacts of Credit Risk Management on the money related performance of commercial bank in Kenya. The investigation uncovered that Sixty four percent (64%) of the respondents felt that Non-performing loans add to the financial performance practices in the commercial banks.

Khan and Ahmad (2001) conveyed an examination on risks emerging from investment deposits. The general objective of the study was to find out whether bankers considered these exceptional risks more genuine than customary risks looked by money related foundations. The findings demonstrated that chance level is viewed as raised. They presumed that the high view of risks might be a sign of the low level of dynamic risk management due to the missing of risks control through inside procedures and control, particularly on account of credit chance.

Hosna et al. (2009) considered the relationship between non-performing loan and capital sufficiency proportions and profitability for four Swedish banks covering a time of 2000 to 2008. The investigation demonstrated that rate of nonperforming loan and capital adequacy ratios was conversely identified with ROE however the degrees shift from one bank to the next. Such reverse relationship between profitability, performance and credit chance measures were likewise found in other studies (Achou and Tenguh, 2008; Kolapoet al., 2012; Musyoki and Kadubo (2011).

Kithinji (2010) examined the impact of credit risk estimated by the proportion of loans and loans on aggregate resources and the proportion of non-performing loans to add up to loans and loans on profit for aggregate resource in Kenyan banks from 2004 to 2008. The findings revealed that the main part of the profits of commercial bank are not impacted by the measure of credit and non-performing loans. The study provides the rationale to consider different factors that could affect bank's performance and furthermore a more drawn out time of the investigation in order to catch the genuine image of the banks' performance. Thus this examination incorporated the effect of liquidity and market risks as parts of financial risks.

Afriyie et al. (2011) analyzed the effect of credit risks on the benefit of rural and community banks in the BrongAhafo Region of Ghana. The investigation utilized the budgetary articulations of ten rustic banks from the time of 2006 to 2010 (five years) for examination. The panel regression model was utilized for the estimation. In the model, of Return on Equity (ROE) and Return on Asset (ROA) were utilized as benefit marker while Non-Performing Loans Ratio (NLPR) and Capital Adequacy Ratio (CAR) as credit chance management pointers.

The findings demonstrated a critical positive connection between non-performing loans and provincial banks' profitability uncovering that, there are higher credit losses yet banks still win benefit. He discovered that there is a connection between the credit risk management and benefit of chosen rural banks in Ghana.

Kargi (2011) assessed the effect of credit risks on the profitability of Nigerian banks. Financial ratios as proportions of bank performance and credit risks were gathered from the yearly reports and records of sampled banks from 2004-2008 and investigated utilizing enlightening, relationship and relapse strategies. The findings revealed that credit chance management significantly affects the profitability of Nigerian banks. The findings of the study revealed that banks' profitability is inversely impacted by the levels of loans and loans, non-performing loans and stores in this way presenting them to extraordinary danger of liquidity and trouble. The extensive examination of credit risks including cash-flow to chance weighted resource proportion should have been considered. Subsequently the current examination thought about these appropriate factors in its investigation.

Kolapoet al. (2012) utilizing panel model approach conducted an exact examination concerning the quantitative impact of credit risks on the performance of commercial bank in Nigeria over the time of 11 years (2000-2010) from 5 selected commercial bank. The traditional profit theory was utilized to plan benefit, estimated 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.

Panel model showed that the effect of credit risk on bank performance measured by the Return on Assets of banks is cross-sectional invariant. The outcomes demonstrated that the impact of credit risks on bank performance estimated 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) investigated different parameters relevant to acknowledge risk management as it influence financial institutions in Nepal utilizing parameters, default rate, cost per loan assets and capital adequacy ratio. 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.

Afriyieet al. (2012) inspected the effect of credit risk indicators on the profitability of rural and community banks in the BrongAhafo Region of Ghana. The study utilized financial statements of ten rural banks from the period of 2006 to 2010 for analysis. The panel regression was utilized for the estimation where the meaning of Return on Equity (ROE) and Return on Asset (ROA) were utilized as profitability pointer while Non-Performing Loans Ratio (NLPR) and Capital Adequacy Ratio (CAR) as credit risk management markers.

The discoveries demonstrate a noteworthy positive connection between non-performing loans and rural banks' profitability uncovering that, there are higher loan losses yet banks still gain benefit. This shows that rural banks don't have sound and viable credit risk management practices. Their investigation did not consider other risks factors that influence bank's profitability

Onaolapo (2012) examined the relationship between credit risk management efficiency and financial health in chosen Nigerian commercial banking sector. Data collections are mainly secondary spanning a 6 years period before and after consolidation programme (2004 to 2009). The examination theorized 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 demonstrate insignificant causation between Deposit Exposure (DE) and performance however more prominent reliance on operational proficiency parameters. In the 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. The study captured most of variables or measures of credit risk management except the asset quality. Other advanced methods such as generalized method of moments least needed to have been used to analyse the data.

Ogboi and Unuafe (2013) analyzed the effect of credit risks and capital adequacy on banks financial performance in Nigeria. Their investigation utilized time series and cross sectional data from 2004-2009 from chosen banks yearly reports and records in Nigeria.

Secondary data for the examination were acquired from the financial statement of six out of twenty one banks working as at December 2009 which were chosen by purposive sampling technique. Panel data model was utilized to gauge the relationship that exists among advance misfortune arrangements (LLP), advances and advances (LA), non-performing advances (NPL) and capital ampleness (CA) which were the free factors and profit for resource (ROA) as the needy variable to quantify the productivity of the banks. The findings showed that sound credit chance management and capital sufficiency affected emphatically on bank's money related performance except for advances and advances which was found to negatively affect banks' profitability amid that period.

Marshal and Onyekachi (2014) did an experimental examination on the impact of credit risks and performance of banks in Nigeria over the time of 15 year (1997-2011) on five keeping banking firms .Data were sourced from the yearly reports and records articulations/sheets of the banks in the example which was timeseries and cross sectional information and assessed utilizing panel data regression techniques. The outcome demonstrates that there is a positive connection between Ratio of non-performing loans to loans and advances (LogNPL) and banks performance (LogROA). Their examination shown that banks in the investigation convey an exceptionally insignificant level of nonperforming advances in their credit portfolio and accordingly this does not adjust to our from the earlier desires. Their discoveries were likewise that there exist a positive connection between proportion of credit and advances to add up to store (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

2.4 Liquidity Volatility Exposure and Banks Performance

Liquidity is another factor that determine the level of bank performance. Liquidity is how much obligations commitments coming due in the following a year can be paid in real money or resources that will be transformed into money. As indicated by Dang (2011) sufficient level of liquidity is decidedly related with bank profitability. The most widely recognized financial ratios that reflect the liquidity position of a bank as indicated by the above creator are client store to add up to resource and aggregate credit to client stores. Be that as it may, the investigation directed in China and Malaysia discovered that liquidity level of banks has no association with the performance of banks (Said and Tumin, 2011).

Doriana (2013) considered the determinants of bank liquidity inside the Euro region. The target of the examination was to dissect the kind of relationship that exists between liquidity risks, measured with the liquidity coverage ratio and the net stable funding ratio, and some specific bank structure variables-size, capitalization, assets quality and specialization. The investigation discovered that bigger banks have a higher liquidity chance introduction, while keeps money with higher capitalization present a superior liquidity on long skyline. The advantages quality effects just on the proportion of the fleeting liquidity risks. As to the specialization, banks more specific on the loaning action demonstrated a more defenseless subsidizing structure. The study also found that during the financial crisis, the liquidity risk management changes only on the short term horizon.

Kamau, Erick and Muriithi (2013) examined the components affecting liquidity level of commercial bank in Kisumu city, Kenya. The study tried to research whether factors internal and factors external to commercial bank influences liquidity level of commercial

banks in Kisumu City. The examination discovered that varieties in liquidity level are caused by both internal and external elements. The internal factors found significant in determining liquidity level of commercial banks were contingency planning, profitability, banks major obligations and management policies. The external factors found to be significant determinants of liquidity were credit rating, monetary policies, government expenditure and balance of payment status. A study conducted to analyze the relationship between liquidity risk and financial performance of commercial banks in Kenya, sought to investigate liquidity risks faced by commercial banks and to establish the relationship between liquidity risk and the performance of banks in Kenya. It was found that profitability of the commercial bank in Kenya is negatively affected due to increase in the liquidity gap and leverage. With a significant liquidity gap, the banks may have to borrow from the repo market even at a higher rate thereby pushing up the cost of banks. The levels of customer deposits were found to positively affect the bank's profitability (Maaka, 2013).

The relationship between liquidity risks can be estimated with two new liquidity markers proposed by the Basel Committee; liquidity inclusion proportion and net stable financing proportion, some monetary record lists - the common logarithm of aggregate resources, the proportion between advances to clients and aggregate loans and some macroeconomic pointers GDP yearly development rate, the spread between the interbank rate and national bank approach rate (Angora and Roulet, 2011). Their study discovered that the liquidity risks proportion has a negative association with a large portion of the markers broke down including size and the proportion between administrative capital and aggregate

resources, while the liquidity measure has a huge and positive association with macroeconomic factors, for example, GDP and the national bank policy rate.

Rauch, Steffen, Hackethal, and Tyrrel (2010) investigated the determinants of liquidity risks and endeavored to distinguish the determinants of liquidity creation. Their outcomes feature that the most critical determinants are macroeconomic factors and financial arrangement, while not demonstrating a huge connection between liquidity creation and bank particular factors, for example, size and performance. They additionally discovered that capitalization estimated by the proportion among value and aggregate resources has a noteworthy and positive association with liquidity and a unimportant association with expansion rate and development rate. Liquidity risks estimated utilizing fluid advantages for aggregate resources proportion, broke down the determinants of liquidity danger of banks from developing economies. The outcome demonstrated that the extent of a bank positively affected liquidity risks, the proportion of value to resources as a proportion of capital sufficiency negatively affected liquidity chance. The nearness of prudential control convincing banks to be fluid enough, the offer of open use on GDP as a proportion of supply of moderately fluid resources and the rate of expansion which builds the helplessness of banks to ostensible estimations of advances gave to clients were found to have negative impact on liquidity risks. The relationship between assets growth and financial performance was also found to be positive and significant (Bunda and Desquilbet, 2008).

Ogbada and Osuji (2013) looked into on the viability of liquidity management and banking performance in Nigeria. Survey design through structured questionnaires was used to collect data .The sample of the study was made up of twenty randomly selected

banks in Nigeria where 300 bank employees derived by randomly distributed questionnaires to each. From their empirical investigation they discovered that there is critical connection between proficient liquidity management and financial performance. Majid (2003) additionally focused on reasonability routine with regards to liquidity management where in their examination on risks management , direction and supervision of Islamic banks in Jakarta-Indonesia .They insinuated that inability to address liquidity management has prompted saving money crumple and to augmentation insecurity in monetary frameworks.

Njeri (2013) performed investigate on the impact of liquidity on financial performance of deposit taking micro finance institutions. Descriptive research design was used to analyze secondary data of 5 years from 2009-2013 using multiple regression model. From the investigation it's clearly that financial performance of the MFIs in Kenya is profoundly relied upon the level of institutional liquidity. Thus MFIs should upgrade their liquidity position to acknowledge expanded and practical money related performance. Weak financial stewardship, inappropriate capital structure and imprudent funds allocation has been cited as some of the factors impending growth of SACCOs. These elements have undermined the profitability and sustainability of growth of SACCOs.

Giannotti et al. (2010), in a study on a sample of 675 Italian banks, also found that larger banks have lower liquidity exposure. The authors feature that there is no huge distinction as far as liquidity risks introduction between banks work in land loaning and different banks. Also, advance reimbursement and measure of cash obtained were huge factors that impacted sparing examples; and store acquired altogether affected speculation designs. This prompted the proposal that sparing and venture level could be improved if loans

were sufficiently made accessible and legitimate supervision and observing of assets was set up.

Adrian and Hynn (2010) in their research on liquidity and leverage concluded that Aggregate liquidity is positively related to how hard the financial intermediaries search for borrower (leverage). Agbada and Osuji (2013) in their research the efficacy of liquidity management and banking performance in Nigeria concluded that there exists a strong positive relationship between efficient liquidity management and performance in terms of profitability and return on capital employed (ROCE) hence the need to remain liquid to influence returns on capital employed by bank. Godfrey (2015) in his research on liquidity and bank performance examined nexus between Net Interest Margin and liquidity on South African banks. The research used 1998 to 2014 as the period for data collection which was subjected to Autoregressive distributed lag (ARDL) and ordinary least squares. In the study three independent variables, namely the market liquidity, fund liquidity and credit risk were regressed against net interest income to assets ratio, a proxy for net interest margin. The research concluded that there is an insignificant co-integrating relationship between Net Interest Margin (NIM) and two measures of liquidity, namely liquidity and funding liquidity.

2.5 Operating Expense Exposure and Banks Performance

Huey-Yeh Lin & Hsiao-Yi Chang (2016) carried out a study on the correlation between operational risks and operational performance: results obtained by comparing independent banks with the financial holding subsidiary banks. The study established that capital requirements based on operational risks neither elevated the operational performance of the independent banks nor increased the banks' operating expenses. By

contrast, FHS banks featured business operations that were more diverse, thus enabling operational risk capital requirements to reduce the banks' operating expenses. These results can serve as a reference for government policy makers for effectively improving banks' operational efficiency by indicating that different assessment indicators be used when developing risk management indices for banks of different sizes and for banks that adopt different operational methods. In addition, the risk management of the FHS banks outperformed that of the independent banks. For example, variables such as the "interest rate sensitivity gap," "net worth ratio," and "employee turnover rate" exhibited no significant effect on the FHS banks, which may have resulted from the following reasons: first, the "interest rate-sensitive assets and liabilities" possessed by the banks cancelled each other out or facilitated risk transfer, enabling the banks to exhibit superior management of interest rate risks; second, the FHS banks were larger than the independent banks and had more talented personnel, enabling the FHS banks to fill vacancies more quickly and to maintain their operational performance. This study showed that FHS banks exhibit more competitive risk management (with greater ability and soundness) than do independent banks. The results also indicated that the government must continue to promote financial holdings management. The findings of this study may serve as a reference for government policy makers when formulating related policies, thus enabling banks to manage risks more effectively and to achieve greater operational efficiency.

Laeven and Levine (2009) compared bank governance, authorities' regulation and risk taking. On the other hand, the annual report of the Operational Riskdata eXchange Association (ORX) (2009) used the ratio operational events per million incomes to

quantify the lack of governance and/or supervision in a way that allows for a fair comparison of all banks, disregarding their size and focusing on wealth production. Another approach considers the cost of capital as an inefficiency factor relating to the institutions' governance and risk management. Uchida and Satake (2009) explained that market discipline has garnered increasing attention as a mechanism to ensure bank soundness. They imply that depositors, who are the largest creditors to banks, may be of primary importance in this mechanism by exerting disciplinary pressure on bank management in terms of efficiency improvements.

Chernobai et al (2011) further examined the incidence of operational losses among US financial institutions using publicly reported loss data from 1980 to 2005. They highlighted the correlation between OR and credit risk, as well as the role of corporate governance and proper managerial incentives in mitigating OR. On the other hand, Cope et al (2012) investigated the relationships between the severity of operational loss events reported in the banking sector and various regulatory, legal, geographical and economic indicators. They found evidence of a significant correlation between internal fraud and constraints on executive power and the prevalence of insider trading.

2.6 Operating Efficiency Exposure and Banks Performance

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. 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.

Operational efficiency is defined by Olalere, Temitope and Oluwatobi (2015) as the capability of an enterprise to deliver products or services to its customers in the most cost-effective manner possible while still ensuring the high quality of its products, service and support. Operational efficiency tends to confirm the notion of increasing competitiveness and improving resource utilization by airports. In the literature on bank performance, operational efficiency is usually used to assess managerial efficiency in banks. Some external factors and characteristics may influence an airport manager's control over operations (Sarkis, 2000). According to research, firm's decision makers should increase the efficiency in using the tangibles assets to generate income (Saleh, 2015).

Banks operate efficiently by directing society's savings toward those enterprises with highest expected social returns and monitoring them carefully after lending society's scarce resources are allocated more efficiently. In contrast, banks that simply operate with waste and inefficiency will slow down economic growth and reduce society's welfare (Athanasoglou et al, 2008). Efficiency in intermediation of funds from savers to borrowers enables allocation of resources to their most productive uses. The more

efficient a financial system is in such resource generation and in its allocation, the greater its contribution to productivity and economic growth (Beck, et al. 2000). Management of operations has been usually a secondary concern, partly because it has been considered, for some reason, to be less critical to profitability (Said, 2012).

The importance of operating efficiency for banks was put into evidence by a study done on Indian scheduled commercial banks (Siraj and Pillai 2011). Its findings were that key determinants of operational efficiency were affected by the global financial crisis. This reinforces the need to understand the drivers of operational efficiency for proper management of commercial banks. Whilst the Kenyan banking sector is the largest in terms of assets in the financial services industry, it is not the largest supplier of credit (KCPA, 2010). The performance of the banking industry in Kenya has improved tremendously over the last decade, since only two banks have been put under CBK statutory management compared to 37 bank-failures between 1986 and 1998 (Mwega, 2009). However, in the same period the level of interest rates have remained high implying an attempt of commercial to pass their inefficiencies to consumers. This could be attributed to the inability to push their operational costs downwards.

Odunga *et al.* (2013) investigated the effect of liquidity and capital adequacy on operating efficiency of commercial banks in Kenya. The results show that previous year's operational efficiency, liquidity and capital adequacy combined explain about 41% of the bank's operating efficiency. Further, total capital ratio and liquid asset to deposits ratio positively affect operating efficiency of the banks. The other liquidity ratios- interbank ratio, loan ratio, net loans to deposits ratio and capital adequacy ratios - core capital ratio, risk based capital ratio and equity to total asset ratio insignificantly effect operating

efficiency of the banks. We recommend commercial banks to strive to increase their total capital ratio in order to reduce their operational risks and therefore increase operational efficiency. Similarly, they should increase the ratio of liquid assets to deposits and short term funding in order to increase their operational efficiency. Future research should be concerned with factors influencing the operating efficiency of commercial banks.

Moreover, a full model for operating efficiency for banks will go a long way in assisting bank managers to evaluate and attempt to minimize risks that banks are exposed to. Banks well-endowed with capital resources are more stable operationally and are able to cushion themselves from financial shocks in the capital markets. Therefore, banks should seek on mechanisms to improve their liquid assets to deposits ratio and total capital ratio in readiness to improve operating efficiency and remain competitive in the market. A model for operating efficiency of banks will go a long way in assisting bank managers to evaluate and attempt to minimize risks that banks are exposed to (Odunga *et al.*, 201).

Sarmiento et al. (2013), using a non-parametric frontier model, found that Colombian banks improved in technical efficiency from 2000 up to the global financial crisis of 2007- 08, when efficiency and productivity decreased. They also found M&A to have a significant and positive impact on bank efficiency, and high heterogeneity in efficiency irrespective of banks' size and affiliation. Gal'an et al. (2015) estimated input-oriented technical efficiency during the period 2000-2009 using a dynamic Bayesian SFA model. They find out that foreign ownership has positive and persistent effects on efficiency of Colombian banks, while the effects of size are positive but rapidly adjusted. They also identified high inefficiency persistence and important differences between institutions. In particular, merged banks were found to exhibit low costs of adjustment that allowed them

to recover rapidly the efficiency losses derived from merging processes. Moreno and Estrada (2013) studied the role of market power in explaining efficiency gains in Colombian banks during the 2004-2012 periods. By using alternative SFA and non-parametric models, they found a positive relationship between market power and efficiency, which is explained by product differentiation that allows banks to gain efficiency while they do not charge excessive credit prices. However, previous applications have not studied the influence of risk-taking on the efficiency of Colombian banks.

A more organized study of bank performance started in the late 1980's (Olweny and Shiphoh, 2011) with the application of Market Power (MP) and Efficiency Structure (ES) theories. The MP theory states that increased external market forces results into profit. Moreover, the hypothesis suggest that only firms with large market share and well differentiated portfolio (product) can win their competitors and earn monopolistic profit. On the other hand, the ES theory suggests that enhanced managerial and scale efficiency leads to higher concentration and then to higher profitability. According to Nzongang and Atemnkeng in Olweny and Shiphoh (2011) balanced portfolio theory also added additional dimension into the study of bank performance. It states that the portfolio composition of the bank, its profit and the return to the shareholders is the result of the decisions made by the management and the overall policy decisions. From the above, it is possible to conclude that bank performance is influenced by both internal and external factors.

Oloo (2010) examined the relationship between operational efficiency and growth of commercial banks in Kenya. The research aimed to examine whether the efficiency structure hypothesis holds true for Kenyan commercial banks. The research design was

descriptive research design with a quantitative approach in order to generate in-depth information from secondary data as obtained from central bank of Kenya. The research was concentrated in the recent performance of commercial banks in Kenya between the periods of 1998 to 2007. The research consisted of 42 commercial banks operating in Kenya under license by the Central Bank of Kenya. This study used accounting data of individual banks drawn from the years 1998 – 2007. The time period was selected considering that it offers recent time series observations and it constitutes a period of major changes for the Kenyan banking system. This study aimed to investigate the relationship between growth and operational efficiency as a performance measure of commercial banks in Kenya.

Correlation coefficient r , was used to establish the association and strength of the relationship. The study found that there was a fairly weak positive correlation between efficiency and growth of banks in Kenya. Efficiency of commercial banks explains only 9.4% of the variance in bank growth as measured by annual percentage rate of growth of earning assets. This implies that the more efficient commercial banks are, the more they grow in terms of their annual growth of earning assets. The results point to the fact that growth in commercial banks is significantly influenced by their efficiency in advances. The study recommended that the strategies used by other efficient banks in deposit mobilization are recommended to the other banks which wish to expand as rapidly as the more efficient ones.

Ongore (2013) examined determinants of Financial Performance of Commercial Banks in Kenya. It utilized CAMEL approach to check up the financial health of commercial banks. The explanatory study was based on secondary data obtained from published

statements of accounts of all commercial banks in Kenya, CBK, IMF and World Bank publications for ten years from 2001 to 2010. In this study 37 commercial banks were considered. The secondary data used in this study were obtained from the statements of the commercial banks, CBK, IMF and World Bank database. The data collected using data collection sheet were edited, coded and cleaned. Then the data was analyzed using Microsoft Excel and econometric views (eviews) software. A multiple linear regression model and t-statistic were used to determine the relative importance (sensitivity) of each explanatory variable in affecting the performance of banks.

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.

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.

Pranowo and Manurung (2010) argued that firm's efficiency measures how productively the firm is using its assets and operations. The study further noted that operating ratio is a

measure of how well a company sells its stock and the efficiency with which it converts sales into cash. Some examples of operating ratios (activity ratios) include; assets turnover (sales to total assets), stocks turn over, debtor's day (day's receivable outstanding) and working capital to sales ratio. Debtor's day shows the average number of days it takes customers to pay for credit sales. Low debtor's day benefits cash flow; an indication for probable saving for positive cash flows.

2.7 Theoretical Framework

2.7.1 Extreme Value Theory

According to Paul Embrechts (1999), Extreme value theory (EVA) is a branch of statistics dealing with the extreme deviations from the median of probability distributions. It seeks to assess from a given order sample of a given random variable, the probability of events that are more extreme than previously observed. The financial industry including banking and insurance is undergoing major changes. The reinsurance industry is increasingly exposed to catastrophic losses for which requested cover is only available. An increasing complexity for financial instruments calls for sophisticated risk management tool.

Extreme event occur when a risk takes values from the tail of its distribution, extreme value theory is a consistent tool which attempts to provide us with the best possible estimate of the tail area of the distribution, Wainnaina & Waititu (2014). Uppal (2013) pointed out that there are two ways of modelling extremes of stochastic variable using the extreme value models. One approach is to divide the sample into blocks and then obtain the maximum from each block, which is referred to as the block maxima method. The

distribution of the block maxima can be modelled by fitting it into Generalized Extreme Value (GEV) model. Gravril & Altar (2009) applied exchange rate returns of four currencies against the Euro to analyze the relative performance of several VaR models and Extreme Value Theory. They revealed that in extreme market conditions, extreme measures are needed and their studies came up with the evidence that no single measure can perform proper for both the centre and the tails of an exchange rate distribution. This theory expand the knowledge of operational risk management as it indicate the securitization of risk and alternative risk transfer highlight the convergence of finance and insurance at the product level. Extreme value theory plays an important methodological role within risk management for insurance, reinsurance and finance.

2.7.2 Positive Accounting Theory

Positive accounting theory (PAT) has been of interest to accounting theorists for around four decades. Positive accounting theory is considered as the mainstream in accounting choices research realm. Jensen (1976) asserts that the PAT has managed to explain why accounting is what it is, why accountants do what they do and the effect these phenomena has on people and resources utilization. Watts and Zimmerman (1990) assert that the accounting theory's role is to provide explanations and predictions for accounting practices. For instance, Zimmerman and Watts (1978) on their paper towards a positive theory of determination of accounting standards noted that management's attitude towards accounting standards is affected by the effect the standards will have on the cash flow of the firm. Thus the positive accounting theory help in understanding better the source of the pressure driving accounting standard setting process, the effect of various accounting standards on different groups of individuals and allocation of resources.

Managers have different reasons to make accounting choices given that the markets are not perfect. Under these assumptions, there are three reasons to accept different accounting choices (Watts and Zimmerman, 1986). The first reason is the presence of agency costs. Management might have incentives to choose an accounting method that maximizes their compensation schemes. This has been one of the areas where a relation between the manager's incentives and their accounting choices can be seen. The second reason is related to the intention of managers in influencing the asset prices or stock prices given the information asymmetry prevailing between managers and investors.

Managers take actions toward smoothing earnings over time, to avoid losses or to try to maximize the earnings over a period. The third reason is related to the intention of managers to influence external parties. Different accounting choices have different impact on the financial numbers, and managers expect to influence them with the information presented. The most important argument in favor is that corporate risk management creates value. In addition, accounting plays an important role reflecting the "reality" of the firm, which is in turn shown to the market through disclosure rules. On the other hand, increased market efficiency is achieved. The problem arises when those disclosure rules affect the decision-making process of risk management by providing different accounting choices. One of those options is hedge accounting; companies are allowed to take profits generated from hedging in reserve and account them in the operating income matching the operations when they occur, thereby smoothing operating profits (Fields, 2001). PAT investigates how particular contractual arrangements based on accounting numbers can be put in place in order to minimize agency costs associated with the problems. Authors such as Dumontier & Raffournier (1998), Missonier-Piera (2004)

have provided empirical support on accounting choices based on positive approach. This theory is critical in this study in seeking to understand the accounting practices adopted to account for operation risks.

2.7.3 Operation Risk Theory

According to (Basak & Buffa, 2015) by considering the simplest possible economic setting in which we incorporate a notion of operational risk into, an optimal decision is formulated whereby the financial institution which is our economic agent accounts for the presence of operational risk. The financial institutions have to rely on a model to make investment decisions. Operational risk arises from the insufficient implementation of these models that the financial institutions adopt to perform their financial operations. This inadequacy in implementation can be caused by different types of errors, mistakes in data collection and processing and system programming codes.

Therefore financial institutions need to keep updating its models often in order to safe guard itself from the operational risks especially since there is always new emerging information and changing operating environment. There are two ways of modelling operational risks, the top down approach and the bottom up approach. According to (Chernobai et al., 2007)the top down approach seeks to quantify losses at a macro level without identifying the event or causes of these losses while the bottom up model seeks to quantify these operational risks at a micro level by understanding the internal operational risk event and how and why they are caused.

Risk management is the identification, assessment, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control

the probability and/or impact of unfortunate events or to maximize the realization of opportunities (Wenk, 2005). Effective risk management can bring far reaching benefits to all organizations, whether large or small, public or private sector (Ranong & Phuenngam, 2009). These benefits include, superior financial performance, better basis for strategy setting, improved service delivery, greater competitive advantage, less time spent firefighting and fewer unwelcome surprises, increased likelihood of change initiative being achieved, closer internal focus on doing the right things properly, more efficient use of resources, reduced waste and fraud, and better value for money, improved innovation and better management of contingent and maintenance activities (Wenk, 2005).

According to Dorfman (2007), ensuring that an organization makes cost effective use of risk management first involves creating an approach built up of well-defined risk management practices and then embedding them. These risk management practices include financial risks management practices, operational risk management practices, governance risk management practices, and strategic risk management practices.

2.8 Knowledge Gap

The main aim of this study is to examine effect of operation risk exposure on financial performance of commercial banks in Kenya. The review considered theoretical review on theories surrounding operation risk exposure. The study also these exposure including; credit exposure, liquidity exposure, operating expense exposure and operating efficiency exposure and how they relate to financial performance of the licensed commercial banks in Kenya. Largely missing from literature is the combination of all these risk exposures (credit exposure, liquidity exposure, operating expense exposure and operating efficiency

exposure and how they relate to financial performance of the licensed commercial banks) and how they affect commercial banks performance in Kenya. The following are the literature gap that this review established; there is no specific literature that generally contain information on effect of operation risk exposure on financial performance of commercial banks in Kenya; None of the studies particularly looked at effect of credit exposure, liquidity exposure, operating expense exposure and operating efficiency exposure and how they relate to financial performance of the licensed commercial banks, all these create literature gap that the current study hopes to fill.

2.9 Conceptual Framework

The conceptual framework is a diagrammatic presentation of relationship between the independent variables of the study which is operation risk exposure and the dependent variables which is the financial performance is the effect as illustrated in figure 2.1

Independent Variables

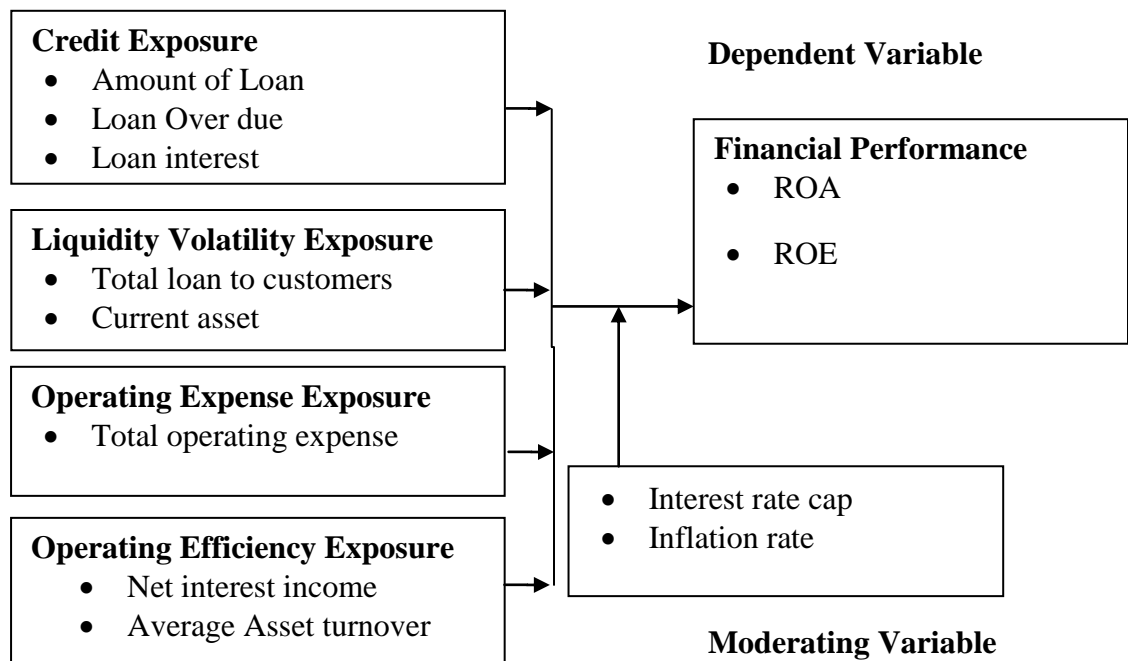


Figure 2.1: Conceptual Framework
Source: Own conceptualization

The independent variables of the study will be credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure. The dependent variable will be financial performance measured in terms of Return on Asset and Return on equity. The extraneous variable is interest cap rates and inflation rate over the period of the study. It is theorized that when the commercial banks manage credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure risks then they will improve on their financial performance measured in terms of Return on Asset and Return on equity and vice versa.

Credit exposure is the total amount of credit made available to a borrower by a lender. The operations that ensure that credit advanced to customers are recovered on time makes banks operation risks minimal. Credit exposure therefore is the loan advanced multiplied by the period of the loan. Liquidity exposure is calculated by the ratio of total loan to customer to current asset. Total operating expenses will be cost incurred due to banks operations. Operating efficiency will be calculated based on net interest income divided by average asset turnover.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodological procedures which were used in carrying out the study. The chapter presents the research design, location of the study, population of the study, sampling procedure and sample size, instrumentation, data collection procedure and data analysis techniques.

3.2 Research Design

According to Rubin et al. (2010), research design refers to the overall strategy to be adopted for a particular project. The study used descriptive research design to explore its set objectives. This design was adopted due to the surveys merit of allowing collection of significant amounts of data from a sizeable population. De Vaus (2002) argues that good description is the basis of sound theory and that unless something is described accurately and thoroughly, it cannot be explained. Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collected. Descriptive surveys are often undertaken to ascertain attitudes, values and opinions. Kothari (2004) indicate that descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. Zikmund (2003) notes that the main characteristic of this method is that the researcher has no control over the variables; he can only report what has happened or what is happening. It can involve collection of quantitative information that can be tabulated along a continuum in numerical form, such as scores on a test. Descriptive research often uses visual aids such as graphs and charts

to aid the reader in understanding the data distribution. Most quantitative research falls into two areas: studies that describe events and studies aimed at discovering inferences or causal relationships. Descriptive studies are aimed at finding out ‘what is’, so observational and survey methods are frequently used to collect descriptive data.

3.3 Population of the Study

Cooper and Emory (1995) define population as the total collection of elements about which the researcher wishes to make some inferences. Element is the subject on which the measurement is being taken and is the unit of study, according to Cooper and Emory (1995). Target population is the whole group of elements to which the researcher can legitimately apply the conclusions of the findings. The target population in this study consists of all 42 Commercial Banks licensed by Central Bank of Kenya and also operating in Kenya (see appendix I). The period of the study was between 2003 to 2017, which is 15 years. The choice of 15 years is taken to be reasonable because of the main variables of the operation risk and performance shift over time and is also dependent on the availability of necessary data.

3.4 Data Collection Tool

The study collected secondary data on operational risk exposure and financial performance from the 42 licensed Commercial Banks’ audited annual reports (Annual Audited Reports, 2003-2017). The study was limited to a time scope of 15 years starting 2003 to the year 2017. The time scope is considered adequate since it is possible to monitor risk exposure trends within this period and evaluate how they affect performance of Licensed Commercial Banks in Kenya.

3.5 Data Analysis

The study used panel data regression analysis model. Panel data utilizes observations that carry both cross-sectional and time series dimensions. The benefit of panel data is that it assumes that different companies are heterogeneous in nature, it equally considers the variability in the data, and it provides more instructive data, and hence panel data provides more efficiency than cross-sectional data methodology (Baltagi, 2001). Correlation and regression analysis was used in the study to identify the effect of operation risk exposure on financial performance of commercial banks in Kenya. Descriptive statistics and inferential statistical techniques were used to analyze the data. This was done with the aid of a computer programme – Stata package for windows was used. All inferential statistics were tested at $\alpha = 0.05$ significance level.

$$ROA = \alpha + \beta_1(CE)it + \beta_2(LE) + \beta_3(OEE) + \beta_4(OEfE) + \varepsilon \dots\dots\dots(i)$$

$$ROE = \alpha + \beta_1(CE) + \beta_2(LE) + \beta_3(OEE) + \beta_4(OEfE) + \varepsilon \dots\dots\dots(ii)$$

Where;

ROA= Return on Asset, ROE=Return on Equity, α =constant, $\beta_1 \dots \dots \beta_{4d}$ = parameter estimates

CE = Credit Exposure

LE = Liquidity Exposure

OEE= Operating Expense Exposure

OEfE = Operating Efficiency Exposure

ε is the error of prediction..

Step 2 - Testing the moderating effect of working interest rate cap on financial performance of Listed licensed commercial banks in Kenya

$$ROA = \alpha + \beta_1(CE) + \beta_2(LE) + \beta_3(OEE) + \beta_4(OEfE) + \beta_5(IRC) + \varepsilon \dots\dots (iii)$$

$\beta_5 =$ parameter of estimate on Interest Rate Cap

IRC = Interest Rate Cap

Step 3 - Testing the moderating effect of inflation rate on financial performance of Listed licensed commercial banks in Kenya

$$ROA = \alpha + \beta_1(CE) + \beta_2(LE) + \beta_3(OEE) + \beta_4(OEfE) + \beta_5(IFR) + \varepsilon \dots\dots (iv)$$

$\beta_5 =$ parameter of estimate on Inflation rate

IFR = Inflation Rate

3.6 Ethical Considerations

The researcher obtained the necessary permission from both the administrators and management of the Central Bank. Their permission was useful in ensuring that this research study was successfully completed so that the findings collected in the consequent stages does not breach the rules and regulations laid down when undertaking this research work.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This section presents the results of descriptive and inferential data analysis of the variables of effect of operation risk exposure on financial performance of commercial banks in Kenya. The section consists of results, interpretation and discussion of; descriptive statistics, fixed effect model regression, random effect regression, Hausman Test, Diagnostic Test and Hypotheses Tests. The secondary data relating to the null hypotheses was tested using panel data regression analysis, tested statistic at 0.05 significance level. Results were presented by the use of tables and figures. A total of 42 audited financial reports were obtained from the licensed commercial banks in Kenya.

4.2 Descriptive Statistics of Operational Risk Exposure, Financial Performance and Macroeconomics

This section presents the mean, standard deviation, minimum and maximum value of measures of operational risk exposure and financial performance of the licensed commercial banks in Kenya. The specific operational risk exposure measures included; credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure on return of asset and return on equity as measures of financial performance of commercial banks. The macroeconomics analyzed were the changes in interest rate and inflation rate.

Table1: Descriptive Statistics of Operational Risk Exposure, Financial Performance and Macroeconomics

variables	obs	mean	std. Dev	min	max
<i>c_exposure</i>	630	4143998	1.1807	14850	6.78
<i>i_exposure</i>	630	.6563492	.4277898	0	6.3
<i>oe_exposure</i>	630	658879.8	1507487	1847	7791882
<i>ef_exposure</i>	630	.1778413	.3280788	0	3.48
roa	630	.6077936	.701972	0	1.79
roe	630	.6090476	.5933902	0	4.9
interest	630	9.666667	2.677113	6	18
inflation	630	8.573333	3.197632	4.3	15.1

Source: Field Data (2018).

Key: *c_exposure* = credit exposure, *i_exposure* = liquidity volatility exposure, *oe_exposure* = operating expense exposure, *ef_exposure*= operating efficiency exposure, roa=return on asset, roe=return on equity, interest=changes in interest rate, inflation=changes in inflation rate.

Total observation was 630 which were 42 banks multiply by 15 years (2003-2017). The mean credit exposure which was loans and advances to customers was Kshs. 4,143,998 ('000 million) deviating by 1.1807. The mean liquidity volatility exposure was 0.6563492 deviating by 0.4277898. The mean operating expense exposure was Kshs. 658,879.8 ('000 millions) deviating by 1507487. The mean operating efficiency exposure 0.1778413 deviating by 0.3280788. The mean Return on Asset was 0.6077936 deviating by .701972 whereas the mean Return on Equity was .6090476 deviating by .5933902. The mean interest rate for the period was 9.666667 deviating by 2.677113 whereas the mean inflation rate was 8.573333 deviating by 3.197632.

This finding indicated that the banks had high credit exposure with high outstanding loans and advances to their customers. Liquidity volatility exposure was equally high with the banks 60% liquid, the money they could still sell out in terms of loans and advances, the operation risk of keeping this large amount of money is of concern. The banks were operating at a very low operating efficiency of 17.8% which exposes the banks to operational risk. Both Return on Asset indicating that the asset employed were able to generate 60.8% of the banks interest income and Return on Equity employed were able to generate were able to generate 70.2% of interest income. Although both the mean interest (9.7%) and inflation (8.6%) rates were slightly below a double digit which are the macroeconomics factors affecting investments and business environment upon which the commercial banks operate.

4.3 Inferential Statistics

The study carried out various inferential statistics to analyze effect of operation risk exposure on financial performance of commercial banks in Kenya. These included panel data regression, Hausman Test for the choice of regression model, data diagnostic tests and hypotheses tests.

4.3.2 Hausman Test

In order to determine the appropriate estimator for the panel data used, Hausman (1978) test (test for the null hypothesis of no correlation) was run on hypothesis of the Hausman test was that the random effects model was preferred to the fixed effects model. The obtained statistically insignificant p-value of 0.016 meant that the hypothesis could not be rejected. Hence a random effect model (REM) was adopted as the best estimator for the

panel data. According to Raheman and Nasr (2007), a random effects model counters the problem of heteroskedasticity by calculating a common weighted intercept for all variables. These authors contend that the generalized least squares procedure normalizes the data by making the weighted residuals more comparable to the un-weighted residuals thereby providing a more consistent estimation.

Table 4.2: Hausman Test

	(b) fe	(b-B) difference	sqrt(diag(V_b- V_B	
C_ exposure	-7.0110	-7.01e-10	0	0
L_ exposure	-1505067	-.1505067	0	0
oe_ exposure	-9.04e-08	-9.004e-08	0	0
ef_ exposure	-203768	-203768	0	0
interest	-0028807	-0028807	0	0
inflation	-0108203	-0108203	0	0

b= constant under Ho and Ha; obtained from Xtreg

B= inconsistent under Ha, efficient under Ho; obtained from Xtreg

test : Ho difference in coefficient not systematic

$$\chi^2(0) = (b-B)[V-b-V-B]^{-1} (b-B)$$

21.09

$$\text{prob} > \chi^2 = 0.016$$

(V-b-v-B is not positive definite)

In order to choose between fixed and random effects model for the model (ROA), the Hausman test was used. The null hypothesis of the Hausman test was that the random effects model was preferred to the fixed effects model. For ROA model, Hausman test reported a chi-square of 21.09 with a p-value of 0.016 implying that at 5 percent level, the chi-square value obtained was statistically significant. The researcher therefore failed

to reject the hypothesis that random effects model was preferred to fixed effect model for ROA as recommended by Greene (2012).

4.3.1 Regression analysis

The study used fixed effects and random effects model panel data regression models, thereafter Hausman test was conducted to choose between the two models and relevant diagnostics test were carried out before conclusion was made from the preferred model. Regression analysis was carried out to establish if there exist any significant relationship between the dependent variable that is Return on Assets and Return on Equity and the independent variables; credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure. The study further carried out the moderating effect of macroeconomics including interest and inflation rates on the relationship between operational risk exposure and financial performance of licensed commercial banks in Kenya.

4.3.1.1 Fixed effects regression model

Table 4.3: Fixed effects regression model for ROA

fixed – effects (within) regression	number of obs = 630
group variable : code	number of groups = 42
R-sq: within = 0.0197	obs per group min = 14
between = 0.0995	avg = 15.0
overall = 0.0300	max = 16
	f(5,583)
corr(U_I, Xb) = 0.0750	prob > F

roa	coef.	Std. Err	t	p>/t/	[95% conf interval]	
<i>c_</i> exposure	4.2010	3.929	0.11	0.915	-7.2809	8.1209
<i>i_</i> exposure	-175572	.0690418	-2.54	0.011	-.311172	-.396999
<i>oe_</i> exposure	-5.0608	4.0808	-1.24	0.216	-1.3107	2.9608
<i>ef_</i> exposure	.1784404	.1103585	1.62	0.106	-0.383082	.395189
- Cons	.8320439	.1065081	0.000		.6228576	1.04123

Source: Published Audited Financial Statements (2003-2017)

sigma- u - .292051

sigma – e 65279008

rho - .16677552 (fraction of variance due to u-i)

F test that all u l =0 $F(41,583) = 2.64$ prob F= 0.0000

The fixed effects model above shows that the combined effect of operational risk exposure on Return on Assets was statistically significant within the licensed commercial in Kenya. The model's chi square value of 0.0398 is much less than 0.05, the value of R squared 0.0300 implies operational risk exposure have a combined effect on return on assets by 3.0 % while the other 97.0% was affected by other factors other than operational risk exposure. It can therefore be concluded that the operational risk exposure can be used to forecast the outcome of Return on Assets in the licensed commercial banks in Kenya.

Further analysis indicated that out of the 4 operational risk exposure by the licensed commercial banks, only liquidity volatility had significant relationship with Return on Asset $r=-0.17557$, $p=0.11 < 0.05$ though the relationship was negative. An increase in 1 unit of liquidity exposure resulted into a decrease in Return on Asset by -0.17557. The relationship between credit exposure and Return on Asset was insignificant though

positive with $r=4.2010$, $p=0.915>0.05$. An increase in 1 unit of credit exposure resulted into an increase of Return on Asset by 4.2010.

Findings on the relationship between operating expense exposure and Return on Asset was insignificant and negative, $r= -5.0608$, $p=216>0.05$. An increase in 1 unit in operating expense exposure resulted into a decrease in Return on Asset by -5.0608. The relationship between operating efficiency exposure and Return on Asset was insignificant though positive $r=.1784404$, $p=106>0.05$. An increase in 1 unit of operating efficiency exposure resulted into a decrease in Return on Asset by 0.1784404.

Table 4.4: Fixed effects regression model for ROE

fixed – effects (within) regression		number of obs = 630				
group variable code		number of groups = 42				
R- sq: within = 0.0125		obs per group : min = 14				
between = 0.0035		avg = 15.0				
overall = 0.0089		max = 16				
curr (u_I, Xb) = 0.0994		f(4,584) = 1.85				
		prob > F = 0.1178				
roa	coef.	Std. Err	t	p>/t/	[95% conf interval]	
$c_exposure$	-4.8509	3.4009	1.42	0.155	-1.1508	1.8409
$i_exposure$.0544042	.0597	0.91	0.362	-.0627587	.1717472
$oe_exposure$	4.6108	3.5408	1.30	0.194	-2.3508	1.1607
$ef_exposure$..1620858	.0957814	1.69	0.091	-.0260322	3502038
- Cons	.5341833	.0487174	10.96	0.000	.4385005	.6298866
sigma- u - .23216236						
sigma – e .56669004						

$\rho = .14371747$ (fraction of variance due to u_i)

F test that all $u_i = 0$ $F(41,584) = 2.37$ prob $F = 0.0000$

Source: Published Audited Financial Statements (2003-2017)

The fixed effects model above shows that the combined effect of operational risk exposure on Return on Equity was statistically insignificant within the licensed commercial in Kenya. The model's chi square value of 0.1178 was more than 0.05, the value of R squared 0.0089 implies operational risk exposure have a combined effect on return on Equity by 0.9 % while the other 99.1% was affected by other factors other than operational risk exposure. It can therefore be concluded that the operational risk exposure cannot be used to forecast the outcome of Return on Equity in the licensed commercial in Kenya.

Further analysis indicated that all the 4 operational risk exposure by the licensed commercial banks had in insignificant relationship with Return on Equity. The relationship between credit exposure and Return on Equity was insignificant and negative $r = -4.8509$, $p = 0.155 > 0.05$. An increase in 1 unit of credit exposure resulted into a decrease in Return on Equity by -0.17557. The relationship between liquidity volatility exposure and Return on Equity was insignificant though positive with $r = .0544942$, $p = 0.362 > 0.05$. An increase in 1 unit of liquidity volatility exposure resulted into an increase of Return on Equity by 0.0544942.

Findings on the relationship between operating expense exposure and Return on Equity was insignificant and negative, $r = 4.6108$, $p = 194 > 0.05$. An increase in 1 unit in operating expense exposure resulted into an increase in Return on Equity by 4.6108. The relationship between operating efficiency exposure and Return on Equity was

insignificant though positive $r=.1620858$, $p=.091 > 0.05$. An increase in 1 unit of operating efficiency exposure resulted into a decrease in Return on Equity by 0.1620858.

4.3.1.2 Random effects regression model

Table 4.5: Random effects regression model for ROA

random - effects GLS regression		number of obs = 630				
group variable code		number of groups = 42				
R- sq: within = 0.0148		obs per group : min = 14				
between = 0.2148		avg = 15.0				
overall = 0.0460		max = 16				
		wald chi2(4)= 17.55				
curr ($u_{I,X}$) = 0(assumed)		f(4,584) = 1.85				
		prob > chi2 = 0.0015				
roa	coef.	Std. Err	z	p>/z/	[95% conf interval]	
<i>c_</i> exposure	-4.0810	3.8809	-0.11	0.916	-8.01e-09	7.1909
<i>i_</i> exposure	.1548327	.00657287	-2.36	0.018	-.02836587	.0260068
<i>oe_</i> exposure	-9.2208	3.55e-08	-2.60	0.009	-1.6207	-2.2608
<i>ef_</i> exposure	.2115709	.1074743	1.97	0.049	-.0009252	.422165
- Cons	.7338739	.0628418	11.68	0.000	..6107063	.68570416
sigma- u - .21579156						
sigma - e .65297881						
rho - .09845917 (fraction of variance due to u-i)						

Source: Published Audited Financial Statements (2003-2017)

The random effects model showed that the combined effect of operational risk exposure on Return on Assets was statistically significant within the licensed commercial in Kenya. The model's chi square value of 0.0015 is much less than 0.05, the value of R squared 0.0460 implies operational risk exposure have a combined effect on return on assets by 5.0 % while the other 95.0% was affected by other factors other than operational risk exposure. It can therefore be concluded that the operational risk exposure can be used to forecast the outcome of Return on Assets in the licensed commercial in Kenya.

Further analysis indicated that apart from credit exposure as operational risk exposure by the licensed commercial banks, 3 other operational risks exposure considered in the study, that is, liquidity volatility exposure, operating expense exposure and operating efficiency exposure liquidity volatility had significant relationship with Return on Asset.

The study established insignificant and also negative relationship between credit exposure and Return on Asset $r=-4.0810$, $p=0.916>0.05$. An increase in 1 unit of credit exposure resulted into a decrease in Return on Asset by -4.0810. The relationship between liquidity volatility exposure and Return on Asset was significant but negative with $r=-.1548327$, $p=0.018<0.05$. An increase in 1 unit of liquidity volatility exposure resulted into a decrease on Return on Asset by -.1548327.

Findings on the relationship between operating expense exposure and Return on Asset was significant but negative, $r= -9.2208$, $p=0.009<0.05$. An increase in 1 unit in operating expense exposure resulted into a decrease in Return on Asset by -9.2208. The relationship between operating efficiency exposure and Return on Asset was significant

and positive $r=0.2115709$, $p=0.049<0.05$. An increase in 1 unit of operating efficiency exposure resulted into an increase in Return on Asset by .2115709.

Table 4.6: Random effects regression model for ROE

random effects GLS regression		number of obs = 630				
group variable code		number of groups = 42				
R- sq: within = 0.0117		obs per group : min = 14				
between = 0.0142		avg = 15.0				
overall = 0.0.119		max = 16				
curr (u_i, X_i) = 0(assumed)		wald chi 2(4) = 7.47				
		prob > <i>chi2</i> = 0.1131				
roa	coef.	Std. Err	t	p>/t/	[95% conf interval]	
<i>c_</i> exposure	-5.4309	3.35e09	-1.62	0.105	-1.2008	1.1409
<i>i_</i> exposure	.587039	.0567985	1.03	0.301	-.0526191	.1700269
<i>oe_</i> exposure	4.0308	3.0708	0.99	0.323	2.9808	9.0408
<i>ef_</i> exposure	.1725724	.0928896	1.86	0.063	-.0094878	.3546327
- Cons	.5431925	.0541874	10.02	0.000	.4369872	.6493977
sigma- u - .18574587						
sigma – e .56669004						
rho .09701434 (fraction of variance due to u i)						

Source: Published Audited Financial Statements (2003-2017)

The random effects model above shows that the combined effect of operational risk exposure on Return on Equity was statistically insignificant within the licensed commercial in Kenya. The model's chi square value of 0.1131 was more than 0.05, the value of R squared 0.119 implies operational risk exposure have a combined effect on

return on Equity by 11.9 % while the other 88.1% was affected by other factors other than operational risk exposure. It can therefore be concluded that the operational risk exposure cannot be used to forecast the outcome of Return on Equity in the licensed commercial in Kenya.

Further analysis indicated that all the 4 operational risk exposure by the licensed commercial banks had in insignificant relationship with Return on Equity. The relationship between credit exposure and Return on Equity was insignificant and negative $r=-5.4309$, $p=0.105>0.05$. An increase in 1 unit of credit exposure resulted into a decrease in Return on Equity by -5.4309 . The relationship between liquidity volatility exposure and Return on Equity was insignificant though positive with $r=0.0587039$, $p=0.301>0.05$. An increase in 1 unit of liquidity volatility exposure resulted into an increase of Return on Equity by 0.0587039 .

Findings on the relationship between operating expense exposure and Return on Equity was insignificant and negative, $r= 3.0308$, $p=323>0.05$. An increase in 1 unit in operating expense exposure resulted into an increase in Return on Equity by 3.0308 . The relationship between operating efficiency exposure and Return on Equity was insignificant though positive $r=.1725724$, $p=063>0.05$. An increase in 1 unit of operating efficiency exposure resulted into a decrease in Return on Equity by $.1725724$.

4.3.1.3 The Moderating Effect of Macro Economics on the Relationship between Operational Risk and Financial Performance

This section tests the moderating effect of macro economics on the relationship between operational risk and financial performance using panel data regression. The study used

random effect model to test the effect of changes in interest rate and inflation rate on the relationship between operational risk and financial performance.

Table 4.7: The Moderating Effect of Macro Economics on the Relationship between Operational Risk and Financial Performance

random effects GLS regression		number of obs = 630					
group variable code		number of groups = 42					
R- sq: within = 0.0185		obs per group : min = 14					
between = 0.2163		avg = 15.0					
overall = 0.0495		max = 15.0					
curr (u_{-I}, Xb) = 0(assumed)		wald chi 2(6) = 19.70					
		prob > <i>chi2</i> = 0.1131					
roa	coef.	Std. Err	t	p>/t/	[95% conf interval]		
<i>c_</i> exposure	-7.0110	3.8909	-0.18	0.857	-8.3209	6.9209	
<i>i_</i> exposure	.1505067	.0659937	-2.28	0.023	-.2798519	-.0211615	
<i>oe_</i> exposure	-9.0408	3.5608	-2.54	0.011	-1.60e-07	-2.0708	
<i>ef_</i> exposure	.203768	.1075464	1.89	0.058	.0070192	.4145551	
interest	-.0028807	.01311532	-0.22	0.827	-.0286605	.0228991	
inflation	-.0108203	.0110294	-0.98	0.327	-.0324375	.0107969	
- Cons	.8530868	.1113769	7.66	0.000	.6347921	1.071381	

sigma- u - .22061363

sigma – e .65294442

rho .10246248 (fraction of variance due to u i)

Source : Published Audited Financial Statements (2003- 2017)

The random effect model of the moderating effect of interest rate and inflation rate of the relationship between operational risk exposures on Return on Assets was statistically significant within the licensed commercial in Kenya. The model's chi square value of 0.0031 compared chi square of 0.0015 less than 0.05 without effect of macroeconomics. It can therefore be concluded that the interest rate and inflation rate moderation did not affect the relationship between operational risk exposure and Return on Assets in the licensed commercial in Kenya. The operational risk exposure was still significantly useful in forecasting the outcome of Return on Assets in the licensed commercial in Kenya.

In comparing the relationship between individual variables, there was a slight change in the relationship with Return on Asset. Only liquidity volatility exposure ($p=0.023<0.05$) and operating expense exposure ($0.011<0.05$) had significant relationship with Return on Asset. The study further established that credit exposure ($0.857>0.05$) and operating efficiency exposure ($0.053>0.05$) had insignificant relationship with Return on Asset. This finding indicated that when interest and inflation rates were introduced in the model, they affected the relationship between operating efficiency exposure with Return on Asset making it insignificant. Interest and inflation rates as macroeconomic factors made the bank to be more exposed making it difficult to streamline their operating efficiency making them more exposed to operational risk as far as their operating efficiency was concerned.

4.4 Diagnostic Test Results

The diagnostic tests carried out to test data normality included: time fixed effects test, test for random effects, test for cross sectional dependence, test of multicollinearity, autocorrelation test, panel unit root test, and Hausman specification test.

4.4.1 Test for Time Fixed Effect

testparm C- exposure i_ exposure oe_ exposure of - exposure

1. $c_exposure = 0$

2. $I_exposure = 0$

3. $oe_exposure = 0$

4. $ef_exposure = 0$

$\chi^2(4) = 9.37$

$\text{prob} > \chi^2 = 0.2914$

The test results gave a p value of 0.2914 which is more than 0.05, so the researcher failed to reject the null that the coefficients for all years are jointly equal to zero, therefore no time fixed effects are needed in this case.

4.4.2 Test for Random Effect

The study conducted Lagrangian multiplier test to decide between random effects regression and simple Ordinary Least Square regression. The study used Breusch and Pagan Lagrangian multiplier test for random effects. The null hypothesis is pooled estimation is appropriate.

$roa[\text{firm},t] = Xb + u[\text{firm}] + e[\text{firm},t]$

Estimated results:

Var | sd = sqrt(Var)

roa | 315.2871 9.1456

```

e | 297.1426    9.5147
u |      0      0
Test:  Var(u) = 0
chibar2(01) = 3.157
Prob > chibar2 = 0.017

```

The study established Chibar2 =3.157 and p=0.017<0.05, the null hypothesis that pooled estimation is appropriate was rejected, concluded that random effects was appropriate model for the study.

4.4.3 Test of cross-sectional dependence

```

__e1  __e2  __e3
__e1  1.0000
__e2  0.0297  1.0000
__e3 -0.1301  0.6249  1.0000

```

Breusch-Pagan LM test of independence: chi2 (3) = 3.864, Pr = 0.7264

Based on 132 complete observations over panel units

The null hypothesis in the B-P/LM test of independence is that residuals across entities are not correlated. The findings above gave a p value of 0.7264 which is more than 0.05.

The researcher therefore failed to reject the null hypothesis and concluded that there was no cross sectional dependence from the analyzed set of data.

4.4.4 Test of heteroskedasticity

Modified Wald test was used to test heteroskedasticity in the panel data. Modified Wald test for group wise heteroskedasticity in fixed effect regression model.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of roalog

chi2 (1) = 0.541

Prob > chi2 = 0.013

The study tested for panel level heteroskedasticity using the Breusch-Pagan / Cook-Weisberg as shown in table above. The null hypothesis of this test was that the error variance was homoscedastic. The Breusch-Pagan / Cook-Weisberg test produced a chi-square value of 0.541 with a p-value of 0.013. The chi-square value was statistically significant at 1.3 percent level and hence the null hypothesis of constant variance was accepted to signify non existence of heteroskedasticity in the study data.

4.4.5 Multicollinearity Test

Table 4. 1: Multicollinearity Test

Variable	VIF	1/VIF
INCC	2.98	0.336
CCC	1.01	0.991
ARB	1.68	0.595
APB	3.46	0.289
Mean VIF	2.280	

As presented in table 4.11 the study used variance inflation factors and the findings were compared to those from the correlation matrix, to test for multicollinearity. The results indicate that there were no multicollinearity between all the variables since VIF was less than 10 (Hair et al., 1999). Average payables period recorded the highest variance inflation factor of 2.280.

4.4.6 Autocorrelation Test

Number of gaps in sample 2

Durbin-Watson d statistics (11, 25) =0.34756

The study used the Durbin-Watson test for autocorrelation to test the presence of autocorrelation in the data and the results are presented in above table. The null hypothesis of this test was that there was no first order autocorrelation in the data. The test statistic reported was D test with 11 and n 25 degrees of freedom. The p-value of the D test was 0.34756 implying the D test was statistically significant at 5 percent level. The results therefore indicate that there was no problem of first order autocorrelation in the data.

4.5 Hypotheses Test

The study established that Further analysis indicated that apart from credit exposure as operational risk exposure by the licensed commercial banks, 3 other operational risks exposure considered in the study, that is, liquidity volatility exposure, operating expense exposure and operating efficiency exposure liquidity volatility had significant relationship with Return on Asset. The hypothesis **HO₁** that Credit exposure does not significantly affect financial performance of commercial banks in Kenya was accepted. The study established insignificant and also negative relationship between credit exposure and Return on Asset $r=-4.0810$, $p=0.916>0.05$. An increase in 1 unit of credit exposure resulted into a decrease in Return on Asset by -4.0810 .

The finding on effect of credit exposure on financial performance was supported by Muasya (2009) analyzed the impact of non- performing loans on the performance of the banking sector in Kenya in the time of global financial crises. The findings confirmed

that nonperforming loans do affect commercial banks in Kenya. Further analysis of individual banks with more than Ksh. 25 billion worth of asset indicated that while the impacts are negative, the magnitude of non-performing loans to both interest income and profitability are not adverse for 7 of the 13 analyzed banks and that asset quality of the whole banking sector has been improving to settle at 7.17%.

The finding is further supported by 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 nonperforming 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 and Tenguh, 2008; Kolapoet al., 2012; Musyoki and Kadubo (2011). 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 are not influenced by the amount of credit and non-performing loans. The study 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 and market risk as components of the financial risk.

The second hypothesis of the study was stated as **HO₂**: liquidity volatility does not significantly affect financial performance of commercial banks in Kenya. The study established significant relationship between operating expense exposure and Return on

Asset therefore the hypothesis that liquidity volatility does not significantly affect financial performance of commercial banks in Kenya was rejected. This was supported by the results of $r = -9.2208$, $p = 0.009 < 0.05$. An increase in 1 unit in operating expense exposure resulted into a decrease in Return on Asset by -9.2208 . This finding was supported by Doriana (2013) studied the determinants of bank liquidity within the Euro area. The objective of the study was to analyze the type of relationship that exists between liquidity risk, measured with the liquidity coverage ratio and the net stable funding ratio, and some specific bank structure variables-size, capitalization, assets quality and specialization. The study found that bigger banks have a higher liquidity risk exposure, while banks with higher capitalization present a better liquidity on long horizon. The assets quality impacts only on the measure of the short term liquidity risk. With regard to the specialization, banks more specialized on the lending activity showed a more vulnerable funding structure. The study also found that during the financial crisis, the liquidity risk management changes only on the short term horizon.

The liquidity factors that this study did not analyze but are importance were studied by Kamau, Erick and Muriithi (2013) who found that variations in liquidity level are caused by both internal and external factors. The internal factors found significant in determining liquidity level of commercial banks were contingency planning, profitability, banks major obligations and management policies. The external factors found to be significant determinants of liquidity were credit rating, monetary policies, government expenditure and balance of payment status. A study conducted to analyze the relationship between liquidity risk and financial performance of commercial banks in Kenya, sought to investigate liquidity risks faced by commercial banks and to establish the relationship

between liquidity risk and the performance of banks in Kenya. It was found that profitability of the commercial bank in Kenya is negatively affected due to increase in the liquidity gap and leverage. With a significant liquidity gap, the banks may have to borrow from the repo market even at a higher rate thereby pushing up the cost of banks. The levels of customer deposits were found to positively affect the bank's profitability (Maaka, 2013).

The third hypothesis of the study **HO₃**: was operating expense exposure does not significantly affect financial performance of commercial banks in Kenya. The study established significant relationship between operating expense exposure and Return on Asset. The hypothesis that operating expense exposure does not significantly affect financial performance of commercial banks in Kenya was therefore rejected. This was supported by the results of $r=0.2115709$, $p=0.049<0.05$. An increase in 1 unit of operating efficiency exposure resulted into an increase in Return on Asset by .2115709. This finding was supported by Chernobai et al (2011) further examined the incidence of operational losses among US financial institutions using publicly reported loss data from 1980 to 2005. They highlighted the correlation between OR and credit risk, as well as the role of corporate governance and proper managerial incentives in mitigating OR. On the other hand, Cope et al (2012) investigated the relationships between the severity of operational loss events reported in the banking sector and various regulatory, legal, geographical and economic indicators. They found evidence of a significant correlation between internal fraud and constraints on executive power and the prevalence of insider trading.

The fourth hypothesis was **HO₄** was that operating efficiency exposure does not significantly affect financial performance of commercial banks in Kenya. The study established significant relationship between operating efficiency exposure and Return on Asset. The hypothesis that operating efficiency exposure does not significantly affect financial performance of commercial banks in Kenya was therefore rejected. This was supported by the results of $r=0.2115709$, $p=0.049<0.05$. An increase in 1 unit of operating efficiency exposure resulted into an increase in Return on Asset by .2115709. This finding is supported by Gal'an et al. (2015) estimated input-oriented technical efficiency during the period 2000-2009 using a dynamic Bayesian SFA model. They find out that foreign ownership has positive and persistent effects on efficiency of Colombian banks, while the effects of size are positive but rapidly adjusted. They also identified high inefficiency persistence and important differences between institutions. In particular, merged banks were found to exhibit low costs of adjustment that allowed them to recover rapidly the efficiency losses derived from merging processes.

The fifth hypothesis **HO₅**: was stated as interest and inflation rates do not moderate the relationship between operational risk and financial performance of the licensed commercial banks in Kenya. The study established that when interest and inflation rates were introduced in the model, they affected the relationship between operating efficiency exposure with Return on Asset making it insignificant. Interest and inflation rates as macroeconomic factors made the bank to be more exposed making it difficult to streamline their operating efficiency making them more exposed to operational risk as far as their operating efficiency was concerned. This was supported operating efficiency exposure ($0.053>0.05$) which was an insignificant relationship with Return on Asset

when interest and inflation rates were introduced compared to the relationship $r=0.2115709$, $p=0.049<0.05$ before the introduction of Interest and inflation rates as macroeconomic factors.

The finding on moderating effect of interest rate and inflation rate was supported by Waweru and Kalani (2009) studied commercial banking crises in Kenya. They found that some of the causes of non-performing loans in Kenyan banks were national economic downturn, reduced consumer, buying ability and legal issues. This current study appreciate that the nonperforming loan and loan delinquency concepts are similar. However this study differs significantly from Waweru and Kalani (2010) in terms of area of study, and study methodology.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter presents the summary and makes conclusion based on the results on effect of operation risk exposure on financial performance of commercial banks in Kenya. The implications from the findings and areas for further research are also presented.

5.2 Summary

The descriptive analysis was used to operational risk variables including; credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure on return of asset and financial performance variable; return on equity and return on asset of licensed commercial banks in Kenya. The study established the banks had high credit exposure with high outstanding loans and advances to their customers. Liquidity volatility exposure was equally high with the banks 60% liquid, the money they could still sell out in terms of loans and advances, the operation risk of keeping this large amount of money is of concern. The banks were operating at a very low operating efficiency of 17.8% which exposes the banks to operational risk. Both Return on Asset indicating that the asset employed were able to generate 60.8% of the banks interest income and Return on Equity employed were able to generate were able to generate 70.2% of interest income. Although both the mean interest (9.7%) and inflation (8.6%) rates were slightly below a double digit which are the macroeconomics factors affecting investments and business environment upon which the commercial banks operate.

The inferential statistical analysis was done using the panel data regression analysis. After carrying our Hausman Test, the study adopted random effect model to interpret the

relationship between operational risk and financial performance of the licensed banks in Kenya. First the study established that apart from credit exposure as operational risk exposure by the licensed commercial banks, 3 other operational risks exposure considered in the study, that is, liquidity volatility exposure, operating expense exposure and operating efficiency exposure liquidity volatility had significant relationship with Return on Asset. Findings on the relationship between operational risk variables and Return on Equity established that all the 4 operational risk exposure by the licensed commercial banks; credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure had in insignificant relationship with Return on Equity.

Third, the study established that the interest rate and inflation rate moderation did not affect the relationship between operational risk exposure and Return on Assets in the licensed commercial in Kenya. The operational risk exposure was still significantly useful in forecasting the outcome of Return on Assets in the licensed commercial in Kenya. Further finding indicated that when interest and inflation rates were introduced in the model, they affected the relationship between operating efficiency exposure with Return on Asset making it insignificant. Interest and inflation rates as macroeconomic factors made the bank to be more exposed making it difficult to streamline their operating efficiency making them more exposed to operational risk as far as their operating efficiency was concerned.

5.3 Conclusions

The main aim of this study was to examine effect of operation risk exposure on financial performance of commercial banks in Kenya.

Regarding the first objective on the effect of liquidity volatility exposure on financial performance of commercial banks. The researcher concluded that commercial banks had high credit exposure with high outstanding loans and advances to their customers. The study also established that insignificant and also negative relationship between credit exposure and Return on Asset. An increase in 1 unit of credit exposure resulted into a decrease in Return on Asset by -4.0810.

Concerning the second objective on the effect of liquidity on financial performance of commercial banks the findings concluded that volatility exposure is equally high with the banks 60% liquid, the money they could still sell out in terms of loans and advances, the operation risk of keeping this large amount of money is of concern. The researcher further concluded that banks were operating at a very low operating efficiency of 17.8% which exposes the banks to operational risk. The study further established significant relationship between operating expense exposure and Return on Asset. An increase in 1 unit in operating expense exposure resulted into a decrease in Return on Asset by -9.2208.

Third, the study established significant relationship between operating expense exposure and Return on Asset. An increase in 1 unit of operating efficiency exposure resulted into an increase in Return on Asset by .2115709.

On the effect of operation efficiency exposure on financial performance of commercial banks it can be concluded that the operational risk exposure can be used to forecast the outcome of Return on Assets in the licensed commercial banks in Kenya. It can also be concluded that the operational risk exposure cannot be used to forecast the outcome of

Return on Equity in the licensed commercial in Kenya. The study also established significant relationship between operating efficiency exposure and Return on Asset. An increase in 1 unit of operating efficiency exposure resulted into an increase in Return on Asset by .2115709.

Regarding the moderating effect of macro-economic on the relationship between operational risk and financial performance of the licensed commercial banks. It can be concluded that the interest rate and inflation rate moderation did not affect the relationship between operational risk exposure and Return on Assets in the licensed commercial in Kenya. The study further established that when interest and inflation rates were introduced in the model, they affected the relationship between operating efficiency exposure with Return on Asset making it insignificant. Interest and inflation rates as macroeconomic factors made the bank to be more exposed making it difficult to streamline their operating efficiency making them more exposed to operational risk as far as their operating efficiency was concerned. This was supported operating efficiency exposure ($0.053 > 0.05$) which was an insignificant relationship with Return on Asset when interest and inflation rates were introduced compared to the relationship $r=0.2115709$, $p=0.049 < 0.05$ before the introduction of Interest and inflation rates as macroeconomic factors.

5.4 Recommendation

The empirical results of this study can be applied by Central Bank of Kenya in adopting policy that may help the licensed commercial banks absorb from the operation risk they are exposed to by tightening banks' operational efficiency which had significant effect on the ROA. This study recommends that the licensed commercial banks should manage

their operations effectively to avoid eventualities like Insolvency and Credit risk which can adversely affect banks performance measured in terms of its assets and shareholders equity. The licensed commercial banks in Kenya should strike a balance between borrowing and deposit rates to avoid credit exposure as well as liquidity exposure which are the challenges facing banking sector.

5.4.1 Recommendations for further research

The study recommends an empirical evaluation of factors affecting operational risk exposure by the commercial banks in Kenya. The analysis should classify the factors in terms of credit exposure, liquidity volatility exposure, operating expense exposure and operating efficiency exposure which were the independent variable of the current study. The findings will broaden the knowledge area of operational risk exposure in commercial banks in terms of the predisposing factors which this study did not consider.

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LIST OF APPENDICES

Appendix I: List of Licensed Commercial Banks in Kenya

SNO		SNO	
1	ABC Bank (Kenya)	28	Middle East Bank Kenya
2	Bank of Africa	29	National Bank of Kenya
3	Bank of Baroda	30	NIC Bank
4	Bank of India	31	Oriental Commercial Bank
5	Barclays Bank of Kenya	32	Paramount Universal Bank
6	Chase Bank Kenya (In Receivership)	33	Prime Bank (Kenya)
7	Citibank	34	SBM Bank Kenya Limited
8	Commercial Bank of Africa	35	Sidian Bank
9	Consolidated Bank of Kenya	36	Spire Bank
10	Cooperative Bank of Kenya	37	Stanbic Bank Kenya
11	Credit Bank	38	Standard Chartered Kenya
12	Development Bank of Kenya	39	Trans National Bank Kenya
13	Diamond Trust Bank	40	United Bank for Africa
14	Dubai Islamic Bank	41	Victoria Commercial Bank
15	Ecobank Kenya	42	Fidelity Commercial Bank
16	Equity Bank		
17	Family Bank		
18	First Community Bank		
19	Guaranty Trust Bank Kenya		
20	Guardian Bank		
21	Gulf African Bank		
22	Habib Bank AG Zurich		
23	I&M Bank		
24	Imperial Bank Kenya (In receivership)		
25	Jamii Bora Bank		
26	Kenya Commercial Bank		
27	Mayfair Bank		