ASSET-LIABILITY MANAGEMENT AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

AMIRA EDWIN AMBETSA

A Thesis Submitted in Partial Fulfilment of the Requirement for the Award of Degree of Doctor of Philosophy in Business Administration (Finance Option)

Masinde Muliro University of Science and Technology

OCTOBER, 2023

DECLARATION AND CERTIFICATION

Declaration by Candidate

This thesis is my original work and it has not been presented for a degree or award to any other University. All sources of information have been acknowledged by means of references.

Signed …….. . Date ……

AMIRA EDWIN AMBETSA

PBA/H/01-53376/2018

Certification by Supervisors

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a thesis entitled ***"Asset-Liability Management and Financial Performance of Commercial Banks in Kenya."***

Signed …….. …….. Date ……...

Prof. Benedict Ondiek Alala

Department of Accounting and Finance

Masinde Muliro University of Science and Technology.

Signed …….. ……. Date …….

Dr. Maniagi Musiega

Department of Accounting and Finance

Masinde Muliro University of Science and Technology.

COPYRIGHT

DEDICATION

I dedicate this thesis to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this program and on His wings only have I soared. I also dedicate this work to my wife; Ruth Andika Amira who has encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I started. To my children Merrill Beatrice, Verrill Hans and Herrill Meg who have been affected by this quest. Jacquie, my sister who inspired me and illuminated my professional journey. I hold you in the highest esteem.

My love for you all can never be quantified. God bless you.

ACKNOWLEDGEMENTS

Special gratitude goes to our Almighty God for seeing me through life journey. I would like to acknowledge my supervisors Prof. Benedict Ondiek Alala and Dr. Maniagi Musiega for their tremendous effort, guidance, encouragement, and pieces of advice, never outgoing patience and remarkable comments in thesis writing process.

My gratitude also goes to my colleagues at work who tirelessly offered their advice towards the preparation of this thesis.

ABSTRACT

The economy depends on the banking industry majorly as far as lending is concerned. Therefore, their profitability and stability is crucial which is achieved through proper asset-liability management. The primary goal of asset-liability management is to produce a high quality, stable, large and growing flow of net interest income to banks. This goal is accomplished by achieving the Optimum combination of assets, liabilities and financial risk. This study sought to determine the effect of asset-liability management on financial performance of Commercial Banks in Kenya. The specific objectives of the study were to; determine the effect of; asset quality, liquidity risk management, capital adequacy, and credit risk management on financial performance of Commercial Banks in Kenya and to establish the moderating effect on bank size on the relationship between asset-liability management and financial performance of Commercial Banks in Kenya. The study was anchored on four theories namely; Asset-liability Management theory, Portfolio theory, Shiftability theory of liquidity management and the concentration stability and fragility theory. Asset-liability management theory was the main theory anchoring the study. Positivism paradigm formed the philosophical underpinning for the study. The study adopted an explanatory research design involving panel data of 32 Commercial Banks in Kenya for the period 2010-2019. Panel data collected from audited financial reports of the commercial banks was analyzed by use of descriptive and inferential statistics using Eviews and presented using tables and figures. The study found out that: Asset quality had a significant negative relationship with ROE (r=-0.490, p=0.000) and ROA (r=-0.481, p=0.000); Liquidity risk management had insignificant relationship with ROE; Capital adequacy had an insignificant effect on ROE and ROA and Credit management also had a significant but a negative effect on ROE (r=-0.464, p=0.000) and ROA (r=-0.520, p=0.000). The findings show that only asset quality management and credit management have important performance implications for the banking industry in Kenya based on data analyzed. The R-square results indicate that the two components of asset-liquidity management explain 17.2% change in ROE of commercial banks in Kenya. the negative relationship between the components and bank performance need further investigation. The recommendations from the study are; one, focus on balancing portfolio that consider risks and stability, two, optimize investments and lending practice, three, invest in a robust credit risk assessment process while balancing risk taking with responsible lending. Finally, larger banks should focus on refining their credit risk strategies to ensure they remain effective even at their scale. The impact of these factors can vary with the size of the bank, necessitating tailored strategies for different scales of operation. Regular evaluation and adjustment of these strategies in response to market dynamics are essential for long-term profitability and sustainable growth.

TABLE OF CONTENTS

DECLARATION AND CERTIFICATION ii

COPYRIGHT iii

DEDICATION iv

ACKNOWLEDGEMENTS v

ABSTRACT vi

TABLE OF CONTENTS vii

LIST OF TABLES xi

LIST OF FIGURES xiii

LIST OF APPENDICES xiv

LIST OF ABBREVIATIONS AND ACRONYMS xv

OPERATIONAL DEFINITION OF TERMS xvi

CHAPTER ONE: INTRODUCTION 1

1.1 Background to the Study 1

1.2 Statement of the Problem 4

1.3 Objectives of the Study 6

1.3.1 General Objective 6

1.3.2 Specific objectives 6

1.4 Hypothesis of the Study 6

1.5 Significance of the Study 7

1.6 Scope of the Study 8

1.7 Limitations of the Study 9

CHAPTER TWO: LITERATURE REVIEW 10

2.1 Introduction 10

2.2 Theoretical Framework 10

2.2.1 The Asset -Liability Management Theory 10
2.2.2 The Portfolio Theory 12
2.2.3 Shiftability Theory of Liquidity Management 14
2.2.4 The Concentration-stability and Concentration-fragility Theory 15
2.3 Conceptual Review 18
2.3.1 Asset-Liability Management 18
2.3.2 Asset Quality 21
2.3.3 Liquidity Risk Management 23
2.3.4 Capital Adequacy 25
2.3.5 Credit Risk Management 28
2.3.6 Financial Performance 31
2.3.7 Bank Size 35
2.4 Empirical Review of Literature 37
2.4.1 Asset-liability Management and Financial Performance 37
2.4.2 Bank Size and Profitability 43
2.4.3 Asset Quality and Financial Performance 46
2.4.4 Liquidity Risk Management and Financial Performance 47
2.4.5 Capital Adequacy and Financial Performance 52
2.4.6 Credit Risk Management and Financial Performance 55
2.4.7 The Moderating Effect of Bank Size on the Relationship between Asset-liability management and Financial Performance 61
2.4.8 Critique of the Existing Literature and Research Gaps 62
2.5 The conceptual Framework 65
CHAPTER THREE: RESEARCH METHODOLOGY 73
3.1 Introduction 73
3.2 Research Philosophy 73
3.3 Research Design 74
3.4 Study Area 74
3.5 Target Population 75

3.6 Data collection Method 75
3.7 Data Analysis and Presentation 75
3.8 Model Specification 76
3.9 Test of Panel Data Assumptions 77
3.9.1 Test for Normality 77
3.9.2 Test of Serial Correlation 78
3.9.3 Test for Heteroscedasticity 78
3.9.4 Test of Unit Root 78
3.11 Ethical Considerations 79
DATA ANALYSIS AND PRESENTATION 80
4.1 Introduction 80
4.2.1 Test of Panel Data Assumptions 80
4.2.2 Test for Normality 80
4.2.3 Test of Serial Correlation 81
4.2.4 Test for Heteroscedasticity 83
4.2.5 Test of Unit Root 83
4.2.6 Dataset Preparation 84
4.3 Descriptive Statistics 86
4.4 Correlation Analysis 90
4.5 Panel Regression Models Preliminary Tests 92
4.5.2 Panel Data Model Specification 92
4.5.3 Breusch and Pagan Multiplier Test 92
4.6 Regression Analysis 97
4.6.1 Regression Analysis for Asset-liability Management and Financial Performance 98
4.6.2 The Moderating Effect of Bank Size on Asset-liability Management and Financial Performance 103
4.6.3 Hypothesis Testing of the Research Variables 108
a) Hypothesis One 108
b) Hypothesis Two 108

c) Hypothesis Three 109
d) Hypothesis Four 109
e)Hypothesis Five 109
4.7 Summary of Statistical Tests and Statistical Analysis 110
CHAPTER FIVE 113
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS ... 113
5.1 Introduction 113
5.2 Summary of Key Study Finding 113
5.2.1 Asset Quality and Financial Performance 113
5.2.2 Liquidity Risk Management and Financial Performance 114
5.2.3 Capital Adequacy and Financial Performance 114
5.2.4 Credit Risk Management and Financial Performance 115
5.2.5 Bank Size on the Relationship between Asset-liability Management and Financial Performance 115
5.3 Conclusion 116
5.4 Recommendations 117
5.5 Study Implications 118
5.5.1 Theoretical Implications 118
5.5.2 Policy Implications 119
5.6 Recommendations for Further Research 120
REFERENCES 121
APPENDICES 135
Appendix I: Commercial Banks in Kenya 135
Appendix II: Data Collection Sheet 136

LIST OF TABLES

Table 2.1: Measurement of study variables ……..……...66

Table 2.2: Research Gaps Matrix……...67

Table 4.1: Jarque-Berra (J-B) Test…….80

Table 4.2: Correlogram using residual of ROE as a measure of Financial Performance..81

Table 4.3 Correlogram using residual of ROA as a measure of Financial Performance……...82

Table 4.4: Summary of Panel Unit Root Test Results on Study Variables……...84

Table 4.5: Summary of Descriptive Statistics……87

Table 4.6: Correlation Matrix ……..…….90

Table 4.7: Panel Least Square Regression using ROE as Dependent Variable…….93

Table 4.8: Panel Least Square Regression using ROA as Dependent Variable……94

Table 4.9: Breusch and Pagan Multiplier Test using ROE……95

Table 4.10: Breusch and Pagan Multiplier Test using ROA…….95

Table 4.11: Hausman Test using ROE……...96

Table 4.12: Hausman Test using ROA……..97

Table 4.13: GLS Random Effect Model for Asset Liability Management and Financial Performance (ROE)……...98

Table 4.14: GLS Random Effect Model for Asset Liability Management and Financial Performance (ROA)……...101

Table 4.15: Interactive Regression Model for testing the effect of Bank Size on relationship between Asset-liability Management and Financial Performance (ROE)……..105

Table 4.16: Interactive Regression Model for testing the effect of Bank Size on relationship between Asset-liability Management and Financial Performance (ROA)……...106

Table 4.17: Summary of Statistical Tests……111

Table 4.18: Summary of Hypothesis Tests……..112

LIST OF FIGURES

Figure 2.1: Conceptualizing the Relationship between Asset-Liability Management, Bank Size and Financial Performance……. 65

Figure 4.1: Residual plot diagnostic…….....83

Figure 4.2: Checking for Outliners in Study Variables…….85

LIST OF APPENDICES

Appendix I: Commercial Banks in Kenya …….....135

Appendix II: Data Collection Sheet ……...….136

LIST OF ABBREVIATIONS AND ACRONYMS

ALC0	Asset-Liability Management Committee
ALM	Asset Liability Management
CAMEL	Capital Adequacy, Asset Quality, Management and Liquidity
CBK	Central Bank of Kenya
CRM	Credit Risk Management
ECB	European Central Bank
GDP	Gross Domestic Product
ICIC	Industrial credit and Investment Corporation of India
NII	Net Interest Income
NSE	Nairobi Securities Exchange
ROA	Return on Asset
ROE	Return on Equity
SBI	State Bank of India
SPSS	Statistical Package for Social Sciences

OPERATIONAL DEFINITION OF TERMS

Asset Quality: The overall health and risk associated with a bank's loan portfolio and other financial assets. It assesses the likelihood that the bank's borrowers will fail to repay their loans, leading to potential losses. High asset quality implies a low level of risky loans, while poor asset quality indicates a higher likelihood of loan defaults and potential financial losses for the bank.

Liquidity Risk Management: Refers to a bank's ability to meet its short-term financial obligations without incurring excessive costs. It involves maintaining a balance between liquid assets (assets that can be quickly converted into cash) and liabilities (obligations to pay). Effective liquidity risk management ensures that a bank can honor customer withdrawals, cover operational expenses, and meet other financial commitments, especially during periods of financial stress or economic downturns.

Capital Adequacy: Capital adequacy refers to the sufficiency of a bank's capital in relation to its risk exposure. Banks are required to maintain a certain level of capital as a buffer to absorb potential losses from risky assets. Adequate capital ensures that a bank can absorb unexpected losses without jeopardizing its financial stability. Regulatory authorities set specific capital adequacy ratios that banks must maintain to ensure their resilience and protect depositors and creditors.

Credit Risk Management: Involves the strategies, policies, and practices employed by banks to assess, monitor, and mitigate the risk of borrowers defaulting on their loans. It includes evaluating the creditworthiness of borrowers, setting appropriate interest rates, and establishing risk mitigation measures such as collateral requirements. Effective credit

risk management helps banks make informed lending decisions, minimize loan defaults, and maintain a healthy loan portfolio.

Bank Size: Refers to the magnitude of a bank's operations, often measured by total assets, capitalization, or the number of branches. Larger banks typically have more extensive operations, serve a broader customer base, and may have a more diversified portfolio of financial products and services. Bank size can influence various aspects of a bank's operations, including its ability to absorb risks, negotiate favorable terms with counterparties, and invest in technology and innovation.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Commercial Banks possess many types of assets, current or fixed, but the asset contributing to the largest share of a bank's income is the bank loan. Perera and Mathushani (2022) stressed that the quality of a bank's assets is influenced by the bank's exposure to specific risks, the trends in non-performing loans and the financial health of bank borrowers. Tee (2017) defines asset and liability management (ALM) as the strategic approach employed to mitigate risks stemming from discrepancies between assets and obligations. The concept of Asset Liability Management (ALM) can be described as a dynamic procedure that involves the strategic planning, organization, coordination, and control of assets and liabilities *(ibid).* This includes managing their composition, quantity, maturity, yield, and costs with the objective of attaining a predetermined net interest income (NII). In essence, this pertains to the strategic allocation of resources to effectively address present objectives and anticipated obligations. The subject matter pertains to the effective management of risks arising from liquidity mismatch, fluctuations in interest rates, and movements in foreign currency prices.

According to Beleta, (2015), the primary goal of asset-liability management is to produce a high quality, stable, large, and growing flow of net interest income. This goal is accomplished by achieving the maximum combination and level of assets, liabilities and financial risk. Asset-liability management calls for the understanding of the interaction between the various types of risks to ensure that they are not evaluated in isolation.

Financial performance and financial profitability are frequently used as interchangeable terms, (Burkhardt & Wheeler, 2013). With the increasing number of analysis and research papers referencing financial performances, there is a need to have basic understanding of definition of financial performance and its various measures, (Burckhardt, 2013). Therefore, choosing a particular measure of financial performance depends on how well it meets the intended purpose. Financial performance of a bank is defined as its capacity to generate sustainable profitability, (European Central Bank (ECB), 2010). Therefore, we can say that financial performance of a bank is its ability to employ the available resources to increase shareholders' wealth and generate sustainable profits to strengthen its capital base through retained earnings to ensure future profitability.

There are various ways through which bank performance can be measured. European Central Bank (2010) report has categorized them in to three major categories which are traditional, economic and market based measures. The traditional measures are similar to those used by other firms which include ROA which is the net income for the year divided by the total assets. The other measure is Return on Equity (ROE) which is the internal performance measure of shareholder's value and this is the most famous measure of financial performance. The Economic measures of performance aim at assessing the economic results generated by the bank from its economic assets. The market based measures depend on the way the capital market value the performance of firm as compared to its economic and accounting value. A relationship of how well a bank is doing by assessing the returns on equity (ROE), which is an indicator of financial

performance vis-à-vis other variables in the form of performance ratios. Progressive ALM policies ensure that banks financial performance is at its peak.

In Kenya, Dubai Bank was placed under receivership in 2015 due to capital and liquidity deficiencies. The bank was subsequently liquidated. In the same year Imperial Bank was put under receivership due to suspected fraudulent activities at the bank. In April 2016 Chase bank went into a bank run. The Kenyan Central Bank had to make an arrangement for its revival. Receivership of three small banks impacted the liquidity distribution within the interbank market, which accentuated segmentation leading to marked reduction of interbank credit lines to small and medium tier banks (CBK, 2016).

Banks need to conduct stress testing in order to survive future dynamics, threats and opportunities. The banking industry plays a crucial role in facilitating global trade and fostering economic growth by serving as a significant provider of financial resources to the economy (Ongore & Kusa, 2013). The financial viability of financial institutions is of paramount significance. The examination of the impact of financial performance on Commercial Banks has been a subject of interest for scholars, investors, and analysts globally, as noted by Sufian and Chong (2008).

The banking industry has a significant role in the economy, particularly in relation to loan activities. Hence, the profitability and stability of the aforementioned entities are of utmost importance. The banking sector plays a crucial role in the overall economy. The function of Commercial Banks in the distribution of economic resources is significant, since they facilitate the continual flow of capital from depositors to investors (Ongore & Kusa, 2013).

Commercial banks play a vital role in the functioning of the economy, akin to the circulatory system's blood vessels. The financial institution provides essential services such as offering deposit and credit facilities to customers, hence facilitating credit and liquidity (Bereh & Nyahas, 2020). Commercial Banks are also conduits for the effective implementation of monetary policy by the central banks of their country's economy. The robustness of a nation's economy is heavily reliant on the stability of its banking sector. There exists a significant interdependence between the banking sector and the economy of a given nation. The financial performance of Commercial Banks plays a significant role in determining their soundness. Typically, it elucidates the vulnerabilities and advantages inherent in Commercial Banks. The assessment of a financial institution's financial performance involves the analysis of its profitability (Makkar & Singh, 2013).

Financial institutions are required to keep strict financial ratio requirements. Bank profits are a good source of equity if reinvested back to the business operations. This should lead to safe banks since the profit leads financial stability. Too high profitability is a sign of monopoly. This may affect intermediation. Banks exercising monopolistic tendencies may offer lower returns on deposit but charge high rates on loan. To low profitability may scare away private agent’s depositors and shareholders from banking thus resulting in the banks failing to attract enough capital to operate.

1.2 Statement of the Problem

The banking system in Kenya is currently grappling with significant challenges, characterized by a controlled and fragmented financial structure. These issues stem from variations in regulations, lack of autonomy, and weak supervisory capacities within the

central bank. As a consequence, the percentage of Non-Performing Loans has surged from 22% to 27.3% of Total Loans. Notable banks, such as the National Bank of Kenya and CFC Stanbic, have faced financial struggles despite revised regulations implemented in 2013. The period between 2010 and 2019 marked a crucial time for Kenya's banking sector.

Previous research studies have explored factors influencing banks' financial performance. However, these studies have limitations in geographical focus and research scope. The study aims to bridge these gaps by investigating the impact of asset-liability management on the financial performance of Kenyan commercial banks. The complexity of the banking system necessitates a systematic analysis of how banks manage their assets and liabilities to ensure stability and profitability. By focusing on this critical aspect, the research aims to provide comprehensive insights into strategies that can enhance financial performance, thereby bridging the existing knowledge gap. The findings will contribute valuable data to the banking industry, regulatory bodies, and researchers, fostering a deeper understanding of effective financial management in challenging environments. Understanding the intricacies of asset-liability management in Kenyan banks is critical for the entire financial ecosystem. Policymakers can utilize the research findings to formulate effective regulations, ensuring the stability of the banking sector. Banking professionals will gain insights into best practices, enabling them to make informed decisions, enhance profitability, and mitigate risks. Additionally, the study's academic value lies in contributing new knowledge to the existing literature on banking and financial management.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study was to determine the effect of asset-liability management on financial performance of Commercial Banks in Kenya.

1.3.2 Specific objectives

Specifically, the study sought;

i. To determine effect of asset quality on financial performance of Commercial Banks in Kenya.
ii. To establish effect of liquidity risk management on financial performance of Commercial Banks in Kenya.
iii. To examine effect of capital adequacy on financial performance of Commercial Banks in Kenya.
iv. To assess effect of credit risk management on financial performance of Commercial Banks in Kenya.
v. To ascertain moderating effect of bank size on the relationship between asset-liability management and financial performance of Commercial Banks in Kenya.

1.4 Hypothesis of the Study

The following hypotheses were formulated for testing;

H_{01}: Asset quality has no significant effect on financial performance of Commercial Banks in Kenya.

H_{02}: There is no significant effect of liquidity risk management on the financial performance of Commercial Banks in Kenya.

H_{03}: There is no significant effect of capital adequacy on financial performance of Commercial Banks in Kenya.

H_{04}: There is no significant effect of credit risk management on financial performance of Commercial Banks in Kenya.

H_{05}: There is no significant moderating effect of bank size on the relationship between asset-liability management and financial performance of Commercial Banks in Kenya.

1.5 Significance of the Study

The study is significant in the following ways;

a) Comprehensive Understanding: The research provides a thorough and detailed analysis of how Kenyan commercial banks manage their assets and liabilities. By delving into the specific strategies employed by these banks, the study offers deeper understanding of the challenges and opportunities in the realm of asset-liability management.

b) Contextual Insights: The study contextualizes its findings within the unique socio-economic and regulatory landscape of Kenya. By considering the local situation and challenges faced by Kenyan banks, the research offers insights that are specifically tailored to the Kenyan banking industry, thus filling a gap in the existing literature that often lacks such contextualization.

c) Practical Recommendations: Through a rigorous analysis of successful asset-liability management practices, the study generates practical and actionable recommendations for Kenyan commercial banks. These recommendations can serve as guidelines for banking professionals, enabling them to make informed decisions to enhance their financial stability and profitability.

d) Comparative Analysis: By drawing lessons from successful asset-liability management practices in other global banking systems, the study facilitates a

comparative analysis. This comparative perspective allows for a broader understanding of effective strategies enabling Kenyan banks to learn from international best practices and adapt them to their local context.

e) Policy Implications: The research findings have implications for policymakers and regulatory bodies. By understanding the challenges faced by banks and the strategies that work, policymakers can formulate targeted regulations and policies. These policies can create an enabling environment for banks to improve their asset-liability management practices, thereby contributing to the overall stability of the banking sector.

f) Academic Contribution: On an academic level, the study adds to the theoretical framework of asset-liability management in the context of developing economies. By conducting in-depth empirical research, the study contributes valuable data and insights that can be used as a foundation for further academic inquiry in the field of banking and financial management

1.6 Scope of the Study

The study targeted 42 Commercial Banks in Kenya as per Central Bank of Kenya Bank Supervision Annual Report of 2019. Ten (10) banks were excluded since some of them have been put under statutory management (Charterhouse Bank Ltd), others put under receivership (Chase Bank Ltd and Imperial Bank Ltd), NIC Bank PLC Merged with Commercial Bank of Africa to form NCBA Bank PLC, and KCB Group PLC acquired 100% shareholding in National Bank Ltd on 2nd September, 2019. As part of the acquisition, NBK will continue operating as a separate player in the near term.

The study examined effect of asset-liability management on financial performance of Commercial Banks in Kenya. The panel data was sourced from secondary data for a period of ten years from the year 2010-2019.

Data was collected from secondary sources using published financial reports. The study adopted an explanatory approach to examine the association between bank balance sheet assets and liabilities on one hand and financial performance on the other.

1.7 Limitations of the Study

The study faces the following limitations;

a) The study was based on secondary data derived from published annual reports of the 32 Commercial Banks in Kenya for a period of ten years. The reliability and findings is dependent on the data published in annual report.

b) The present study did not consider all the elements of the CAMEL evaluation tool as used by the Central bank. It selects three elements namely; capital adequacy, asset quality and liquidity management from the model. This may limit the efficiency of the results if interaction effects are observed between all the factors.

c) Further methodological limitations may be at play because the study employed a generalized least square method for analysis of data which assumes no significant difference between the individual banks.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature examining recent and historical studies. It also analyses various theories and their relevance to the study of asset-liability management and financial performance of Commercial Banks in Kenya.

2.2 Theoretical Framework

The study was guided by four theories. These theories are Asset-liability management theory will be the study main theory. Other theories supporting the study were; portfolio theory, Shift-ability theory of liquidity management and the concentration stability and fragility theory.

2.2.1 The Asset -Liability Management Theory

Redington (1952) and Haynes and Kirton (1952) are widely recognized advocates of the liability management idea. The researchers conducted an analysis on the financial framework of a life insurance company, with a specific focus on examining the interplay between the assets and liabilities inside a life insurance fund. The particular issue at hand was to the identification of an optimal asset allocation strategy that would ensure a balanced vulnerability of assets and liabilities to external factors, such as fluctuations in market interest rates. Redington (1952) uses the term immunization to describe the investment of the assets in a way that protects the company from changes in the general rate of interest.

Haynes and Kirton (1952) employed the concept of insulation in a comparable manner. The convergence of essential conclusions between the two authors is noteworthy. This

idea, which has been expanded upon in subsequent literature, posits that financial institutions have the ability to access reserve funds from the money market as needed. According to the theory, it is posited that a bank has the ability to maintain reserves by generating extra liabilities through various means. The sources mentioned encompass the issuance of time certificates of deposit, borrowing from other commercial banks, borrowing from the central bank, obtaining capital money through the issuance of shares, and reinvesting earnings.

This theory acknowledges the significance of a bank's asset structures in facilitating the acquisition of necessary liquidity. The strategy is widely regarded as being more assertive compared to alternative methods, as it effectively amplifies prospects for securing funds in order to execute compelling investment ventures. According to Osifisan (1993), banks in the United States began implementing this approach in 1960, when they adopted a more proactive stance in attracting potential depositors. This was achieved through the establishment of dedicated marketing departments, which enabled them to sustain profitability in their operations.

The liability-management hypothesis, which gained prominence in the early 1960s, has had a significant impact on the lending portfolios of Commercial Banks. This theory pertains to asset-liability management and posits that adhering to traditional ALM practices, such as maintaining liquid assets and investments, is unnecessary. In recent times, financial institutions have directed their attention towards the liabilities component of their balance sheets. According to the aforementioned idea, financial institutions have

the ability to fulfill their Asset Liability Management (ALM) requirements by engaging in borrowing activities within the money and capital markets. The key contribution of this theory was to take into account the assets and liabilities of a bank as reflected in its balance sheet (Emmanuel, 1997).

In contemporary banking practices, financial institutions employ a combination of assets and liabilities to effectively address their Asset Liability Management (ALM) requirements. The Asset and Liability Management Committee (ALCO) of a bank identifies and compares the sources of Asset Liability Management (ALM) that are currently available to meet the foreseeable demands of the bank. Important factors to take into account encompass the preservation of a robust portfolio of assets and a solid capital foundation, which not only mitigates the need for asset and liability management but also enhances a bank's ability to obtain money at a favorable cost. A trade-off exists in the short run between asset and liability management (ALM) and profitability. Profits and capital will grow at a faster rate than at other banks if management is good at ALM (Karelskaya & Zuga, 2012; Clerk & Dean 2013)). This theory served as the basis for the primary purpose of studying asset-liability management and financial performance of Commercial Banks in Kenya.

2.2.2 The Portfolio Theory

The foundation for Modern Portfolio Theory (MPT) was established in 1952 by Harry Markowitz with the writing of his doctoral dissertation in statistics. The most important aspect of Markowitz' model was his description of the impact on portfolio diversification by the number of securities within a portfolio and their covariance relationships

(Megginson, 1996). His dissertation findings, entitled “Portfolio Selection” (1952), were first published in The Journal of Finance. Subsequently, these findings were significantly expanded with the publication of his book, Portfolio Selection: Efficient Diversification in 1959.

The portfolio theory approach holds significant relevance and assumes a crucial role in the examination of bank performance. The Portfolio Balance Model of asset diversification posits that the optimal allocation of assets in a portfolio is influenced by policy decisions, which are determined by various factors. These factors include the vector of rates of return on all assets held in the portfolio, the vector of risks associated with owning each financial asset, and the size of the portfolio. The concept of portfolio diversification and the desired composition of portfolios for Commercial Banks are outcomes of decisions made by bank management. Moreover, the attainment of optimal profitability is contingent upon the set of assets and liabilities deemed practicable by the management, as well as the unit costs associated with the production of each asset component inside the bank.

This theory posits that incorporating a portfolio model of asset diversification can effectively mitigate financial losses. By maintaining a well-structured portfolio, firms can minimize risks associated with individual assets, thereby safeguarding against potential financial losses. However, it is important to note that this approach may have adverse implications for the liquidity position of financial institutions. Nevertheless, the establishment of a clearly delineated portfolio serves to mitigate the possibility of the firm incurring complete financial loss, as the inherent risks associated with the firm's investments are effectively managed through the strategic allocation of assets within the

portfolio. According to Markowitz (1952) as referenced in Obari (2015), and Black et al. (1972), it is contended that the portfolio diversification and desired portfolio composition of Commercial Banks are outcomes of decisions made by bank management. The attainment of maximum profits is contingent upon the viable set of assets and liabilities as decided by the management, as well as the unit expenses incurred by the bank in the production of each component of assets. This implies that the company has the ability to mitigate the fluctuation in the company's portfolio in order to enhance its performance through diversification, which involves distributing risks across various types of securities that exhibit diverse behaviors. This theory provided the foundation for investigating the initial, subsequent, and final objectives pertaining to asset quality, capital sufficiency, and credit risk management, as well as their correlation with the financial performance of Commercial banks in Kenya.

2.2.3 Shiftability Theory of Liquidity Management

Shiftability theory, developed by Bhattacharyya (2011), states that the level of defensible financial institution liquidity management is having possession or investing in legal capital capable of shifting solely to other investments in obtaining liquid equipment. Loan for instance becomes secondary back up while secondary back up shifts to become primary back up. This means shiftability theory suggests that financial institutions should give credit paid with notification before they apply for commercial paper pawn. According to this theory banks maintain liquidity if they hold assets that are marketable. During a liquidity crisis such assets are easily converted into cash. Thus this theory contends that shiftability, or marketability or transferability of bank assets is a basis for ensuring good liquidity management (Deger & Adem, 2011).

When cash is limited, financial institutions tend to sell pawn goods on loan aiming to obtain adequate cash. The friction happens because collateral which is illiquid turns into liquid. Besides this they also often sell marketable securities like super common stock. As a result, the shiftability theory is comprehended to give description and confidence of management of financial institutions until certain degree of removable asset possession in condition is needed to fulfill liquidity management (De-Young & Rice, 2004). This theory informed the study second objective involving liquidity risk management and its relationship with financial performance of Commercial banks in Kenya.

2.2.4 The Concentration-stability and Concentration-fragility Theory

The concentration-stability paradigm, which is also referred to as the franchise value paradigm proposed first by Keeley (1990), argues, on a (positive) margin effect hypothesis, that banks operating in a concentrated market signal or that have some market power (i.e. positive franchise value) might be more prudent in the aspect of risk-taking. It is assumed that larger banks tend to undertake credit rationing since fewer, but more qualitative credit investments will increase the return of the singular investment and hence foster financial soundness (Boot, et al., 2000). Similarly, banks in concentrated banking system may enhance profits, through either higher interest rates or less loan loss provision, (Boyd, et al., 2004) as the higher the franchise value of the greater the opportunity cost of bank when going bankrupt, and therefore risky investments that could jeopardize future profits may not be accepted by banks authorities (Hellmann, et al., 2000). Higher profits, on the other hand, may provide higher capital buffer that protects them from adverse external macroeconomic, loan losses and liquidity shocks and eventually increase the charter or franchise value of the bank, reducing the incentives for

banks to take excessive and unwarranted risk and thus reducing the probability of default (Beck, et al., 2006; Berger & Bouwman, 2013).

Further, larger banks may even be able to diversify (even geographically) loan portfolio risks more efficiently due to higher economies of scale (Diamond, 1983; Uhde & Heimeshoff, 2009)). In another aspect, as Allen and Gale, (2004) states, it would also prove substantially easier for bank supervisors to monitor a few banks in a concentrated banking system in which a few larger banks hold more diversified portfolios. Such a concentrated banking system, resilience to higher risk absorption would be more pronounced, leading to fewer crises. In contrast, proponent of the concentration-fragility view argues that banks operating in a more concentrated environment, exploiting arbitrary their monopoly power in the loan market, tend to induce higher loan rates [Boyd and De Nicolo (2005), which in return, create moral hazards and eliminate the least risky part of the banks' customers (Berger, et al., 2009), or even make it harder for them to repay loans (Mirzaei, et al., 2013).

In this context, default risk will surge, while large banks are of particular importance because their failure could pose significant risks to the collapse of financial institutions and the financial system as a whole, as the crisis in US has shown (De Haan & Poghosyan, 2012 a&b). This could also negatively affect the monetary system and real production. To ensure financial stability, those institutions considered as too-big-to-fail might implicitly or explicitly be protected by public guarantees or subsidies, as observed during and in the aftermath of GFC (Moch, 2013), which in return may intensify risk-taking incentives and hence increase banking fragility (Mishkin, 1999). In another aspect,

Cetorelli, et al., (2007) stress that a lower degree of diversification may end up deteriorating managerial efficiency, less effective internal corporate control and increased operational risk that may be prone to supervisory failures. According to this theory, in an environment characterized by saturation or concentration, major banks have the ability to mitigate their financial vulnerabilities through a range of mechanisms.

According to Uhde and Heimeshoff (2009), the implementation of buffers by large banks can potentially enhance their profitability and reduce their vulnerability to liquidity-related challenges. According to Boot and Thakor (2000), large banks tend to limit credit and make few high-quality investments. This enhances their stability. Central banks and other regulatory bodies typically find it advantageous to oversee large banks due to their relative ease of supervision and their positive impact on the overall health of the economy. Large banks possess superior and more extensive diversification strategies, resulting in a diminished level of risk exposure. Consequently, larger financial institutions possess the ability to engage in independent investing activities with minimal capital and reduced reliance on external funding. Additionally, they possess the benefit of economies of scale. The theory is predicated on the idea that firm size and bank profitability are positively correlated (Laeven, 2014). This theory served as the foundation for the investigation of the moderator objective, which was to examine the moderating impact of bank size on the association between asset-liability management and financial performance of Commercial banks in Kenya.

2.3 Conceptual Review

2.3.1 Asset-Liability Management

Oracle White Paper (2011) states that managing maturity gaps and mismatches while controlling interest rate risk within the overall ALCO mandate constitute the main functions of asset-liability management. The Asset-liability management team is responsible for overseeing five major tasks, which encompass several customary activities. One of these responsibilities involves the management of structural gaps. The significance of maintaining a balance between maturities and cash flows on both sides of the balance sheet, specifically with regards to deposits and loans, is emphasized in the context of Asset-liability management. The strategy involves dynamic balancing of gaps, providing timely guidance to alter focus on appropriate product types and tenors, and actively engaging the asset liability committee in this process (Oracle White Paper, 2011).

Darush (2013) investigated the connection between asset liability and small-business success in Amsterdam. The research revealed a significant correlation between the asset liability and profitability of manufacturing enterprises. The study conducted by Deloof (2003) examined the impact of asset-liability management on the performance of service firms in Europe. The research revealed a positive correlation between asset-liability management and profitability. Belete (2013) investigated the connection between Ethiopian commercial banks' profitability and liability management. The findings of the study demonstrated a favorable correlation between bank assets and return on assets.

The study conducted by Gikonya (2011) examined the impact of asset-liability management on the profitability of commercial banks in Kenya. The study revealed a

strong correlation between the management of asset liquidity and profitability among Commercial Banks in Kenya. In a study conducted by Kimondo (2014), the author examined the correlation between liquidity and profitability among nonfinancial companies that are publicly listed on the Nairobi Securities Exchange (NSE). The study's results revealed a somewhat positive correlation between liquidity and profitability among the sample of nonfinancial enterprises listed in Kenya. Anjichi (2014) investigated how asset-liability management affected Kenyan commercial banks' financial results. The research findings indicated a significant correlation between the management of assets and liabilities and the financial performance of Commercial Banks in Kenya.

Rogers (2005) examined the influence of asset and liability management on the financial performance of Scottish Commercial Banks. The sample size for the population of interest was 100 Commercial Banks. A survey with an exploratory approach was employed to examine the association between the variables. The findings of the study revealed a favorable link between asset-liability management and the financial performance of Commercial Banks. Stierwald (2010) investigated how asset and liability management affected the profitability of big Australian businesses. The research employed longitudinal data over a span of ten years. Both correlation and regression analysis were employed to examine the association between the variables. The study's findings indicate a positive correlation between asset and liability management and profitability.

Harvey (2013) looked into the connection between commercial banks' financial performance and asset-liability management. The research design employed in this study

was cross-sectional. The study included panel data spanning a period of three years. The data was subjected to analysis through the utilization of a regression model. The research findings indicated a significant correlation between asset-liability management and the financial success of service-oriented enterprises operating within the United States. Di-Maggio (2013) conducted a study on the relationship between Swedish firms' asset-liability management and financial performance. The research employed a cross-sectional survey methodology, in which secondary data sources were utilized from the financial statements of micro enterprises in Sweden. Descriptive statistics were employed in the analysis conducted in this study. The findings of the study provided evidence supporting a favorable link between asset-liability management and the financial performance of micro enterprises in Sweden.

One of the measures of supervisory information that has been developed and used in evaluating the overall condition and soundness of banks is the CAMEL rating system. CAMEL is an acronym for five components of bank safety and soundness, namely Capital adequacy, Assets quality, Management efficiency, Earnings ability, and Liquidity. The rating system dated back to 1979 when Federal Reserve System of United States implemented The Uniform Financial Institutions Rating System (UFIRS) in the US banking institutions in order to help provide a convenient summary of bank condition at any time (Deyoung *et al*., 2001).

Capital adequacy focuses on the total position of a bank's capital. It assures the depositors that they are protected from the potential shocks of losses that a bank incurs. Asset quality determines the robustness of financial institutions against loss of value in the

assets. Since banks are in the business of creating loans and advances, high concentration of loans and advances indicates vulnerability of assets to credit risk. An adequate liquidity position refers to a situation, where an institution can obtain sufficient funds, either by increasing liabilities or by converting its assets quickly at a reasonable cost. It is assessed in terms of assets and liability management (Trautmann, 2006; Demyanyk & Iftekhar, 2009; Idris, 2010; Dang, 2011). In what follows, each of the components of the asset-liability management is discussed with emphasis on its measurement and parameters.

2.3.2 Asset Quality

Asset quality is a metric that assesses the probability of loan default and the marketability of the loan. Asset quality refers to the evaluation of the value at which a financial institution would transfer a loan to an external entity, as defined by the borrower. The composition of the bank's assets includes fixed assets, current assets, credit portfolios, and various other investments. According to Nyanga (2012), loans represent the most significant component of a bank's assets and pose the highest level of risk to its capital. Other elements that may potentially affect the quality of assets include real estate holdings, additional assets, off-balance sheet items, cash owed from accounts, and physical premises. Asset quality is assessed by the CBK through the utilization of a ratio that compares the amount of net non-performing loans to the total value of gross loans. A greater ratio is indicative of subpar asset quality.

The asset of a bank is a variable that is distinctive to the bank and has an impact on its profitability. The bank's asset has several components, including but not limited to current assets, credit portfolios, fixed assets, and other investments. Frequently, the bank

loan serves as the primary asset that creates a significant portion of the bank's revenue. Loans constitute a significant asset for commercial banks, serving as a primary source of income generation. The profitability of banks is contingent upon the quality of their loan portfolio. The quality of the loan portfolio directly impacts the profitability of banks. Losses from delinquent loans pose the greatest threat to banks (Dang, 2011).

Nonperforming loan ratios serve as the most reliable indicators of asset quality. Various scholars employ a range of financial ratios to examine the performance of banks. Maintaining a minimal level of nonperforming loans is a primary priority for Commercial Banks. This phenomenon occurs due to the negative impact of a high level of nonperforming loans on the bank's profitability. Therefore, a low ratio of nonperforming loans to total loans indicates the soundness of a bank's portfolio. According to Sangmi and Nazir (2010), a lower ratio indicates greater performance for a bank.

The primary origin of operational risk for a bank is typically attributed to its assets. This is due to the fact that banks engage in the practice of financial intermediation. The majority of their operations are focused on the origination of loans and advances. Banks face credit risk when engaging in the activities of originating, distributing, and overseeing loans and advances. The concept of asset quality pertains to the evaluation of a bank's ability to effectively generate, administer, and recoup loans. The measurement of a bank's financial strength is a significant parameter. The purpose of this metric is to determine the proportion of non-performing assets in relation to the overall value of assets. The evaluation of asset quality is conducted by considering many parameters. The parameters encompass various factors such as the magnitude of problematic assets, the extent of delinquent or rescheduled loans, the proficiency of bank management in overseeing and

recovering problem loans, significant concentrations of loans and loans granted to insiders, the management of the loan portfolio, provisions for potential loan losses, and the growth of loan volume relative to a bank's capacity (Trautmann, 2006; Dang, 2011).

2.3.3 Liquidity Risk Management

Liquidity pertains to a company's capacity to fulfill immediate financial obligations by turning short-term assets into cash without incurring any financial detriment. Assets are classified as high-quality liquid assets when they possess the ability to be readily and promptly converted into cash with minimal or no loss of value, as stated by the Basel Committee on Banking Supervision (2013). The liquidity of markets is determined by the ability of asset holders to sell their holdings at prices that do not result in significant losses, so enabling them to obtain the necessary funds to meet their other obligations.

The level of bank performance is influenced by liquidity, which serves as an additional determining element. Liquidity pertains to the capacity of a financial institution to meet its commitments, primarily those of depositors. Dang (2011) asserts that there exists a positive correlation between an acceptable amount of liquidity and bank profitability. According to the aforementioned source, the financial ratios that most frequently indicate a bank's liquidity status are the ratio of client deposits to total assets and the ratio of total loans to customer deposits. Various experts employ diverse financial ratios to assess liquidity. Ilhomovich (2009) employed the cash to deposit ratio as a metric for assessing the liquidity status of banks in Malaysia. However, a study conducted in China and Malaysia discovered that there is no significant correlation between the liquidity level of banks and their performance (Said & Tumin, 2011).

Liquidity is widely regarded as a fundamental criterion for the effective functioning of banking operations. The metric indicates the extent to which a financial institution have the ability to meet its financial commitments within the specified time frame. Banks make money by mobilizing short-term deposits at lower interest rate, and lending or investing these funds in long-term at higher rates (Rai, 2012). If a bank faces liquidity crisis, there is a probable chance of bank run to occur. Liquidity is thus crucial for banks and it is of utmost importance for a bank to maintain correct level of liquidity which will otherwise lead to decline earnings (Getahun, 2015).

Liquidity is rated based on sources and volume of liquid funds available to meet short term obligations, volatility of deposits and loan demand, interest rates and maturities of assets and liabilities, access to money market and other sources of funds, diversification of funding sources, reliance on inter-bank market for short term funding, and management ability to plan, control and measure liquidity process (Trautmann, 2006). Liquidity risk on the other hand, is a curse to the image of a bank. As such banks need to take appropriate measures that will help in hedging liquidity risk; at the same time ensuring that good percentage of funds is invested in high return generating securities in order to generate profit with provision of liquidity to the depositors.

Liquidity is measured using a number of ratios. One of the ratios is Liquid Assets to Demand Deposits (LA/DD), which measures the ability of a bank to meet the demand from depositors in a particular year. Another ratio is Liquid Assets to Total Deposits (LA/TD) that measures liquidity to total deposits of a bank. A third ratio is Liquid Assets to Total Assets (LA/TA), which measures the overall liquidity position of a bank. Liquid

assets include cash in hand, balance with institutions and money at call and short notice while total assets include the revaluation of all assets (Nimalathasan, 2008; Dang, 2011).

2.3.4 Capital Adequacy

Capital adequacy refers to the extent of capital that a commercial bank must possess in order to withstand the risks it faces, including credit, market, and operational risks. This capital serves to absorb any losses and safeguard the bank's borrowers. Capital is a significant determinant within the banking sector that exerts a direct influence on the extent of bank profitability. Capital refers to the financial resources that a commercial bank possesses to sustain its business operations. The capital of a bank serves as a protective measure in instances where unfavorable circumstances arise within the organization. Furthermore, the presence of capital in a commercial bank serves to enhance its liquidity, as deposits are inherently more vulnerable and susceptible to the occurrence of bank runs. Adequate amounts of capital serve to mitigate the likelihood of financial trouble within a banking firm. The measurement of capital adequacy is conducted through the utilization of the capital adequacy ratio (CAR) (Nyanga, 2012).

The calculation of the Capital Adequacy Ratio (CAR) is based on the formula: CAR = Tier One Capital divided by Tier Two Capital, all divided by Risk Weighted Assets. The minimum acceptable Capital Adequacy Ratio (CAR) is 8%. A greater ratio signifies an elevated susceptibility of the bank to insolvency resulting from an overabundance of losses. According to Mulualem (2015), a lower value of the Capital Adequacy Ratio (CAR) indicates that a bank falls below the minimum level and possesses a greater capacity to manage the risk of insolvency.

Capital is a significant determinant of bank profitability, since it is one of the specific characteristics pertaining to banks that exert an influence on this metric. Capital refers to the quantity of internal financial resources that are accessible to sustain the operations of a bank and serve as a safeguard in the event of unfavorable circumstances (Athanasoglou et al., 2005). The capital held by banks serves the purpose of generating liquidity within the banking system, primarily because deposits are highly vulnerable and susceptible to bank runs. Additionally, it has been found that an increase in bank capital serves to decrease the likelihood of financial difficulty (Diamond & Raghuram, 2000).

Nevertheless, there are certain problems associated with this approach since it leads to a decrease in the demand for liability and favors the utilization of the most cost-effective sources of funding. Capital adequacy refers to the amount of capital that banks must maintain in order to effectively manage and mitigate various risks, including credit, market, and operational risks. This capital serves as a buffer to absorb any losses and safeguard the interests of the bank's borrowers. Dang (2011) asserts that the evaluation of capital sufficiency is predicated upon the capital adequacy ratio (CAR). The capital adequacy ratio is a metric that assesses the internal resilience of a bank in the face of potential losses during times of financial distress. The relationship between the capital adequacy ratio and the bank's ability to withstand crisis scenarios is one of direct proportionality. It also exerts a direct impact on the profitability of banks, as it influences their decision to expand into initiatives or sectors that carry both risk and potential profitability (Sangmi & Nazir, 2010).

A bank needs capital because it serves several important roles. It absorbs losses by allowing a bank to continue to operate as going concern during periods when losses owing to operation or other adverse financial results are experienced; promotes public confidence by providing a measure of assurance to the public that an institution will continue to provide financial services even in the event losses are incurred, thereby helping to maintain confidence in the banking system and minimize liquidity concerns. Also capital, along with minimum capital ratio standards, restrains unjustified bank asset expansion by requiring that asset growth be funded by a commensurate amount of additional capital; helps to minimize the potential moral hazard; and promotes safe and sound banking practices (Nimalathasan, 2008).

Capital adequacy is a significant metric that serves as a key indicator of a bank's financial soundness. The aforementioned metric is widely recognized as a valuable indicator of a bank's capacity to withstand unforeseen losses and effectively absorb disturbances originating from the financial system. The aforementioned acts as a fundamental framework for the preservation, safeguarding, and cultivation of stakeholders' trust, while concurrently mitigating the risk of insolvency inside a financial institution. This statement elucidates the inherent resilience of a financial institution and its capacity to maintain stability amidst periods of turmoil. The aforementioned factors have a significant impact on the entire performance of a bank, as they influence various operational aspects such as the establishment of new branches, the provision of loans in high-risk yet lucrative sectors, the recruitment of personnel, and the expansion of commercial ventures (Demyanyk & Iftekhar, 2009; Sangmi & Nazir, 2010).

According to Sangmi and Nazir (2010), the level of capital adequacy inside a bank may potentially impact its overall performance. This assertion is supported by the evidence that the expansion of branch networks, initiation of new lending activities in high-risk yet lucrative sectors, recruitment of personnel, and diversification of business operations via subsidiaries or specialized branches all necessitate sufficient capital resources. Hence, capital adequacy is a measure of a bank's leverage, reflecting the ratio of shareholders' equity and debt employed to fund its assets.

Capital adequacy is rated based on a number of parameters. These include nature and volume of problem assets in relation to total capital and adequacy of loan loss and other reserves; balance sheet structure, nature of business activities and risks to the bank, asset and capital growth experience and prospects, earnings performance and distribution of dividends, capital requirements and compliance with regulatory requirements, access to capital markets and sources of capital, and ability of management to deal with the above factors (Trautmann, 2006).

2.3.5 Credit Risk Management

The growth of credit risks in financial institutions globally and locally, and the rise of commercial economies have changed the role of credit risk management in the banking industry. According to Jamaat and Asgari (2010) banks are investing a lot of funds in credit risk management modeling. Skills in risk-focused supervision are continually being developed while exposing supervisors to relevant training (Kithinji 2010). By adopting this approach, the banking industry, and specifically the small banks are sensitized on the need to have formal and documented risk management frameworks. Effective risk

management is a crucial aspect for Commercial Banks, serving not only as a defensive measure but also as an offensive strategy. The success of risk management is significantly influenced by the caliber of leadership and governance inside the organization.

The Basel Committee (1991) suggests that liberalized loaning, bad management of credit portfolio, insufficient evaluation of changing economies creates a lot of problems for financial institutions. It has been noted with a lot of concern that the more complex a risk type is the more specialized, concentrated and controlled its management must be (Seppala, 2000). Risk management can be defined as the systematic approach implemented by a financial institution, such as a bank, to effectively manage and mitigate its financial exposures. The risk management process encompasses several essential stages, namely risk identification, risk analysis and assessment, risk audit monitoring, and risk treatment or control (Bikker & Metzmakers, 2005). This shows that Credit risk is still considered the most significant risk that Commercial Banks face, (Bis. Org; 2014) thus supplying the foundation for new business models, new business processes and new ways of credit risk management. This for instance has led to the banking sector mispricing of credit and liquidity risk, inadequate liquidity buffers and excess credit growth.

According to the Basel Accords (1999), a global regulation framework for financial institutions, credit risk is one of the three fundamental risks a bank or any other regulated financial institution has to face when operating in the markets (the two other risks being market risk and operational risk). As the 2008 financial crisis has shown us, a correct understanding of credit risk and the ability to manage it are fundamental in today's world.

The worldwide credit crunch, which started in 2006 with sub-prime mortgages in the United States, has highlighted the fundamental importance of the credit decision.

The Basel Committee is issuing this document in order to encourage banking supervisors globally to promote sound practices for managing credit risk. Although the principles contained in this paper are most clearly applicable to the business of lending, they should be applied to all activities where credit risk is present. The measuring of efficiency is a fundamental component in the examination of a company's overall performance. Efficiency can be assessed using three key metrics: output maximization, cost reduction, and profit maximization. Efficiency is typically categorized into two components, as outlined by Kumbhakar and Lovell (2003). A firm is considered to be technically efficient when it is capable of achieving the highest possible outputs from a given set of inputs, or alternatively, minimizing the inputs required to produce a given set of outputs. The primary goal of producers in this context is to minimize or prevent the generation of trash.

Regional and national governments play a key role in promoting the adoption of e-commerce technology in order to keep up with the evolving trends of the information age. In line with these, they are ever in search of ways to utilize this technology to improve efficiency and effectiveness in the management of credit risk. Dionne and Triki (2005) emphasizes on the importance to evaluate whether risk of a particular loan is risk of the whole portfolio. An effective Credit Risk Management (CRM) government thus requires well defined procedures and methods, for instance, technology to effectively protect loans from credit risk. For most banks, loans are the largest and most obvious source of credit risk; however, other sources of credit risk exist throughout the activities

of a bank, including in the banking book and in the trading book, and both on and off the balance sheet.

The government of Kenya, like most governments, has also launched several initiatives regarding CRM. The Central Bank of Kenya (CBK) has the regulatory authority over Commercial Banks, micro-finance institutions and forex bureaus. As at December 2016, Kenya had 43 licensed Commercial Banks and one Mortgage Company; CBK, 2016. Out of the total 44 institutions, 28 are locally owned and 16 are foreign owned. Since 2005, Commercial Banks have embarked upon upgrading their risk management and control systems (CBK, 2016). This was after the issuance of the Risk Management Guidelines (RMG) in 2005 and the adoption of the Risk Based Supervision approach to supervising financial institutions in 2005. Despite these approaches in credit risk management, it is not clear to what extent it has impacted on profitability.

2.3.6 Financial Performance

Financial performance is the evaluation of a company's policies and operations in terms of monetary outcomes. The metric is employed as an indicator of a company's comprehensive financial well-being during a specific timeframe. Different institutions employ diverse metrics to evaluate their financial success. Nevertheless, the prevailing indicators of financial performance encompass the ROA and ROE.

The primary objective of Commercial Banks is to maximize profitability. All the methods devised and activities implemented are intended to achieve this overarching goal. Nevertheless, it should be noted that Commercial Banks may have additional objectives. Commercial banks may also possess supplementary social and economic objectives.

Nevertheless, the primary focus of this study is to the initial purpose, namely, profitability. Various ratios are utilized to assess the profitability of Commercial Banks, such as Return on Asset, Return on Equity, and Net Interest Margin being the primary indicators (Murthy & Sree, 2003; Alexandru et al., 2008).

The ROE is a financial metric that quantifies the profitability of a firm by assessing the ratio of its net profit to the total shareholder equity recorded on the balance sheet. ROE is the metric that shareholders want as a measure of the profitability and efficiency of their investment. A corporation exhibiting a high return on equity is more inclined to possess the ability to generate internal cash flows. Therefore, a higher ROE indicates superior profitability for the organization. According to Khrawish (2011), the calculation of ROE involves dividing the Net Income after Taxes by the Total Equity Capital. The statement elucidates the concept of return on investment, denoting the profitability achieved by shareholders through their capital contributions to the bank. The ROE metric serves as an indicator of the efficiency with which a bank's management utilizes the capital provided by shareholders. Therefore, it can be inferred from the aforementioned statement that a higher ROE indicates more efficient utilization of shareholders' capital by the management.

The ROA is an additional significant statistic that serves as an indicator of a bank's profitability. The ratio being referred to is the income-to-total asset ratio, as stated by Khrawish (2011). The metric evaluates the bank management's capacity to create revenue through the efficient utilization of available corporate assets. In essence, this metric serves as an indicator of the effectiveness with which the company's resources are

utilized in generating revenue. This statement by Khrawish (2011) highlights the effectiveness of a company's management in maximizing net income by efficiently utilizing all available resources inside the institution. According to Wen (2010), a greater ROA indicates that the organization is more proficient in effectively utilizing its resources.

The most often employed financial statistics are ROE and ROA. The desirable range for ROE is typically between 15% and 30%, while ROA is considered satisfactory if it exceeds 1%. According to Wong et al. (2008), the measurement of banks' efficiency can be accomplished through the utilization of ROE, which serves as an indicator of the amount to which banks employ reinvested income to generate future profits. The measurement of linking earnings to shareholder's equity, as defined by the Financial Stability Report (2002) of Riksbank, is commonly employed to assess the profitability of banks. According to Jensen Investment Management (2008), the metric of ROE serves as a valuable indicator of a firm's ability to generate profits, since it quantifies the amount of earnings a company can generate relative to its equity capital.

According to the introduction of DuPont model, ROE values the overall profitability of the fixed income per dollar of equity (Saunders & Marcia, 2011). ROE value the overall profitability of fixed income per shilling of equity. The shareholders of banks prefer higher ROE. However, increasing ROE demonstrates increasing risk for instance when total equity capital decreases relative to net income, ROE will have an increasing under the constant net income. A large drop in equity capital may result in violation of

minimum regulatory capital requirement and therefore increase the risk of insolvency of the bank (Saunders & Marcia, 2011)

ROA here determines the net income produced per shilling of assets. EM measures the dollar value assets funded with each shilling of equity capital (Saunders & Marcia, 2011). The higher EM ratio indicates the more leverage (or debt) that is used by banks to fund its assets (Saunders & Marcia, 2011). High EM ratio and ROA ratio have positive influence on ROE ratios. However, whenever there is a high ROE; it should be of concern to the bank's manager. For example, increasing EM generates increasing ROE ratio while the leverage of bank has also enhanced, which causes solvency risk (Saunders & Marcia, 2011).

The ROE is a financial metric that quantifies the profitability of a firm by assessing the ratio of its net profit to the total shareholder equity recorded on the balance sheet. ROE is the metric that shareholders want as a measure of the profitability and efficiency of their investment. A corporation exhibiting a high return on equity is more inclined to possess the ability to generate internal cash flows. Hence, a higher ROE indicates superior profitability for the organization. According to Abdullah, Parvez, and Ayreen (2014), the concept of ROE can be elucidated as the quotient obtained by dividing the Net Income after Taxes by the Total Equity Capital. The aforementioned statement elucidates the concept of return on investment, which signifies the percentage of profit generated from the capital invested in a financial institution by its shareholders. The ROE metric serves as an indicator of the efficiency with which a bank's management utilizes the capital provided by shareholders. Therefore, it can be inferred from the aforementioned

statement that a higher ROE indicates more efficient utilization of shareholders' capital by the management (Diamond & Raghuram, 2012).

The ROA ratio is an important indicator of a bank's profitability. The ratio being referred to is the income-to-total-asset ratio, as mentioned by Abdullah, Parvez, and Ayreen in their study conducted in 2014. The metric evaluates the bank management's capacity to create revenue through the effective utilization of available corporate assets. In essence, it demonstrates the degree of effectiveness with which the company's resources are employed in order to earn revenue. This statement highlights the ability of a company's management to effectively utilize all available resources in order to generate net income (Abdullah, Parvez & Ayreen, 2014). According to Dietrich and Wanzenried (2011), a higher ROA indicates that the organization is more proficient in utilizing its resources.

2.3.7 Bank Size

The evaluation of a bank's size is often based on the total value of its assets. While there is a consensus regarding the need of statutory assets holding in mitigating moral hazard, the ongoing discussion is around determining the appropriate level of assets for banks.

There is significant importance on the asset base of banks as a means to mitigate the occurrence of bank failures. Conversely, bankers contend that acquiring extra equity is both costly and challenging, and that higher requirements impede their ability to compete effectively (Koch, 1995). According to Beckmann (2007), there is a contention that a high asset base is associated with reduced profitability. This is because banks with

substantial asset values tend to exhibit risk aversion, leading them to overlook potentially lucrative investment possibilities. Consequently, investors may expect a lower return on their money as compensation for assuming lower levels of risk.

In contrast, Gavila et al. (2009) contend that despite the high costs associated with assets in terms of expected returns, banks with substantial capitalization experience reduced bankruptcy costs and a decreased reliance on external funding. This is particularly relevant in emerging economies where accessing external borrowing can be challenging. Therefore, it may be inferred that banks with a higher level of capitalization and a larger asset basis are expected to exhibit greater profitability compared to banks with lower levels of capitalization and smaller asset bases.

The theoretical underpinnings for discussing the relationship between entity size and financial hardship are rooted in the concepts of economies of scale and the typical neoclassical perspective of the company (Muigai & Muriithi, 2017). Large organizations engage in negotiations to secure more favorable rebates, discounts, or financing rates as a result of their substantial purchasing volume, thereby capitalizing on the advantages associated with economies of scale. Furthermore, it should be noted that the presence of lower unit fixed costs per produced unit, as well as the implementation of division of labor and specialization, result in the emergence of similar economies, as highlighted by Papadogonas (2006). Papadogonas (2006) postulated that the presence of these notions leads to the hypothesis that larger enterprises exhibit more financial resilience.

2.4 Empirical Review of Literature

2.4.1 Asset-liability Management and Financial Performance

There exists a substantial body of research and a wealth of scholarly literature pertaining to asset-liability management in the banking sector. Tee (2017) focused on the financial statements of banks and the effects of interest rates while studying the management of assets and liabilities in the banking industry. The individual has conducted an assessment of interest rates that give rise to liquidity risk. The researcher's study on interest rate risk management yielded the finding that balance sheet risks encompass both interest rate and liquidity issues. In addition, Rasika (2018) study revealed that private sector banks exhibited a proactive approach towards profit growth, whereas nationalized banks shown a heightened emphasis on maintaining liquidity.

Khalid (2012) conducted a study on asset-liability management in Indian banks. The authors proposed that the incorporation of interest rate risk and liquidity risk is crucial within the business planning process of banks. Chimkono et al., (2016) used a linear model for the evaluation of asset liability. The researchers discovered that public sector banks have superior asset-liability management capabilities, effectively ensuring profitability, meeting liquidity requirements, and mitigating exposure to interest rate risks. This study examines the influence of Reserve Bank of India (RBI) recommendations on the efficient management of Asset Liability Management (ALM) in banks.

According to Surjith and Sathyanarayana's (2014) analysis, it is evident that ICICI aims to enhance its service quality in the foreseeable future. The company's balance sheet has

exhibited a constant pattern, suggesting indications of growth and expansion. The corporation is anticipated to enhance its profitability by a greater degree using a variety of means in order to contribute to the advancement of the industry and economy. The bank's proactive approach in catering to many societal groups is crucial in fostering an improved business climate.

Meena and JoydipDhar (2014) conducted research on the top three Indian banks from the public, private, and international sectors, analyzing and comparing their asset-liability management practices and liquidity ratios. The analysis was conducted by calculating liquidity ratios and examining the maturity gap profiles of the institutions included in the study. The findings of this study indicate that banks in India possess a commendable level of short-term liquidity, as seen by their ability to finance their short-term obligations through their long-term assets.

According to the research of Baser (2014), Asset-Liability Management (ALM) is a comprehensive and dynamic framework for measuring, monitoring, and managing a bank's market risk. The study aimed to assess the evolving viewpoints of banks in recognizing and addressing risks, as well as preserving Asset Quality, in order to secure profitability through the utilization of Asset Liability Management (ALM) strategies. Singh (2013) conducted an analysis on the effects of measures and tactics implemented by banks to effectively manage the composition of their asset-liability structure. The study aimed to examine the overall influence of these measures on the banks' performance, with a specific focus on their profitability. Banks have made concerted

efforts to mitigate the asset liability mismatch following the introduction of regulatory guidelines by the Reserve Bank of India (RBI) in 1997. The study indicates that there is significant potential for banks to enhance their profitability through the use of effective monitoring and reduction strategies for short-term liquidity.

Prathap's (2013) study showed that ALM in the Indian banking system is still in its early stages. Given the aforementioned context, the primary aim of this study was to examine and evaluate the current state of the Asset Liability Management (ALM) methodology inside the banking sector of India. The study further demonstrates a robust correlation between fixed assets and net worth across several categories of institutions. According to Patil (2014), Effective corporate governance is of utmost importance for the smooth and efficient operation of an organization, particularly in the context of a financial institution. The importance of competent management and sound governance processes in urban credit cooperative societies/banks in the current competitive environment is undeniable. Banks play a vital part in the process of converting assets with low liquidity into demand deposits that are more liquid. To be more precise, banks fulfill the role of generating liquidity. One issue that occurs is the occurrence of an assets liability mismatch under specific situations, rendering them vulnerable to failure. This research study centers on the management of assets and liabilities inside a banking institution.

Perera and Mathushani (2022) contend that asset-liability management (ALM) has emerged as a crucial undertaking for financial institutions, and to a certain extent, other businesses as well. The optimization of return and risk reduction has emerged as a central

concern within the banking sector, prompting each bank to prioritize these objectives. The issuance of instructions by the Reserve Bank of India to banks operating in the Indian context aims to regulate their asset-liability situations, hence ensuring the stability of the financial system. The examination of maturity gaps encompasses a broad scope, serving not only as a tool for situational assessment, but also as a means of strategic planning.

Florence and Francis's (2014) study is an evaluation of the effect of asset liability on the financial success of Commercial Banks in Kenya, with a focus on Diamond Trust Bank. The study aimed to assess the impact of client deposits, loans advanced to customers, management of loans advanced to customers, and management of loans from other banks on the Net Interest Income (NII) of Diamond Trust Bank. The research employed a case study methodology and utilized secondary data sourced from the bank's audited financial statements spanning the years 2006 to 2013. The statistical significance of the regression model was assessed by the utilization of a t-test. The data that was analyzed was presented using time series charts, tables, and graphs. The study indicates that banks should prioritize the promotion of higher client deposits and the provision of additional loans to customers in order to enhance their financial performance.

Jaiswal (2010), This research examines the correlation between the asset and liability components of the balance sheet of scheduled Commercial Banks in India from 1997 to 2008. The study focuses on public sector banks, private sector banks, and foreign banks. The statistical technique employed to analyze the data is multivariate canonical correlation analysis. There exists a significant correlation between the asset and liability

accounts of banks in India. However, as time progresses, there has been a decrease in canonical correlation, suggesting a reduced level of interdependence between asset and liability accounts. The drop is particularly notable in the context of international banks, as they are significantly exposed to off-balance sheet activity. This analysis also establishes a significant correlation between individual asset and liabilities accounts inside the balance sheet. Banks are employing a potentially precarious approach of asset-liability management (ALM) by depending on short-term assets to finance long-term liabilities.

In his research article titled "Assets and Liability Information Analysis of the Indian Public Sector Banks," Bagchi (2003) examines the capital adequacy ratio dynamics of banks in India. The author does this by doing a decomposition study of the financial statements. This study presents empirical data indicating that banks engaged in asset and liability reorganization strategies to enhance their capital adequacy ratios. Furthermore, the findings suggest that the reorganization of assets was more prominent compared to the reorganization of liabilities. In their study conducted in 2004, Ranjan and Nallari examined the correlation between asset and liability by employing canonical correlation analysis. The time frame for their investigation spanned from 1992 to 2004. The research findings indicate that a majority of financial institutions possess a well-established framework for managing their asset-liability management (ALM) practices. A significant correlation exists between Fixed Assets and Net Worth across all banking institutions. The banks, with respect to their ownership, exhibit variations in several elements such as their tolerance for risk.

In their study, Adyafitri and Pratama (2014) sought to assess the relationship between interest rate risk and profitability within the Indonesian Banking Industry. They employed gap analysis and profitability measures, namely return on assets and return on equity, as the primary methods for their investigation. The main objective was to determine whether the industry is characterized by asset sensitivity or liability sensitivity. The findings indicate that there is no statistically significant relationship between interest rate risk and profitability in PT Bank Central Asia Tbk. PT. Bank Central Asia (BCA) is a financial institution that operates in Indonesia. It is one of the largest banks in the country and provides a wide range of banking services to its customers. BCA The bank in question has been empirically demonstrated to exhibit a liability-sensitive stance during the period spanning from 2007 to 2012. On the contrary, the business has been demonstrated to possess a favorable gap ratio, so establishing it as an industry that is sensitive to changes in assets. The banks did not exhibit substantial substitution of high-risk weighted assets, as mandated by regulatory minimum requirements. The authors further said that the change of capital ratios was mostly driven by profit considerations, whereby banks with greater levels of core capital may have been reinvesting their profits into reserves in order to augment their overall capital levels.

According to Chaudhary (2012), the Indian economy has recently observed the proliferation of numerous private sector banks. The proliferation of commercialization within the banking sector can be attributed to various factors. The expansion of these banks is contingent upon their ability to achieve certain benchmarks, such as customer

satisfaction, net assets, managerial efficiency, and the extent of their networks in both private and public sectors.

Dwivedi and Charyulu (2011) conducted a study on the "Efficiency of the Indian Banking Industry in the Post-Reform Era." There exists a significant correlation between the asset and liability accounts of banks in India. The study finds that banks should prioritize the promotion of higher client deposits and the provision of additional loans to customers in order to enhance their financial performance. According to Gindodiya (2006), Asset Liability Management (ALM) poses a problem in effectively managing the maturities and interest rate sensitivities of assets and liabilities. The objective is to mitigate the risks associated with disparities between these factors, particularly interest rate risk and liquidity risk, by ensuring they are contained within acceptable limits. The primary objective of ALM is not to avoid risk, but rather to effectively manage it by maintaining various categories of risk at acceptable levels, all while ensuring sustained profitability.

2.4.2 Bank Size and Profitability

Dawood (2014) used a consolidated dataset from commercial banks to analyze the factors influencing the profitability of publicly traded Pakistani commercial banks from 2009 through 2012. The study's dependent variable was the rate of return on assets, and the study's independent variables included both internal and external influences. The author concludes from his study that total equity to total assets and loan to total assets both have a positive effect on profitability. On the flip side, we see that larger banks have a negative

impact, as do banks with a high cost-to-income ratio. Profitability is also found to be unaffected by the ratio of non-interest income to total assets or by economic growth.

Ani (2014) studied 147 commercial banks in Nigeria over a ten-year period, from 2001 to 2010, to determine what factors contributed to their profitability. Pooled ordinary least squares were used to estimate the coefficient. According to a recent study, commercial banks in Nigeria can be profitable regardless of their size. Banks' bottom lines benefit from a stronger capital-asset ratio. Internal factors affecting the profitability of Commercial Banks listed on the Amman Stock Exchange in Jordan between 2005 and 2011 were analyzed by Jaber and Al-khawaldeh (2014). This research shows that the cost-income ratio has a significant bearing on the profitability of Commercial Banks in Jordan.

Lim (2015) looked at how profitable Philippine banks were during the years 1990 and 2005. According to the findings, there is a strong correlation between profitability factors and bank profitability. Expense-related behavior and credit risk are also hypothesized to have a negative impact on bank profitability in the Philippines. Non-interest income and capitalization are also found to positively correlate with a bank's profitability, according to the study. According to the study's findings, there is an inverse relationship between inflation and bank profits in the Philippines.

Using data from the fifteen largest Commercial Banks in the Pakistani economy between 2005 and 2009, Dawood (2014) investigated the connection between bank attributes and bank profitability. Using the Polled Ordinary Least Square (POLS) technique, this

research dissects the relationship between a number of variables and several measures of profitability, including return on assets (ROA), return on equity (ROE), return on capital employed (ROCE), and net interest margin (NIM). This research shows that internal and external factors are equally important in determining a bank's profitability.

Ali (2016) examined the public and private commercial banks of Pakistan to determine the elements that contributed to their profitability between 2006 and 2009. Descriptive statistics, correlation analysis, and regression modeling were used in this study. The return on investment and return on equity are the dependent variables, whereas the independent variables include both internal and external factors. According to the data, there exists a causal relationship between economic growth and profits, with rising profits following expansion in the economy. Instead, a decline in profitability is seen alongside an increase in credit risks.

Between 2006 and 2012, Madishetti and Rwechungura (2013) studied what factors contributed to the success of Tanzanian commercial banks. Liquidity risk, credit risk, operating efficiency, business assets, and capital sufficiency are all examples of internal determinants. In contrast, factors like GDP growth and inflation rate are used by external determinants. The aforementioned factors are not dependent on any others. According to the findings, external factors do not have a substantial role in determining a commercial bank's profitability, while internal factors do. Eljelly (2013) looked into what factors Islamic banks in Sudan face to make a profit. This research shows that commercial banks' profitability is driven largely by internal factors. There is a positive relationship between

banks' profitability and their size, liquidity, and cost structure. To what extent macroeconomic or external factors affect profitability is not well established.

2.4.3 Asset Quality and Financial Performance

The performance of a bank can be influenced by the asset quality, which is a bank-specific characteristic. The health of a bank is influenced by the quality of the assets it holds. The assessment of asset quality serves as a crucial determinant for banks in comprehending the magnitude of credit risk (Bireh & Nyahas, 2020). Chen et al. (2009) define credit risk as the risk of loss attributable to a debtor's inability to make loan repayments, including principal and interest. Default is a situation that arises when a debtor is unable to meet their legal duties as stipulated in a contract, or when they have breached a loan condition outlined in a debt contract. This can potentially occur with several types of financial obligations, such as bonds, mortgages, loans, and promissory notes. According to Khalid (2012), the primary factor leading to the majority of bank failures is poor asset quality. Nonperforming loan ratios (NPLs) and the allowance or provision for loan losses reserve are highlighted as examples of asset quality indicators (Mulalem, 2015).

Sufian and Chong (2008) looked at the factors that affected financial performance under profitability in Philippine banks from 1990 to 2005. The findings of the research demonstrated a clear correlation between financial success and elements specific to banks. In a similar vein, the empirical findings indicate that bank-specific criteria, such as asset quality, have a significant impact on profitability and, consequently, the overall financial performance of banks. Commercial banks in Kenya have large loan portfolios that generate a sizable portion of their operating profits. Although the loans provide

funding, they also expose banks to default and the associated losses (Dang, 2011). Nonperforming loans have been shown to negatively affect a bank's profitability and financial performance, hence it is advised that commercial banks keep their NPL ratios low (Sangmi & Nazir, 2010).

Ifeacho and Ngalawa (2011) investigated the effects of selected macroeconomic variables and bank-specific variables on the South African banking industry and found that asset quality had a positive effect on bank performance. The study used the CAMEL model to evaluate financial institution efficiency, focusing on ROA and ROE as measures of success. All variables considered to be of relevance to banks were found to have a substantial effect on bank performance.

Olweny and Shipho (2011) investigated the influence of bank-specific factors on the financial performance of Commercial Banks within the Kenyan banking sector. The study took an explanatory approach using a panel data research methodology. This study used data from the Central Bank of Kenya's 2009 banking survey and the annual financial statements of 38 Kenyan banks operating between 2002 and 2008. Multiple linear regression was used by the researchers to analyze the data. According to the results, Commercial Banks can improve their bottom line by focusing on asset quality and reducing the number of bad loans they make.

2.4.4 Liquidity Risk Management and Financial Performance

Numerous empirical investigations have been conducted to ascertain the correlation between liquidity and financial performance across diverse sectors of the economy, both domestically and globally. According to Berrios (2013), there exists a negative

correlation between liquidity management and the performance of commercial banks on a global scale. The Global financial crisis of 2007-08 revealed the presence of a liquidity management dilemma (Bhattacharyya, 2011). The financial crisis in question, as highlighted by Banks (2005), was a significant event that gave rise to critical inquiries on the management of liquidity. The banking sector experienced significant challenges in managing liquidity throughout the crisis, resulting in substantial cutbacks (CBK, 2016). Numerous regions experienced a significant economic setback, leading to the occurrence of house evictions, foreclosures, and protracted unemployment (Basel Committee on Banking Supervision, 2013). The significance of liquidity management for commercial banks was highlighted by the crisis (Basel Committee on Banking Supervision, 2013).

Alshatti (2015) conducted research to assess the impact of effective liquidity management on the profitability of Jordanian Commercial Banks and to propose strategies for strengthening both aspects of these institutions' financial performance. The study concluded that liquidity management has a considerable effect on profitability as measured by ROE and ROA. A favorable correlation between investment and quick ratios and return on equity was discovered in the research. The research also found that the capital ratio is positively related to profitability as assessed by return on investment or ROA

Working capital management influences a company's profitability and liquidity, according to (Dong & Su, 2010) research. This study employed a comprehensive dataset spanning from 2006 to 2008 to evaluate the performance of the companies listed on the Vietnam Stock Exchange. The primary objective of this study was to assess the efficacy of utilizing the cash conversion cycle as a metric for evaluating the management of

working capital. The study revealed a significant negative correlation between the variables, indicating that an increase in CCC had a detrimental effect on profit. The research additionally shown that there is a positive correlation between a decrease in the debtor's collection time and inventory conversion period, and an improvement in profitability.

In a study conducted by Ehiedu (2014), the researcher examined the influence of liquidity on the profitability of a specific group of companies in Nigeria. The findings of the study revealed that 75% of the selected companies shown a notable positive association between their current ratio and profitability. The study posits that the observed positive correlation between the current ratio and profitability might be attributed to the utilization of idle funds, particularly when acquired through borrowing, which leads to increased profits and reduced expenditures within the organization. The two corporations exhibited an inverse relationship between the Acid test ratio and return on assets, respectively. Based on the aforementioned findings, it can be concluded that 50% of the examined organizations had a notable inverse relationship between their current ratio and profitability within the scope of this investigation.

In their study, Nyamao et al. (2012) examined the effects of different working capital management methods, specifically aggressive and cautious policies, on the profitability and value of listed companies in the Tehran Stock Exchange. The research employed panel data and operationalized the working capital management philosophy as either conservative or aggressive. The findings of the research indicate that the implementation

of a cautious investment strategy and a bold financing strategy adversely affects the profitability and value of a company.

Apuoyo (2010) conducted a study on the relationship between working capital management policies and profitability for companies listed on the NSE. The findings revealed that the financial and investment sector demonstrated strong performance in the different aspects of working capital, leading to a positive influence on profitability. In a study conducted by Mathuva (2009), the researcher investigated the impact of several components of working capital management on the profitability of a sample of 30 enterprises that were listed on the Nairobi Stock Exchange (NSE). The research employed the cash collection cycle as a metric for assessing working capital.

Mathuva (2009) used fixed effects regression models, pooled ordinary least squares, and Pearson and Spearman's correlations to analyze data. The research revealed a statistically significant inverse correlation between the level of profitability and the duration organizations require to retrieve cash from their clientele. The study additionally discovered a statistically significant positive correlation between profitability and the duration required to convert stocks into sales, as well as the time it takes for enterprises to fulfill their payment obligations.

Maina (2011) conducted a study investigating the correlation between liquidity and profitability across oil businesses in Kenya during the time span of 2007 to 2010. Secondary information was gathered from the companies' financial accounts. The firms' profitability served as the dependent variable, while the independent factors, including the firms' liquidity, were determined using a regression model. Independent variables

comprised measures of liquidity such as the current ratio, quick ratio, and cash conversion cycle, while leverage and the firm's age served as controls. The research indicates that the management of liquidity does not independently play a substantial role in determining a firm's profitability. Additionally, it highlights the presence of other variables that have an impact on the firm's ROA. Nevertheless, it is crucial for a company to comprehend the impact of individual liquidity components on its profitability and actively implement strategies to optimize its liquidity level.

Omesa (2015) carried a research on how financial institutions listed on Kenya's NSE perform financially. The investigation relied on secondary data obtained from the relevant financial accounts of the NSE. The investigation was carried out from 2011 to 2015.The researcher discovered a negative correlation between ROA and liquidity, indicating that a reduction in liquidity will result in a decline in the financial performance of financial enterprises listed on the NSE.

Rahaman's (2010) research in Canada suggests that there is a nonlinear link between holding certain liquid assets and greater profitability for banks; but, there is a limit beyond which storing more liquid assets reduces banks' profitability, all other things being equal. Simultaneously, the estimation findings offer indications that the association between liquid assets and profitability is contingent upon the bank's business model and the level of risk associated with funding market challenges. The implementation of a conventional business model, characterized by a focus on deposits and loans, enables banks to enhance profitability while maintaining a reduced level of liquid assets.

Olongo (2013) investigated the link between liquidity and profitability for Nairobi Stock Exchange (NSE)-listed Kenyan firms. According to the study's findings, NSE-listed companies' profits suffered across the study's five-year time span when the cash conversion duration and the current ratio were employed as liquidity measures. Quick ratio, a liquidity indicator, was found to have no meaningful impact on NSE-listed companies' profitability during the same 5-year period.

2.4.5 Capital Adequacy and Financial Performance

Capital adequacy refers to the fundamental capacity of a bank to withstand and navigate through adverse events or crises. The regulatory authority in the banking sector establishes the Capital Adequacy Ratio (CAR). According to Myers and Brealey (2003), the ratio is subject to mandatory requirements set forth by the Central Bank. The Capital Adequacy Ratio is a metric that can be employed to assess the financial soundness of a banking institution.

The study conducted by Sangmi and Nazir (2010) demonstrated that there exists a favorable correlation between the capital adequacy ratio and the earnings and profitability of banks. Shahatit (2011) presented contrasting viewpoints to those of Suka (2012) and Sangmi and Nazir (2010) found different results when examining how capital adequacy regulations affected the bottom lines of Commercial Banks. According to this research, Commercial Banks in Jordan have been profitable regardless of their level of capital sufficiency. In line with the results of Sangmi and Nazir (2010), Suka (2012) investigated the effect of capital adequacy on the bottom lines of Commercial Banks traded on the NSE. Capital adequacy was found to have a considerable impact on bank profitability. In

particular, it discovered that commercial bank profits increased when capital adequacy was high. A non-significant negative association was found between the capital adequacy ratio and capital risk in a study of Jordanian commercial banks done by Al-Tamimi (2013). However, financial results were not the main emphasis of these studies.

Ifeacho and Ngalawa (2014) conducted a study that looked at how certain macroeconomic variables and individual banks' traits affected South Africa's banking industry between 1994 and 2011. Within the context of the CAMEL model for assessing bank performance, the study analyzed capital adequacy, asset quality, management, earnings capacity, and liquidity. Ifeacho and Ngalawa's research examined annual frequency data from ABSA, First National Bank, Nedbank, and Standard Bank, the four largest banks in South Africa. Together, those four institutions control more than 70% of all banking assets in South Africa. The study was conducted on financial institutions with the researcher using ROA and ROE as performance indicators. The study found that an organization's capital sufficiency directly correlates to its ROA. In addition, a positive and statistically significant correlation was discovered between capital adequacy and ROE.

Okoth and Gemechu (2013) conducted research to determine what aspects of commercial banks' financial performance in Kenya are most important. From 2001 through 2010, researchers uncovered relevant data. The researchers used a panel data analysis method called generalized least squares regression, together with a linear multiple regression model. Capital adequacy, asset quality, management efficacy, liquidity management, and GDP growth were included as independent variables in the study.

The implications of capital adequacy legislation on financial performance were explored by Reru and Bichanga (2015). The study utilized a descriptive survey methodology, with a total of 38 participants taking part in the research. The analysis of quantitative data involved the utilization of descriptive statistics, specifically means and standard deviations, as well as inferential statistics, including regression. The results of the study revealed a robust and favorable association between capital adequacy and financial success. This finding substantiates the significance of the aforementioned sections under the prudential regulations of central banks. The findings of the study indicate that the implementation of prudential measures by the central bank in Kenya has had a favorable impact on the financial performance of commercial banks. The study employed primary data, whereas this research relied on secondary data obtained from second-tier Commercial Banks in Kenya.

Mwongeli (2016) investigated whether there was a connection between rules and financial results. The variable of capital sufficiency was considered as an independent factor, whereas financial performance was regarded as the dependent variable. The present study employed a descriptive design. The study focused on the population of Commercial Banks in Kenya, specifically during the period from 2010 to 2015. The Chi-square test of independence was employed to examine the association between the two variables. The survey revealed that a majority of banks have successfully adhered to the minimum capital requirement. It is imperative for the government to persistently enforce the prescribed criteria to safeguard the stability of the banking industry in Kenya. This

measure will allow Kenya to mitigate the risk of encountering financial crises inside its economy. This study aimed to assess the impact of regulations on the financial performance of second-tier Commercial Banks during the period from 2014 to 2016.

Karanja and Nasieku (2016) aimed to investigate how capital affected the financial performance of Kenyan commercial banks. The research design utilized in this study was descriptive in nature. The designated population consisted of the Commercial Banks in Kenya that were officially licensed by the Central Bank of Kenya as of the year 2014. The research was conducted using secondary data obtained from the yearly audited financial reports of banks during a period of five years, specifically from 2010 to 2014. The research was grounded in quantitative data. The Pearson's Correlation Coefficient analysis was employed to assess the magnitude of the association between the dependent and independent variables. The study employed multiple regression analysis to examine the impact of capital variables on the financial performance of Commercial Banks in Kenya. The research findings indicate a decline in the core capital to total risk weighted assets for Tier I banks and Tier II banks between the years 2010 and 2014.

2.4.6 Credit Risk Management and Financial Performance

Ajibola (2016) and Belete (2013) conducted a study to examine the relationship between credit risk management and profitability of Commercial Banks in Nigeria. The profitability measure employed in this study was return on equity, while credit risk management indicators included the non-performing loan ratio and capital adequacy ratio. The findings of the study indicate that the management of credit has a significant

impact on the profitability of the banks included in the sample. However, it is important to note that this influence differs among different banks.

A study conducted by Aduda and Gitonga (2011) investigated the correlation between credit risk management and profitability among the Commercial Banks of Kenya throughout the period from 2000 to 2009. The empirical analysis involved the utilization of correlation and regression analytic techniques. The dependent variable in this study was the return on equity, while the explanatory variable was the non-performing loan percentage. The findings of the study indicate the presence of a linear correlation between return on equity and nonperforming loan ratio. Furthermore, the nonperforming loan ratio can serve as an effective metric for evaluating credit risk management practices, which in turn have a discernible impact on profitability at a satisfactory level.

Boahene, Dasah, and Agyei (2012) conducted a study to determine the connection between credit risk and profitability at a selection of Ghanaian banks between 2005 and 2009. The rate of ROE is the dependent variable, while the nonperforming loan rate, net charge-off rate, and pre-provision profit as a percentage of net total loans and advances are the independent factors. The approach utilizes bank size, growth, and capital structure as control variables. Credit risk was found to have a positively correlated with profitability for the sampled Ghanaian banks across the study period. Poudel (2012) conducted research to determine how credit risk management affected the bottom lines of Commercial Banks in Nepal from 2001 to 2011.

Fredrik (2012) performed research into how credit risk management affected the bottom lines of Kenya's commercial banks between 2006 and 2010. Credit risk management was evaluated using the CAMEL framework, while financial performance was measured with ROE. The results show that there is a significant relationship between the CAMEL factors and ROE. Mwangi (2012) performed research into the effect of credit risk management on the profitability of Kenya's commercial banks between 2007 and 2011. The study's dependent variable was the rate of return on equity, and the independent variables were the percentage of nonperforming loans and the capital adequacy ratio. Nonperforming loan ratios, as measured by the study, were found to have a strong negative correlation with both capital adequacy ratios and return on equity. The effect of these parameters on ROE was found to be statistically significant.

Kurawa and Garba (2014) examined the effect of credit risk management on the earnings of Nigerian institutions between 2002 and 2011. As a proxy for both profitability and default rate, return on asset was used. In addition, the capital adequacy ratio, age, and cost per loan asset were used as proxies for credit risk management. The study found that the return on assets was positively affected by default rate, cost per loan asset, and capital adequacy ratio. There is statistical significance solely for the default rate and the cost per loan asset. On the other hand, a negative association between age and ROI was shown to be statistically significant.

Ojo et al. (2012) looked into how credit risk affected the success of Nigeria's commercial banks between 2000 and 2010. The ratio of nonperforming loans to loans and advances,

total loans and advances to total deposits, and loan loss provision to categorized loans are the independent variables, while return on assets is the dependent variable. Credit risk is quantified by these explanatory variables. A panel regression analysis was used for the statistical study. Credit risk was found to have a continuous and statistically significant effect on the profitability of Nigerian banks during the whole study period, proving cross-sectional invariance. This suggests that different banks experienced similar consequences from credit risk.

Muritala and Taiwo (2013) analyzed the impact of credit risk management on the profitability of Nigerian institutions between 2006 and 2010. Profitability was approximated using the return on assets metric, while credit risk was estimated using the loan-to-assets ratio and the nonperforming loan-to-loan ratio. According to the results, profitability decreases when the percentage of nonperforming loans to total loans and the ratio of loans and advances to total assets increase. Moreover, return on assets, a key indicator of profitability, is heavily influenced by these ratios.

Afriyie and Akotey (2013) conducted research in the Brong Ahafo region of Ghana from 2006 to 2010 on credit risk management and rural bank profitability. Return on assets and return on equity were used as proxies for profitability, and the nonperforming loans ratio and capital adequacy ratio were used for credit risk management. The study found that better capital adequacy and lower nonperforming loan rates were linked to higher profits. Only the ratio of nonperforming loans, however, was found to have a significant effect on earnings.

Kaaya and Pastory (2013) conducted research on Tanzanian commercial banks' credit risk and performance. Indicators of credit risk were loan loss to gross loan, non-performing loan to gross loan, loan loss to net loan, and impaired loan to gross loan, while the return on assets metric was used to measure financial performance. A multiple regression analysis was part of the empirical study. Bank size and deposit were included as independent variables in the analysis. Credit risk indicators were found to have a statistically significant inverse relationship with financial outcomes throughout the study period. Charles and Kenneth (2013) conducted a study covering the years 2004-2009 in which they analyzed the effect of credit risk management and capital sufficiency on the financial performance of Commercial Banks in Nigeria. ROAs served as the dependent variable, with loan loss provision, loans and advances, non-performing loans, and capital adequacy ratio as the independent variables. Except for loans and advances, which were found to have a negative effect on the financial performance of banks, the study's findings suggest that adequate credit risk management and sufficient capital reserves have a positive effect on banks' financial performance.

Olawale et al. (2013) examined the risk management and financial performance of Nigerian banks between 2006 and 2009 using ROE and ROA as dependent variables and dubious loans and capital asset ratio as independent variables. Though a negative association between financial performance and dubious loans was found, statistical significance could not be established. On the other hand, the capital asset ratio was positively and significantly related to financial performance. Abdelrahim (2013)

undertook a study to evaluate the efficiency of credit risk management in Saudi banks, especially in light of recent global financial crises. Financial performance was evaluated using return on equity as a proxy, and credit risk management was assessed using the CAMEL components. The study identified a positive and substantial relationship between credit risk management and liquidity, but a positive but insignificant relationship between credit risk management and capital adequacy, asset quality, managerial soundness, and earnings.

Mutua (2015) found that credit risk management significantly influenced bank profitability. The term credit risk management refers to an all-encompassing procedure that includes the steps of spotting hazards, imposing penalties for bad behavior, and keeping an eye on things. Author's findings are consistent with those of Kargi (2011), who also found that banks in Nigeria benefited significantly from careful attention to credit risk management. The authors also showed a connection between improper credit risk management and financial difficulties. If credit risk exposures are high, business results will suffer and possibly cause a financial catastrophe. Both Nyong'o (2014) and Mutua (2015) agreed that senior leadership is responsible for overseeing the creation of credit risk management policies and procedures. In addition, most financial institutions have established procedures for effectively managing credit risk. However, the issue of financial hardship was not discussed in terms of credit risk management.

Musyoki and Kadubo (2012) discovered that credit risk variables negatively impacted the financial performance of banks. However, the authors failed to establish a clear link between financial difficulty and credit risk. The findings of a study conducted by

Chimkono, Muturi, and Njeru (2016) indicate that many key factors, namely cost efficiency ratios, average lending interest rate, and non-performing loan ratio, exerted a substantial impact on the overall performance of banks operating in Malawi. However, the study did not include an analysis of the impact of non-performing loans on the occurrence of financial difficulty.

2.4.7 The Moderating Effect of Bank Size on the Relationship between Asset-liability management and Financial Performance

Muigai and Muriithi (2017) propose an alternative conceptual framework in which a negative influence of entity size on corporate financial distress is hypothesized. Marsh (1982) posits that significant organizations may encounter suboptimal performance when certain managers, driven by self-interest and without considering the firm's objective of profit maximization, assume control over huge businesses.

Obamuyi (2013) discovered that sizable businesses who have a propensity of issuing more debt may suffer the consequences of overleveraging. This phenomenon could potentially lead to financial difficulties for these prominent corporations. Khan (2012), Maina and Ishmail (2014), and Khan (2012) all agreed with this assertion. The results of their research demonstrated that the size of an entity has a detrimental impact on its worth. The authors suggested that sizable corporations encounter subpar financial performance due to operational inefficiencies. The research conducted by Muigai and Muriithi (2017) demonstrated that debt exerted a detrimental and statistically significant impact on the financial distress experienced by the companies examined. Nevertheless, as the organization expands in scale, its impact becomes both positive and substantial. Therefore, the researcher somewhat concurs with the perspectives presented by Khan (2012), Gonenc (2005), Dittmar (2004), and Maina and Ishmail (2014) that bank

liabilities have a negative significant influence on profitability. Thus a proper balance needs to be maintained between assets and liabilities so that returns can be improved.

Almazari (2014) found a substantial and positive link between profitability and liquidity risk. However, there exists a negative relationship between the size of a bank and its profitability. This can be attributed to the phenomenon of decreasing marginal returns, wherein rising and expanding institutions may see a decrease in average earnings as their size increases.

Muigai and Muriithi (2017) conducted research to see if the size of a bank would moderate the correlation between debt and economic distress. The researchers used a method of analysis known as moderated regression analysis. Debt was found to have a negative and statistically significant effect on the financial challenges encountered by the businesses studied. However, as the organization grows larger, its influence grows in a positive and significant way. Three criteria were used in this analysis of the financial health of banks: asset-liability management, performance, and size. This research shows that the size of a bank matters greatly in determining the correlation between asset-liability management and the financial success of Kenya's commercial banks.

2.4.8 Critique of the Existing Literature and Research Gaps

The existing literature presents a comprehensive overview of asset-liability management (ALM) practices in various banking sectors, including India and Indonesia. However, there is a notable gap in research that specifically integrates ALM with critical aspects such as capital adequacy, asset quality, liquidity management, and credit risk

management within a singular analytical framework. Since studies have explored individual components of ALM, there is a lack of comprehensive research that examines how these components interact and influence each other in the context of banking institutions.

The studies have also provided valuable insights into the intricate nature of bank profitability, considering several factors and contexts. However, a more in-depth exploration of the interconnections between internal and external variables and a deeper analysis of the effect of macroeconomic factors could enhance the depth of understanding in this.

The utilization of methodologies such as CAMEL model and multiple linear regression enhances the analytical rigor. However, while the studies establish a clear correlation between asset quality and financial performance, the specific strategies employed by banks to improve asset quality, beyond reducing bad loans, remain underexplored. In addition, studies have collectively lay emphasis on the importance of maintaining an optimal liquidity level for financial institutions, some limitations are evident. These include a lack of consensus on specific strategies to optimize liquidity, limited exploration of the impact of macroeconomic factors on liquidity, and a need for more in-depth analysis of the nuanced relationship between liquidity measures and profitability, especially in diverse economic contexts.

The reviewed research has revealed a positive correlation between capital adequacy and bank profitability, emphasizing the significance of having sufficient capital buffers to withstand adverse events. While the literature presents a well-rounded view of this

relationship, some studies diverge in their findings, suggesting that the impact of capital adequacy regulations can vary depending on the specific banking context.

The studies demonstrate the importance of effective credit risk management in enhancing a bank's profitability, highlighting the significant role played by metrics such as non-performing loan ratios, capital adequacy ratios, and various components of the CAMEL framework. The research findings reveal a generally negative impact of high non-performing loan ratios on financial performance, emphasizing the need for vigilant credit risk management to mitigate potential losses The studies indicate a positive association between prudent credit risk management and bank profitability, emphasizing the importance of strategic decision-making in managing credit risk factors. However, some studies lacked specificity in linking credit risk to financial difficulty, indicating a potential area for further research exploration.

The methodologies employed in these studies, such as the sample sizes or the variables considered, which are crucial for a comprehensive evaluation. Furthermore, there's a need for more critical analysis and synthesis of these findings to provide a deeper understanding of the complex relationship between bank size, asset-liability management, and financial performance.

2.5 The conceptual Framework

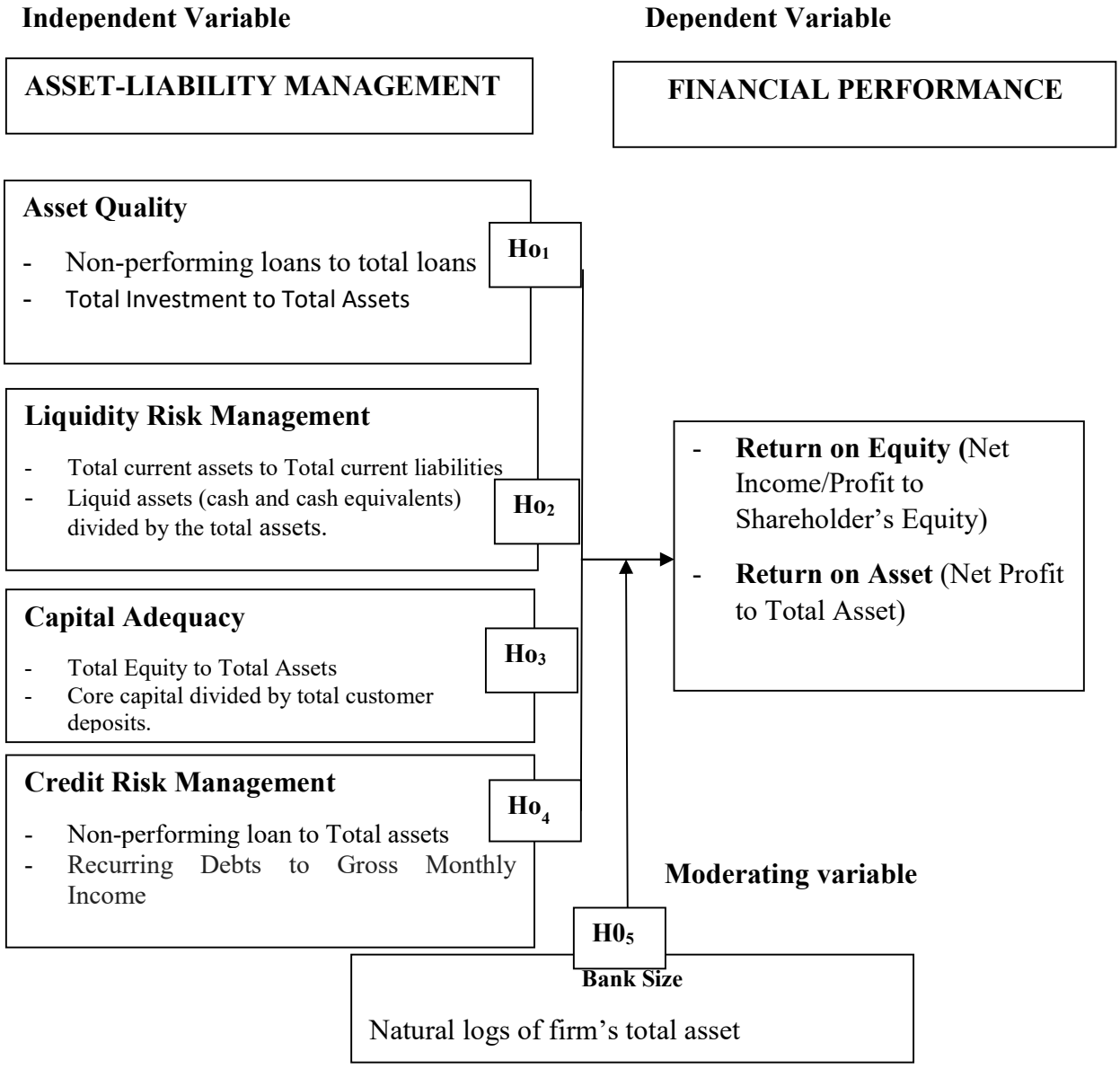

Figure 2.1: **Conceptualizing the Relationship between Asset-Liability Management, Bank Size and Financial Performance**

Source: *Researcher's self-conceptualization (2022)*

Table 2.1: Measurement of Study Variables

Variable	Indicators	How it was measured
Financial Performance	- Return on Equity - Return on Asset	- **Return on Equity (**Net Income/Profit to Shareholder's Equity) - **Return on Asset** (Total Asset to Shareholders Equity)
Asset Quality	Non-performing loans, total loans, total investments and total assets	- Non-performing loans to Total loans - Total Investment to Total Assets
Liquidity Risk Management	Total current assets, Total current liabilities, Liquid assets & Total assets	- Total current assets to total current liabilities - Liquid assets (cash and cash equivalents) divided by the total assets.
Capital Adequacy	Total Equity, Total Assets, Core capital & Total customer deposits	- Total Equity to Total Assets - Core capital divided by total customer deposits
Credit Risk Management	Non-performing loans, Total assets, Recurring Debts & Gross Monthly Income	- Non-performing loan to Total assets - Recurring Debts To Gross Income
Bank Size	Firms total assets	Natural logs of firms total asset

Table 2.2: Research Gaps Matrix

"Study Objective	Author (s) for other Studies	Study Focus	Methodology	Findings	Research Gaps	Focus of the Current Study
To determine the effect of asset-liability management on financial performance of Commercial Banks in Kenya. (Main Objective)	Florence and Francis (2014)	Influence of asset liability on financial performance of Commercial Banks in Kenya with specific interest in Diamond Trust Bank	The study adopted a case study research design and collected secondary data.	The study concludes that banks should lay more emphasis on encouraging increased customer deposits and the advancement of more loans to customers so as to increase their financial performance	The study focused on one bank (Diamond Trust Bank) and relied on only secondary data	This study conducted in all commercial banks in Kenya and was a census study. Secondary data was collected.
	Meena and JoydipDhar (2014)	Analysis and comparison of liquidity ratios and asset-liability management practiced in top three banks	The researcher conducted a compassion study	The results of this study suggested that overall banks in India have very good short term liquidity position and all banks were financing their short term liabilities	The study was conducted in India The study involved a comparison between liquidity ration and asset-liability management	The study was conducted in Commercial Banks Kenya The study related asset-liability management with

		from public, private and foreign sector in India.		by their long term assets.		financial performance
	Adyafitri and Pratama (2014)	Correlation between interest rate risk and profitability in Indonesian Banking Industry	Correlation research design was used	The result describes that there is no correlation between interest rate risk and profitability	The study relied on only correlational research design	This study utilized both correlation and regression method for data analysis
To determine the effect of asset quality on financial performance of commercial banks in Kenya.	Ifeacho and Ngalawa (2011)	Impact of bank-specific variables and selected macroeconomic variables on the South African banking sector	The study used the CAMEL model in evaluation of bank performance and investigated the banks performance using the ROA and ROE as measures of the bank performance	The study found out that all bank-specific variables are statistically noteworthy determinants of bank performance	The study used CAMEL Model to evaluate bank performance. It also considered banks in South Africa	Current study was conducted in Commercial Banks in Kenya. Correlation and regression was adopted to analyze data
	Olweny and Shipho (2011)	Effects on bank-specific factors on financial performance of Commercial Banks in Kenya	Panel data research design was used involving 38 Kenyan banks from 2002 to 2008	The study revealed that Commercial Banks can achieve profitability by improving asset quality this is by reducing the rate of non-performing	38 Commercial Banks were involved for a period of 2002-2008	This study had an enlarge scope by involving 32 Commercial Banks in Kenya for a period between 2010-2019

				loans.		
To establish the influence of liquidity risk management on financial performance of commercial banks in Kenya.	Alshatti (2015)	Degree to which effective liquidity management affects profitability in Jordanian Commercial Banks	Correlation research design was used	The study concluded that liquidity management has effect on profitability as measured by ROE and ROA	The study was based in Jordanian Commercial Banks and used correlational research design	Study was conducted in Kenya involving commercial banks and adopted mixed research method (explanatory and longitudinal)
	Ehiedu (2014)	Impact of Liquidity on Profitability of some selected companies in Nigeria	Correlation research design was used	The study depict that 75% of companies indicated that current ratio has a significant positive correlation with profitability	Study was conducted in Nigerian Companies	Current study was conducted in Commercial Banks in Kenya and involved mixed research design.
	Omesa (2015)	Effect of liquidity on financial performance of financial institutions listed at the NSE in Kenya.	Secondary data was collected for a period of 2011 to 2015	The researcher found out that the relationship between ROA and liquidity is negative implying that a decrease in liquidity will lead	Study was done in NSE in Kenya between a period of five years (2011-2015)	Study was conducted in Commercial Banks in Kenya for a period of ten years (2010-2019)

				to a decrease in financial performance of financial companies listed at the NSE.		
To examine the effect of capital adequacy on financial performance of commercial banks in Kenya.	Reru and Bichanga (2015)	Effects of capital adequacy regulation on the financial performance in second tier Commercial Banks in Kenya	A descriptive survey was adopted and 38 respondents participated in the study	Findings showed a strong and positive correlation between capital adequacy and financial performance	Study done was conducted among second tie Commercial Banks in Kenya using a descriptive survey research design	The study was conducted in all Commercial Banks in Kenya involving a mixed research design
	Al-Tamimi (2013)	Commercial Banks' capital adequacy in Jordan	Secondary data was collected	The results of the study showed that there was a negative non-significant relationship between capital adequacy ratio and capital risk	Study conducted in Jordan Banks	The study was conducted in all Commercial Banks in Kenya and used financial performance as dependent variable
To assess the influence of	Olawale et	Risk	Panel data for a	The result of the	Study Conducted in	This study was

credit risk management on financial performance of commercial banks in Kenya.	al. (2013)	management and financial performance of banks in Nigeria	period of period of 2006-2009 was used	study shows an inverse relationship between financial performance and doubt loans and statistically insignificant while capital asset ratio was found to be positive and significant	Nigerian banks	conducted in Commercial Banks in Kenya for a period of 2010-2019 and used credit risk management as independent variable
	Kaaya and Pastory (2013)	Credit risk and Commercial Banks performance in Tanzania	The study was a case Study	The study revealed that there is a negative and statistically significant association between the credit risk indicators and financial performance over the study period.	Study was conducted in Tanzania and used ROA as a proxy of financial performance	The study focused on Commercial Banks in Kenya and will use both ROA and ROE as proxies of financial performance
To ascertain the moderating effect of bank size on the relationship between asset-liability management	Almazari (2014)	Moderating effect bank size on liquidity risk and profitability	Correlation research design was used	The study found that there is a positive and significant relationship between liquidity and profitability,	The study moderating effect of bank size was based on liquidity and profitability	The study moderating effect of bank size involved asset-liability management and financial

and financial performance of commercial banks in Kenya.				however banks which are growing and expanding might encounter the diminishing marginal returns therefore the average profits would reduce with bank size.		performance.
	Muigai and Muriithi (2017)	Moderating effect of bank size on debt and financial distress	Moderated regression analysis was used	The findings of the study indicated that debt had a negative and significant influence on financial distress of the entities under study. However, as the entity grows in size, this influence becomes positive and significant	Debt, financial distress and bank size were used as research variables	The current study used asset-liability management, financial performance and bank size as research variable"

Source: Research Authors Empirical Literature

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the data collection and analysis procedure. The chapter contains research philosophy, research design, target population, sample and the sampling procedures, data collection, validity and reliability and data analysis methods and presentation.

3.2 Research Philosophy

This study utilized positivist research philosophy. The positivist position is characterized by the testing of hypothesis developed from existing theory through measurement of observable social realities. The rationale for using positivist research philosophy in this study was for the researcher to gather panel data of the financial institutions listed in NSE which was not subject to manipulation. Also according to Hazzi and Maldaon (2015) with a positivist philosophy, hypotheses of the study will be easily testable and provide the opportunity for confirmation and falsification. Given that the study involved test of hypotheses, positivist philosophy will be the most appropriate research philosophy to be used in the study. Simon (2011) noted that studies based on positivism are most often deductive in nature while Johnson and Christensen (2010) opined that positivist philosophy uses past studies in forecasting. Moreover, a positivist philosophy allows the derivation of hypotheses from theories and existing data that later on can be validated and tested with quantitative data. This method is more useful in bank profitability studies because it gives an opportunity for the researchers to identify the patterns, trends and correlations so as to come up with more objective and generalized understanding of factors impacting profitability across the banking sector.

3.3 Research Design

According to Orodho (2003), research designs are the schemes, outlines, or plans developed to find solutions to research questions. This study adopted an explanatory research design. This was appropriate in establishing the association amongst the study variables. According to Saunders and Thornhill (2003), explanatory studies are used when trying to explain the relationship between a number of variables. The study utilized explanatory research design in explaining the relationship between asset quality, credit risk management, capital adequacy, and liquidity risk management on financial performance of Commercial Banks in Kenya.

Longitudinal research design is where a researcher conducts several observations of the same subjects over a period, sometimes lasting several years (Cooper and Schindler (2011). The study relied on financial statements of 32 Commercial Banks in Kenya for the period of ten years as from 2010 to 2019.

3.4 Study Area

This study was conducted on the licensed Commercial Banks in Kenya. They are the key players of an economy since they intermediate funds from the savers to the borrowers within an economy. The funds therefore pumped into the economy are supposed to make a return for the fund owners. Therefore, knowing how these institutions function and what determines their profitability is important for stability in the economy. Banks are also essential to install stability within the financial system. If banks face financial distress, it can have a domino effect on the whole economy. Through studying commercial banks, the researchers and the policymakers can be able to establish such

risks beforehand and take necessary measures so that there is stability being witnessed within the sector of banking

3.5 Target Population

Target population refers to the complete group of specific population elements relevant to the research project (Zikmund, 2003). The study targeted 42 Commercial Banks out of which 32 Commercial Banks were sampled as shown in Appendix I. The study used purposive sampling techniques to select 32 Commercial Banks while 10 Commercial Banks were not selected since some of them were under receivership, statutory management or were merged and acquired.

3.6 Data collection Method

"The study relied on panel data which consisted of time series and cross-sections. The study used secondary balanced panel data. The data was quantitative in nature, and sourced from the financial statements of Commercial Banks in Kenya. The panel data set covered a period of 10 years as from 2010 to 2019. The total number of observations was 320 from the 32 banks over 10-year period. The data collected was capital adequacy, asset quality, liquidity risk, and credit risk management obtained from the audited financial reports of the commercial banks.

3.7 Data Analysis and Presentation

The study employed panel data analysis estimation techniques since the data collected was a combination of both cross-sectional and time-series. Data was analyzed using Eviews. According to Hsiao (2014), panel data analysis is commonly used to examine complex behavioural models since it has the ability to overcome cross-sectional data

issue such as heterogeneity and identify dynamics of change. It also helps in providing more accurate predictions for individual results.

The study data type was a balance panel data since data for different cross section were available with the same time periods. Panel data sets normally utilize three different models: Pooled Ordinary Least Square (OLS) model, fixed effects and random effects. Pooled OLS uses cross sectional data only and since the data involved was cross sectional and time series, fixed effects or random effects model were to apply for analysis. Pooled OLS also assumes uniform error and does not take into consideration differences between cross section units.

Field (2013) opined that an effect is said to be fixed if all possible treatment conditions that a researcher is interested in are present in the experiment. Fixed effect models therefore control the time-invariant characteristics to assess the net effect of predictor variables. The model assumes that intercept or the coefficients are different since different banks operate in different conditions. On the other hand, an effect is said to be random if the experiment only contains a sample of all possible treatments or conditions. The model here assumes that difference in the intercept or coefficients is due to randomness of the sample selected.

3.8 Model Specification

The research employed a regression model to ascertain the correlation between asset-liability management and the financial performance of Commercial Banks in Kenya. The research anticipated a direct correlation between asset-liability management and the financial performance of Commercial Banks in Kenya. Additionally, an interactive

multiple regression model was utilized to investigate the potential moderating effect of bank size on this association. The study panel data models were written as:

Model 1: Multiple Regression Model

$$Y_{it} = \beta_0 + \beta_1 AQ_{it} + \beta_2 LRM_{it} + \beta_3 CA_{it} + \beta_4 CRM_{it} + e_{it} \quad \text{………………………………….}(1)$$

Where;

Y_{it} =Financial Performance (ROA and ROE), AQ_{it}=Asset Quality, LRM_{it}=Liquidity Risk Management, CA_{it}=Capital Adequacy and CRM_{it}=Credit Risk Management. *i-an index for cross section (Banks), t-an index for time series-(2010-2019, i=bank 1…bank 32 , and* e_{it}*=error term* β_1…… β_4 are beta coefficients for the independent variables

Model 2: Interactive Multiple Regression Model (For Moderating Effect*)*

Since

$$\beta_1 AQ_{it} + \beta_2 LRM_{it} + \beta_3 CA_{it} + \beta_4 CRM_{it} = ALM_{it} \text{………………………………………..}(2)$$

thus

with BS_{it} as moderator;

$$Y_{it} = \beta_0 + \beta_1 ALM_{it} * (BS_{it}) + e_{it} \text{ …………………………....…………………………}(3)$$

Where;

BS_{it} =Bank Size, BS_{it}*ALM_{it}= Interaction term between *Asset-Liability Management and Bank Size, i-an index for cross section (Banks), t-an index for time series-(2010-2019)*

i=1, ---------n_1*, t=1, -------*n_1*, and* e_{it}*=error term.* $\mathbf{B_1}$=Beta Coefficient.

3.9 Test of Panel Data Assumptions

The study carried out a series of diagnostic tests to ascertain the soundness of the panel regression models for better forecasting (Gujarati, 2003). The researcher conducted the following tests; normality of the residuals, serial correlation, heteroscedasticity and unit root test.

3.9.1 Test for Normality

Green (2008) opined that if the residuals display a normal distribution pattern then it follows that the coefficients of the estimates themselves are also normally distributed. The study used Jarque-Berra (J-B) Test to check if the residuals were normally

distributed. The null hypothesis stated is that the observed data fit the normal distribution and is rejected if P-value is less than 0.05.

3.9.2 Test of Serial Correlation

Asteriou and Hall (2007) noted that a serial correlation (autocorrelation) normally occurs in time-series studies when the error terms associated with a given time period carry over into future time periods. Correlogram was used to check the presence of autocorrelation. The Q-statistic in the correlogram should range above 0.5 to conclude that autocorrelation is nonexistent.

3.9.3 Test for Heteroscedasticity

Ouma and Muriu (2014) noted that heteroscedasticity is a condition where the residual variance from a model is not constant. Dependent variable is assumed to exhibits equal levels of variance across the range of predictor variables, hence when dispersion is unequal, the relationship is said to be heteroscedastic. Heteroscedasticity may make predictions unstable at some levels of the independent variables than others resulting to hypothesis tests either too insensitive or too stringent. The study used residual plot diagnostic to determine heteroscedasticity.

3.9.4 Test of Unit Root

The researcher subjected the panel data to unit root test using two methodologies namely; Levin, Lin, Chu (LLC) and Im, Pesaran, Shin (IPS) Tests. This was to determine the stationary conditions of the panel data. According to Gujarati, 2007, Baltagi, 2001), when data is found to be unstationary at level, it is differenced at first and second difference using intercept, trend, both or none until it becomes stationary.

3.11 Ethical Considerations

Schurink (2014) explains that ethical practices serve the interest of not only the research study process, but also everyone involved in the entire research project. Every research study requires authorization from relevant authorities. For this study, permission was obtained from different entities. First, permission was sought from Masinde Muliro University of Science and Technology (MMUST) school of Graduate Studies. Secondly, in compliance with the Science and Technology Act, Chapter 250, Laws of Kenya, a research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI). Final permission was obtained from 32 Commercial Banks' management which allowed the researcher to access secondary data of the study variables for a period of ten years as from 2010 to 2019.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter discusses the research findings. It displays the descriptive and inferential analysis of panel data based on the study objectives.

4.2.1 Test of Panel Data Assumptions

"The following tests were conducted by the researcher; normality of the residuals, serial correlation, heteroscedasticity and unit root test.

4.2.2 Test for Normality

Jarque-Berra (J-B) Test was used to check if the residuals were normally distributed. The null hypothesis stated is that the observed data fit the normal distribution and is rejected if the P-values are less than 0.05.

Table 4.1: Jarque-Berra (J-B) Test

	ROE	ROA	AQ	LRM	CA	CRM	BS
Jarque-Bera	275.7731	382.5412	343.9665	5214.208	6137.154	7614.962	14.53410
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000698
Observations	320	320	320	320	320	320	320

Source: Panel Data (2022)

As a rule of thumb, the null hypothesis was rejected at 5% significant level thus the regression residuals did not follow a normal distribution. Jarque-Berra normality test results in Table 4.1 for all the study variables therefore confirm that the assumption of normality distribution was violated by the data series. This is however not unusual for large samples.

4.2.3 Test of Serial Correlation

Correlogram was used to check the presence of autocorrelation as shown in Table 4.2

Table 4.2 Correlogram using residual of ROE as a measure of Financial Performance

Sample: 2010 2019

Included observations: 320

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|***** |	.|***** |	1	0.708	0.708	161.81	0.000
.|**** |	.|* |	2	0.540	0.078	256.19	0.000
.|*** |	.|* |	3	0.445	0.076	320.50	0.000
.|*** |	.|. |	4	0.387	0.061	369.22	0.000
.|** |	*|. |	5	0.263	-0.121	391.92	0.000
.|* |	.|. |	6	0.164	-0.053	400.79	0.000
.|* |	.|. |	7	0.108	-0.006	404.59	0.000
.|. |	.|. |	8	0.073	0.002	406.35	0.000
.|. |	.|. |	9	0.022	-0.033	406.51	0.000

Source: Panel data (2022)

Table 4.2 reveals that the Q-Statistics probability value are all 0.000 thus less than the recommended range of above 0.05 implying existence of autocorrelation in the study panel data.

Table 4.3 Correlogram using residual of ROA as a measure of Financial Performance

Sample: 2010 2019

Included observations: 320

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|***** |	.|***** |	1	0.731	0.731	172.42	0.000
.|**** |	.|* |	2	0.600	0.142	289.12	0.000
.|*** |	.|. |	3	0.461	-0.042	358.15	0.000
.|** |	.|. |	4	0.349	-0.029	397.81	0.000
.|** |	.|. |	5	0.259	-0.013	419.69	0.000
.|* |	.|. |	6	0.188	-0.008	431.28	0.000
.|* |	.|. |	7	0.133	-0.007	437.11	0.000
.|* |	.|. |	8	0.090	-0.007	439.80	0.000
.|. |	.|. |	9	0.060	-0.001	440.99	0.000

Table 4.3 depicts that the Q-Statistics probability value are all 0.000 thus bellow the recommended range of above 0.05 implying existence of some autocorrelation in the study panel data. This may be a problem when using statistics to make predictions but not a serious one.

4.2.4 Test for Heteroscedasticity

The study used residual plot diagnostic to determine heteroscedasticity. The study employed residual plot diagnostic to determine heteroscedasticity as shown in Figure 4.1.

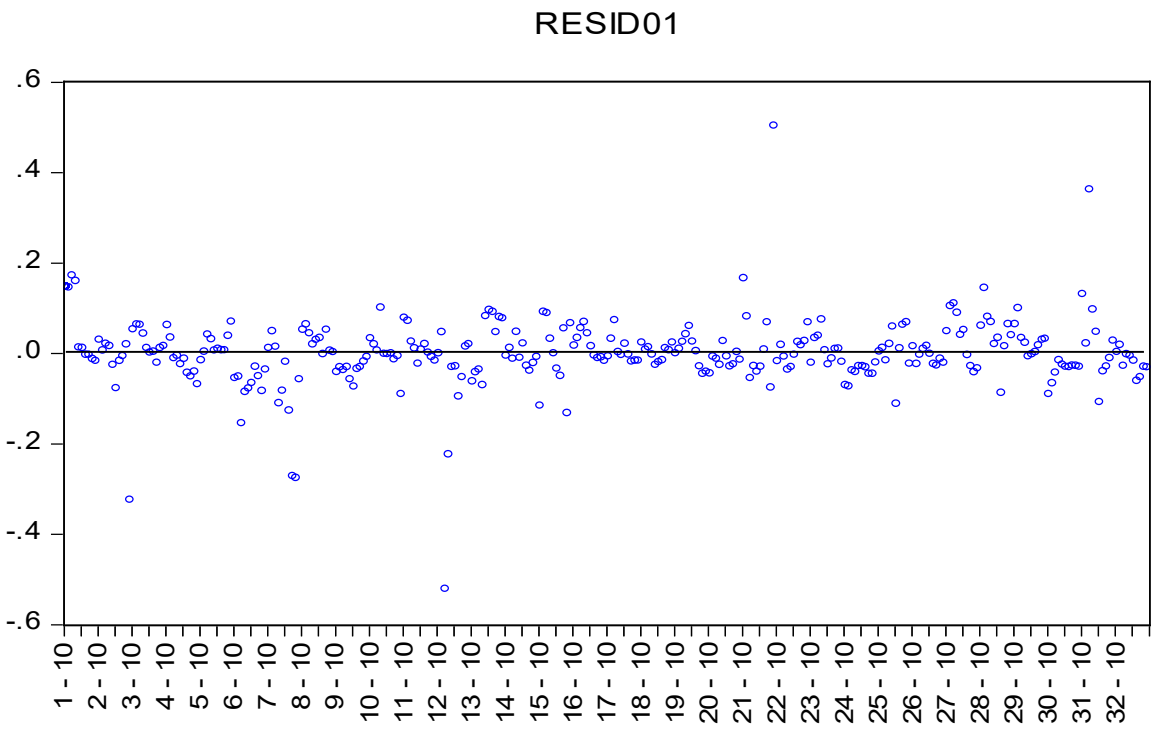

Figure 4.1: Residual plot diagnostic. Source: Panel Data (2022)

Figure 4.1 indicate that residuals exhibit increasing and decreasing variations in some systematic way from the straight-line drawn from the origin confirming that there was presence heteroscedasticity in the panel data. However, a visual inspection of the residual plot does not show a serious violation.

4.2.5 Test of Unit Root

The researcher used Levin, Lin, Chu (LLC) and Im, Pesaran, Shin (IPS) Tests for unit root testing. The two tests were used because they are effective in determining the unit root test and when one test failed, the other can be used as an option. Table 4.4 illustrates the results of the study findings.

Table 4.4: Summary of Panel Unit Root Test Results on Study Variables

Variable	Levin, Lin, Chu (LLC)	IM, Pesaran, Shin (IPS)	Conclusion
ROE	-13.5008	-4.93679	I(1)
	(0.0000)	**(0.0000)**	
ROA	-13.6188	-5.16027	I(1)
	(0.0000)	**(0.0000)**	
AQ	-7.80676	-2.57749	I(1)
	(0.0000)	**(0.0050)**	
LRM	-26.2067	-8.77068	I(1)
	(0.0000)	**(0.0003)**	
CA	-8.97974	-3.47616	I(1)
	(0.0000)	**(0.0003)**	
CRM	-6.92879	-2.21401	I(1)
	(0.0000)	**(0.0134)**	
BS	-4.31308	-1.21529	I(1)
	(0.0000)	**(0.1121)**	

Significant at 5% level of confidence

Source: Panel Data (2022)

Table 4.4 results shows that all the variables except for bank size shown by Im, Pesaran, Shin (IPS) test were stationary at first difference show by the significant p-values. Bank size was stationary at first difference when subjected to Levin, Lin, Chu Test. This implies that the researcher remodeled the study variables at first difference to make them stationary before conducting panel data analysis.

4.2.6 Dataset Preparation

Pre-conducting panel data analysis, the underlying assumption regarding data was checked. This is because the violations of assumption have a serious implication on validity and reliability of the outcome of the analyses (Field, 2013). The researcher first checked for missing data and outliners in the panel data.

The researcher looked for missing data so as to determine if data consists of valid values. According to Hair, Black, Babin, and Anderson (2010), a researcher can use a rule of the

thumb that if there is 10% and below of the individual case or observation, then the missing data can be ignored. Since the entire panel data called balanced panel data used in this research was available, it was concluded that data had no missing values.

The study checked for outliers in the dataset using box plot in Eview. Outliers refer to observations with a unique combination of characteristics identifiable as distinctly different from the other observations' (Hair et al., 2010). The outliers can either be extreme high or low value observations for a study variable which make it stand out from others. These values have a considerable impact on regression analysis. The study used box plot to identify if the panel data had extreme values as indicated in Figure 4.2.

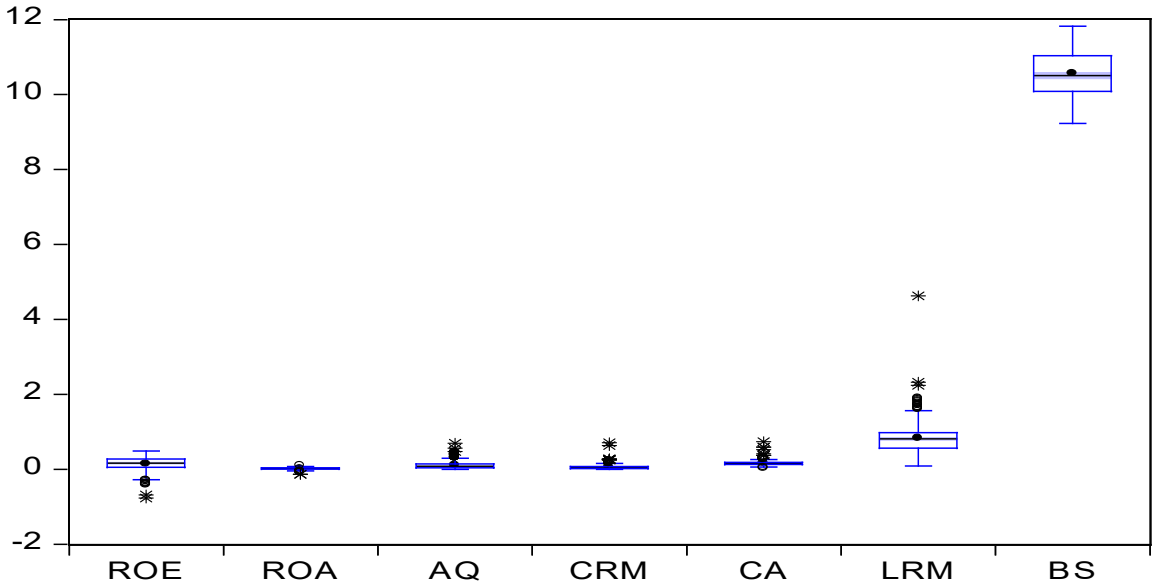

Figure 4.2: Checking for Outliners in Study Variables. Source: Panel Data (2022)

The results in Figure 4.2 shows that there were no extreme values in the panel data which imply that it was fit for inferential analysis. Extreme values have a considerable impact on regression analysis

4.3 Descriptive Statistics

The sections present descriptive output of the study variables. They include; mean, maximum, minimum, standard deviation and number of observations. Data from all the 32 commercial banks in Kenya out of a possible 42 commercial banks were collected giving 76.2% participation rate. 32 Commercial Banks were purposively selected since they meet all the necessary criteria. Some the Commercial Banks left out have been put under receivership, some under statutory management and other merged or acquired. All of the variables were converted in ratio formats before analysis. The descriptive statistics of each study variables shows the distributions across the period of study from 2010-2019. The mean shows an average of the variable over the period while standard deviation illustrates an extent of variations in the study period. Table 4.5 shows the results of the descriptive statistics.

Table 4.5: Summary of Descriptive Statistics

	BANK	YEAR	ROE	ROA	AQ	LRM	CA	CRM	BS
Mean	16.50	2014.5	0.1447	0.0231	0.1173	0.8328	0.1682	0.0663	10.569
Maximum	32.00	2019.0	0.4940	0.1040	0.6962	4.6289	0.7377	0.7086	11.829
Minimum	1.000	2010.0	-0.76700	-0.13600	0.0005	0.0906	0.0354	0.0019	9.2363
Skewness	0.0000	0.0000	-1.3838	-1.4000	1.7978	2.7269	3.5167	3.7409	0.1637
Kurtosis	1.7977	1.7758	6.6088	7.5663	6.5875	22.0085	23.2686	25.6968	2.0086
Jarque-Bera	19.275	19.9836	275.7731	382.5412	343.9665	5214.208	6137.15	47614.962	14.5341
Probability	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007
Std. Dev.	9.248	2.8768	0.1762	0.0302	0.1103	0.4275	0.0723	0.0776	0.5905
Observations	320	320	320	320	320	320	320	320	320

Source: Research data

Study findings in Table 4.5 indicate that the bank has a minimum and maximum value of 1 and 32 respectively. This implies that there are a total of 32 commercial banks involved in the study. The year minimum value of 2010 and a maximum value of 2019 denotes that the study gathered secondary data for a period of 10 years as from 2010 to 2019. There is therefore a total of 320 observations since 32 banks were studied for a period of ten years.

From the study findings, the mean value of ROE which is a measure of financial performance is 0.1447 with a standard deviation of 0.1762, a minimum of -0.767 and a maximum value of 0.4940. The computed minimum value of -0.767 shows that some of the commercial banks have been reporting negative ROE during the study period. The standard deviation of 0.1762 shows that the ROE of commercial banks have been varying across the periods.

Study findings depict ROA mean value of 0.0231 with a standard deviation of 0.0302, a minimum and a maximum value of -0.13600 and 0.1040 respectively. Minimum value of -0.136 indicates that some of the commercial banks have been reporting negative ROA during the study period. The standard deviation of 0.0302 reveals that the ROA of commercial banks have been varying across the periods. It is observed that over the study periods, the commercial banks in Kenya reported a better ROE as compared to ROA with very little variations as indicated by the small standard deviation (SD=0.0302).

Descriptive output on asset quality depicted that asset quality (AQ) has a mean of 0.1173, maximum value of 0.6962, minimum value of 0.0005 and a standard deviation of 0.1103. The mean of 0.1173 showed that on average, commercial banks is relatively experiencing moderate bad loans making them make provisions for bad debts. This is because default on loans can put a bank on a fragile state. The standard deviation of 0.1103 revealed that commercial banks asset quality varies across the study period. Asset quality deals with assessment of commercial bank's asset in order to understand the risks associated with each asset.

Table 4.5 results on liquidity risk management shows a mean of 0.8328, a maximum value of 4.6289 and a minimum value of 0.0906 with a standard deviation of 0.4275. The

minimum value of 0.0906 (9.06%) show indicate that some banks were having liquidity problems since they were operating below the recommended liquidity threshold of 20% by the regulator, Central Bank of Kenya.

Further, the study findings denote a mean value of 0.1682, minimum value of 0.0354, maximum value of 0.7377 and a standard deviation of 0.0723 for capital adequacy. The standard deviation of 0.0723 connotes that asset quality was varying across the banks. The minimum value of 0.0354 (3.5%) revealed that some banks where operating below the minimum threshold devised by the CBK regulator. Other commercial banks were operating well above the recommended threshold as indicated by a mean of 16.8%. The regulator opined that commercial banks need hold a minimum of 14% of their aggregate assets as core capital. Capital Adequacy refers to the amount of capital held by commercial banks to offset liquidity risks in times of uncertainty thus acting as a safety net to protect depositors in case the bank collapses or goes out of the market. Commercial banks in Kenya with substantial large amount of capital are able to take up on riskier and rewarding investments as compared to banks holding less capital and have to rely on debt financing. This is as a result of debt covenants which restricts borrower from financing high risk projects.

On credit risk management, the study findings depicted a mean of 0.0663, minimum value of 0.0019, maximum value of 0.7086 and a standard deviation of 0.0776. The standard deviation illustrates that credit risk management varies across the time periods in the banking sector. Finally, on the bank size, the study results show that the commercial banks have an average asset base of 10.569 translated to Kshs. 10.569 billion, with a maximum of 11.829 (Kshs. 11.829 billions) and a minimum value of 9.2363 (Kshs.

9.2363 billions). The standard deviations show that the bank size do not vary across the study periods.

4.4 Correlation Analysis

The researcher conducted correlation analysis for the study variables in order to assess whether the independent variables are serially correlated and also to gauge from the onset how each of the variables affect financial performance of commercial banks. Relatively small correlation indicates absence of the problem of multicollinearity. Tables 4.6 and 4.7 show the correlation analysis results.

Table 4.6: Correlation Matrix
Covariance Analysis: Ordinary
Sample: 2010 2019
Included observations: 320

Correlation Probability	ROE	ROA	AQ	LRM	CA	CRM
ROE	1.000000 -----					
ROA	0.899370 0.0000	1.000000 -----				
AQ	-0.490225 0.0000	0.480828 0.0000	1.000000 -----			
LRM	-0.042812 0.4453	0.092934 0.0970	-0.037502 0.5038	1.000000 -----		
CA	-0.064200 0.2522	-0.055919 0.3187	-0.172877 0.0019	-0.004393 0.9376	1.000000 -----	
CRM	-0.463541 0.0000	-0.520427 0.0000	0.845563 0.0000	0.276001 0.0000	-0.172205 0.0020	1.000000 -----

Source: Panel Data (2022)

Table 4.2 illustrates that none of the independent variables were highly correlated and therefore absence of cross-sectional serial correlations. However, looking at how each of the variables affects financial performance, asset quality and credit risk management had a negative but significant effect on financial performance of commercial banks. Asset quality had a significant negative relationship with ROE (r=-0.490, p=0.000) and ROA (r=-0.481, p=0.000). Olweny and Shipho (2011) study revealed that Commercial Banks can achieve profitability by improving asset quality by reducing the rate of non-performing loans that is consistent with research study.

Credit management also had a significant but a negative effect on ROE (r=-0.464, p=0.000) and ROA (r=-0.520, p=0.000). Previous researchers concur with the research findings of this study like Olawale et al. (2013) and Kaaya and Pastory (2013) noted that credit risk management has a negative effect on financial performance of organizations.

The result output also depicted that liquidity risk management and capital adequacy had negative but an insignificant effect on financial performance of commercial banks. Liquidity risk management had insignificant negative relationship with ROE (r=-0.0428, p=0.445) and ROA (r=-0.0929, p=0.097). The negative relationship mirrors a study conducted by Omesa (2015) who found out that liquidity has a negative effect on financial performance of financial institutions listed in NSE.

Capital adequacy also had an insignificant but a negative effect on ROE (r=-0.064, p=0.252) and ROA (r=-0.056, p=0.319). This study contradicts previous researcher who opined that capital adequacy has a strong positive effect of financial performance (Reru and Bichanga, 2015).

The present study's findings are consistent with previous research conducted by Muigai and Muriithi (2017), which demonstrated that debt had a notable and adverse impact on the financial distress experienced by the companies examined. Nevertheless, as the organization expands in scale, its impact becomes both favorable and substantial. Almazari (2014) showed that there is a positive and significant correlation between liquidity risk and profitability while the bank size and the profitability is in negative relationship where they give further explanation that banks, which are growing and expanding might encounter the diminishing marginal returns therefore the average profits would reduce with bank size.

4.5 Panel Regression Models Preliminary Tests

The researcher conducted a number of tests to determine whether the panel data meet the underlying assumptions for multiple regression and also determine the most appropriate model to use in the analysis.

4.5.2 Panel Data Model Specification

A number of tests were carried out by the researcher in order to determine the most appropriate panel data model from a choice of either fixed effects (FEM)or random effects (REM) model as in the case of cross sectional and time series data. These tests include; Breusch and Pagan Multiplier Test, and Hausman Test as discussed therein.

4.5.3 Breusch and Pagan Multiplier Test

The study used Breusch and Pagan Multiplier (BP) to determine whether Panel Least Square or Pooled Ordinary Least Square (POLS) method was appropriate model. In Pooled OLS, an assumption is made that all the commercial banks in Kenya do operate under the same conditions. The null hypothesis is to test the significant difference across

units since the variances across entities is zero. If the result reject the null hypothesis, then Panel Least Square regression is necessary (Gujaratti, 2003).

***Ho**: POLS is appropriate than FEM/REM or No effect of different cross-sections on intercept*

If p-value is greater than 0.05, then fail to reject null hypothesis and go for POLS but if p-value is less than 0.05, then reject null hypothesis and go for FEM/REM. A panel least square regression was conducted first before applying the BP test as shown in Tables 4.7-4.8.

Table 4.7: Panel Least Square Regression using ROE as Dependent Variable
Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2010 2019
Periods included: 10
Cross-sections included: 32
Total panel (balanced) observations: 320

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRM	-0.003427	0.024258	-0.141260	0.8878
CRM	-0.403070	0.250482	-1.609181	0.1086
CA	-0.385977	0.119021	-3.242945	0.0013
AQ	-0.587520	0.169302	-3.470243	0.0006
C	0.307983	0.032322	9.528663	0.0000

R-squared	0.273124	Mean dependent var	0.144566
Adjusted R-squared	0.263894	S.D. dependent var	0.176179
S.E. of regression	0.151155	Akaike info criterion	-0.925515
Sum squared resid	7.197105	Schwarz criterion	-0.866635
Log likelihood	153.0824	Hannan-Quinn criter.	-0.902003
F-statistic	29.59030	Durbin-Watson stat	0.631969
Prob(F-statistic)	0.000000		

Source: Panel Data (2022)

After conducting panel least square regression using pooled least square as shown in Tables 4.7 and 4.8, the study then tested for random effect using Breusch and Pagan Multiplier Test as shown in Tables 4.9-4.10.

Table 4.8: Panel Least Square Regression using ROA as Dependent Variable
Source: Panel Data (2022

Dependent Variable: ROA
Method: Panel Least Squares
Sample: 2010 2019
Periods included: 10
Cross-sections included: 32
Total panel (balanced) observations: 320

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRM	0.001550	0.004082	0.379852	0.7043
CRM	-0.170285	0.042148	-4.040165	0.0001
CA	-0.064690	0.020027	-3.230087	0.0014
AQ	-0.037526	0.028488	-1.317269	0.1887
C	0.048379	0.005439	8.895319	0.0000

R-squared	0.300075	Mean dependent var	0.023102
Adjusted R-squared	0.291187	S.D. dependent var	0.030210
S.E. of regression	0.025435	Akaike info criterion	-4.489917
Sum squared resid	0.203778	Schwarz criterion	-4.431037
Log likelihood	723.3867	Hannan-Quinn criter.	-4.466405
F-statistic	33.76200	Durbin-Watson stat	0.521377
Prob(F-statistic)	0.000000		

Table 4.9: Breusch and Pagan Multiplier Test using ROE

Lagrange multiplier (LM) test for panel data
Sample: 2010 2019
Total panel observations: 320
Probability in ()

Null (no rand. effect) Alternative	Cross-section One-sided	Period One-sided	Both
Breusch-Pagan	369.5416 (0.0000)	2.446821 (0.1178)	371.9884 (0.0000)
Honda	19.22346 (0.0000)	-1.564232 (0.9411)	12.48696 (0.0000)

Source: Panel Data (2022)

Study findings in Tables 4.9 and 4.10 result show that Breusch-Pagan p-value for the cross-section and for both were all significant. Since the p-value is less than 0.05, the study rejected the null hypothesis that stated that 'POLS is appropriate than FEM/REM' thus either the FEM or REM was deemed fit for the panel data analysis. This resulted to further test using Hausman Test to determine whether to use for use either fixed effect model or random effect model

Table 4.10: Breusch and Pagan Multiplier Test using ROA

Lagrange multiplier (LM) test for panel data
Sample: 2010 2019
Total panel observations: 320
Probability in ()

Null (no rand. effect) Alternative	Cross-section One-sided	Period One-sided	Both
Breusch-Pagan	450.2071 (0.0000)	3.021683 (0.0822)	453.2288 (0.0000)

Source: Panel Data (2022)

4.5.4 Hausman Test

Breusch and Pagan Multiplier test, revealed that either FEM or REM was the best model for panel data analysis hence Hausman Test was conducted in order to make a choice between fixed effects and random effects panel data models. The null hypothesis of the Hausman test was stated as;

***Ho**: REM is appropriate than FEM*

If the p-value is greater than 0.05 then fail to reject the null hypothesis and go for REM while if p-value is less than 0.05, then reject the null hypothesis and go for FEM. Random Effect model was applied in the cross-section before carrying out Hausman Test (Gujaratti, 2003). Tables 4.11 and 4.12 present the results obtained from Hausman Test. Before conducting the Hausman Test, the researcher carried out least square panel analysis using random effect.

Table 4.11: Hausman Test using ROE

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	**5.512973**	**4**	**0.2386**
Cross-section random effects test comparisons:			
Variable	Fixed	Random	Var(Diff.)	Prob.
AQ	-0.200096	-0.256041	0.001186	0.1043
LRM	0.021704	0.018402	0.000014	0.3750
CA	-0.183383	-0.218858	0.001481	0.3567
CRM	-0.497960	-0.486133	0.001513	0.7611

Source: Panel Data (2022)

Table 4.12: Hausman Test using ROA

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.178278	4	**0.0568**

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
AQ	0.038322	0.030107	0.000022	0.0831
LRM	0.005689	0.005310	0.000000	0.4578
CA	0.008548	-0.001371	0.000028	0.0619
CRM	-0.183144	-0.183227	0.000029	0.9876

Source: Panel Data (2022)

Study findings in Tables 4.11 and 4.12 Hausman Test P-values are greater than 0.05 (p=0.2386 and 0.0568) thus the study failed to reject the null hypothesis and concluded that random effect model was the most appropriate model for the panel data analysis.

4.6 Regression Analysis

The study established that Random Effect Model was the most appropriate model in explaining the relationship between asset-liability management and financial performance of Commercial Banks in Kenya. Since the panel data exhibited some aspects of non-normality, heteroscedasticity and autocorrelation which may lead to unreliable and biased results during regression analysis, the researcher used Generalized Least Square (GLS) to estimate random-effect model. Gaur and Delios (2006) noted that GLS allows researchers to examine cross-sectional variations simultaneously with the individual unit variations over time.

4.6.1 Regression Analysis for Asset-liability Management and Financial Performance

The study sought to determine the effect of asset-liability management on financial performance of Commercial Banks in Kenya. Indicators were asset quality, liquidity risk management, capital adequacy and credit risk management while financial performance was measured using either ROE or ROA shown in Tables 4.13 and 4.14 using GLS Random Effect Model.

Table 4.13: GLS Random Effect Model for Asset Liability Management and Financial Performance (ROE)

Dependent Variable: **ROE**
Method: Panel EGLS (Cross-section random effects)
Sample: 2010 2019
Periods included: 10
Cross-sections included: 32
Total panel (balanced) observations: 320
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AQ	**-0.256041**	0.143599	-1.783030	**0.0755**
LRM	**0.018402**	0.019405	0.948334	**0.3437**
CA	**-0.218858**	0.118137	-1.852576	**0.0649**
CRM	**-0.486133**	0.196595	-2.472766	**0.0139**
C	0.228307	0.034912	6.539594	0.0000
	Effects Specification			
			S.D.	Rho
Cross-section random			0.114371	0.5543
Idiosyncratic random			0.102561	0.4457
	Weighted Statistics			
R-squared	**0.171856**	Mean dependent var		0.039440
Adjusted R-squared	0.161340	S.D. dependent var		0.112262
S.E. of regression	0.102807	Sum squared resid		3.329351
F-statistic	**16.34214**	Durbin-Watson stat		**1.263220**
Prob(F-statistic)	**0.000000**			

Source: Panel Data (2022)

Results in Table 4.13 depict Durbin-Watson statistics value of 1.263 which is within the recommended value of 1-3 illustrating absence of autocorrelation since GLS Random Effect Model was used in the study (Hoe, 2008, and Blackwell, 2005**).** From the study findings, asset quality has an insignificant negative effect on ROE at 5% level of significance (β=-0.2560, p-value=0.08). This implies that asset quality results to insignificant decrease in ROE in Commercial Banks. Olweny and Shipho (2011) study opined that Commercial Banks can achieve profitability by improving asset quality by reducing the rate of non-performing loans that is consistent with research study.

The study results on liquidity risk management revealed that it has a positive but an insignificant effect on ROE at 5% level of significance (β=0.0184, p-value=0.344). The results of the output shows that capital adequacy has a negative insignificant effect on ROE at 5% level of significance (β=-0.2189, p-value=0.065). The negative relationship mirrors a study by Omesa (2015) who noted that liquidity has a negative effect on financial performance of financial institutions listed in NSE.

The results also indicate that credit risk management has a negative and significant effect on ROE at 5% level of significance (β=-0.486, p-value=0.014). This implies that an increase credit risk management results to a significant decrease in ROE of commercial banks. Previous studies are consistent with the research findings like Olawale et al. (2013) and Kaaya and Pastory (2013) noted that credit risk management has a negative effect on financial performance of organizations.

The resultant multiple regression equation using ROE as an indicator of financial performance was therefore fitted as;

Est. Y_{it} = 0.228-0.486CRM_{it} ……...(3)

From this equation (3), the only significant asset-liability management indicators effect on ROE is credit risk management. The R-squired results revealed that components of asset-liquidity management together can explains 17.2% change in ROE in commercial banks in Kenya. This implies that 82.8% of ROE in commercial banks is attributed to other factors beyond the scope of this study. The study results also show that the GSL regression model used was fit at 95% confidence level due to the significant F-statistic value (F-statistic=16.34214, p-value=0.000). Table 4.14 shows GLS random effect regression models using ROA as a measure of financial performance.

Table 4.14: GLS Random Effect Model for Asset Liability Management and Financial Performance (ROA)

Dependent Variable: **ROA**
Method: Panel EGLS (Cross-section random effects)
Sample: 2010 2019
Periods included: 10
Cross-sections included: 32
Total panel (balanced) observations: 320
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AQ	**0.030107**	0.022212	1.355441	**0.1762**
LRM	**0.005310**	0.002996	1.772554	**0.0773**
CA	**-0.001371**	0.018356	-0.074702	**0.9405**
CRM	**-0.183227**	0.030354	-6.036386	**0.0000**
C	**0.027520**	0.005648	4.872291	**0.0000**
	Effects Specification			
			S.D.	Rho
Cross-section random			0.019973	0.6159
Idiosyncratic random			0.015774	0.3841
	Weighted Statistics			
R-squared	**0.251441**	Mean dependent var		0.005598
Adjusted R-squared	0.241935	S.D. dependent var		0.018265
S.E. of regression	0.015903	Sum squared resid		0.079667
F-statistic	**26.45211**	Durbin-Watson stat		**1.129931**
Prob(F-statistic)	**0.000000**			

Source: Panel Data (2022)

Study findings in Table 4.14 illustrates a Durbin-Watson statistics value of 1.13 which is within the recommended value of 1-3 illustrating absence of autocorrelation as a result of using GLS Random Effect Model in the study (Hoe, 2008, and Blackwell, 2005).

From the study findings in Table 4.14, asset quality has an insignificant positive effect on ROA at 5% level of significance (β=0.0301, p-value=0.1762). This implies that asset quality results to insignificant increase in ROA in Commercial Banks in Kenya

The study results on liquidity risk management indicated that it has a positive but an insignificant effect on ROE at 5% level of significance (β=0.0053, p-value=0.0773). The study output shows that capital adequacy has a negative insignificant effect on ROA at 5% level of significance (β=-0.0014, p-value=0.940). The negative relationship mirrors a study conducted by Omesa (2015) who found out that liquidity has a negative effect on financial performance of financial institutions listed in NSE. While Reru and Bichanga (2015) contradict previous researcher who opined that capital adequacy has a strong positive effect of financial performance (Reru and Bichanga, 2015).

Further, the results from the study shown that credit risk management has a negative significant effect on ROA at 5% level of significance (β=-0.183, p-value=0.000). This indicates that an increase credit risk management results to a significant decrease in ROA of commercial banks. Past researchers concurs with the research findings of this study like Olawale et al. (2013) and Kaaya and Pastory (2013) noted that credit risk management has a negative effect on financial performance of organizations.

The resultant multiple regression equation using ROA as an indicator of financial performance was therefore fitted as;

Est. $\mathbf{Y_{it} = 0.028-0.183CRM_{it}}$ **……...(4)**

From this equation, the only significant asset-liability management indicator influencing ROA is credit risk management. The R-squared results indicated that components of asset-liability management together can explain 25.1% which is consistent with findings by Tee (2017). This implies that 74.9% of ROA in commercial banks is attributed to other factors beyond the scope of this study. The study results also show that the GSL

regression model used was fit at 95% confidence level due to the significant F-statistic value (F-statistic=26.45211, p-value=0.000).

The researcher then conducted interactive regression modeling in order to determine the moderating effect of bank size on the relationship between asset-liability management and financial performance of commercial banks in Kenya. Florence and Francis (2014) study on studied the effect of asset-liability management on financial performance of Commercial Banks in Kenya. The study concludes that banks should lay more emphasis on encouraging increased customer deposits and the advancement of more loans to customers so as to increase their financial performance. The current study builds on this foundation.

4.6.2 The Moderating Effect of Bank Size on Asset-liability Management and Financial Performance

The study used an interactive regression analysis with an interactive term (Asset-liability management and financial performance) helped in testing the moderating effect of the study variables. An interactive Regression model was performed as shown in Tables 4.15 and 4.16.

Table 4.15: Interactive Regression Model for testing the effect of Bank Size on relationship between Asset-liability Management and Financial Performance (ROE)

Dependent Variable: **ROE**
Method: Panel EGLS (Cross-section random effects)
Sample: 2010 2019
Periods included: 10
Cross-sections included: 32
Total panel (balanced) observations: 320
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AQBS	**-0.023217**	0.013850	-1.676342	**0.0947**
LRMBS	**0.001743**	0.001801	0.967971	**0.3338**
CABS	**-0.020352**	0.012245	-1.662102	**0.0975**
CRMBS	**-0.048501**	0.019163	-2.530977	**0.0119**
C	**0.227020**	0.036128	6.283725	**0.0000**

Effects Specification

	S.D.	Rho
Cross-section random	0.116927	0.5665
Idiosyncratic random	0.102289	0.4335

Weighted Statistics

R-squared	**0.172492**	Mean dependent var	0.038545
Adjusted R-squared	0.161984	S.D. dependent var	0.111965
S.E. of regression	0.102496	Sum squared resid	3.309233
F-statistic	**16.41523**	Durbin-Watson stat	**1.265225**
Prob(F-statistic)	**0.000000**		

Source: Panel Data (2022)

Study findings in Table 4.15 have a Durbin-Watson statistics value of 1.27 which is within the recommended value of 1-3 showing absence of autocorrelation since GLS Random Effect Model was employed in the study (Hoe, 2008; Blackwell, 2005).

The results output indicate that asset quality and bank size have an insignificant negative effect on ROE at 5% level of significance (β=-0.023217, p-value=0.095). This implies that asset quality together with bank size result to an insignificant decrease in ROE in Commercial Banks in Kenya.

From the study results, liquidity risk management and bank size lead to a positive but an insignificant effect on ROE at 5% level of significance (β=0.0017, p-value=0.334). It is

evident that capital adequacy and bank size have a negative insignificant effect on ROE at 5% level of significance (β=-0.020352, p-value=0.098). Also, the results of the study show that credit risk management and bank size has a negative significant effect on ROE at 5% level of significance (β=-0.0485, p-value=0.0119). This indicates that an increase credit risk management and bank size result to a significant decrease in ROE of commercial banks. This can be interpreted to mean larger banks with stricter credit management measures have a higher likelihood of reducing credit to customers and consequently reducing performance compared to small banks which may not face similar scenarios and thus likely to extend more credit.

The study findings can be compared with previous researches. The study by Muigai and Muriithi (2017) showed that credit risk management had a negative and significant influence on financial distress but as the entity grows in size, this influence becomes positive and significant. Hence partially agreeing with Khan (2012), Gonenc (2005), Dittmar (2004) and Maina and Ishmail (2014). Almazari (2014) study also indicated that there is a positive and significant correlation between liquidity risk and profitability. However, the bank size and the profitability is in negative relationship.

The resultant multiple regression equation using ROE as an indicator of financial performance was therefore fitted as;

$$\mathbf{Y_{it} = 0.227 - 0.0485CRMBS_{it}}$$

From this equation, bank size had a significant moderating effect through credit risk management. The R-squared results indicate that components of asset-liquidity management and bank size together can explain 17.2% change in ROE in commercial banks in Kenya. This implies that 82.8% of ROE in commercial banks is attributed to

other factors beyond the scope of this study. The study results also show that the GSL regression model used was fit at 95% confidence level due to the significant F-statistic value (F-statistic=16.41523, p-value=0.000). Table 4.16 illustrates GLS regression analysis on the interactive terms and ROA.

Table 4.16: Interactive Regression Model for testing the effect of Bank Size on relationship between Asset-liability Management and Financial Performance (ROA)

Dependent Variable: **ROA**
Method: Panel EGLS (Cross-section random effects)
Sample: 2010 2019
Periods included: 10
Cross-sections included: 32
Total panel (balanced) observations: 320
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AQBS	**0.003280**	0.002144	1.530357	**0.1269**
LRMBS	**0.000513**	0.000278	1.843999	**0.0661**
CABS	**0.001070**	0.001903	0.562110	**0.5744**
CRMBS	**-0.017954**	0.002962	-6.061840	**0.0000**
C	**0.025090**	0.005871	4.273774	**0.0000**

Effects Specification		
	S.D.	Rho
Cross-section random	0.020709	0.6336
Idiosyncratic random	0.015747	0.3664

Weighted Statistics			
R-squared	**0.253399**	Mean dependent var	0.005401
Adjusted R-squared	0.243918	S.D. dependent var	0.018197
S.E. of regression	0.015823	Sum squared resid	0.078864
F-statistic	**26.72801**	Durbin-Watson stat	**1.131040**
Prob(F-statistic)	**0.000000**		

Source: Panel Data (2022)

Table 4.16 study results have a Durbin-Watson statistics value of 1.13 which is within the recommended value of 1-3 showing absence of autocorrelation since GLS Random Effect Model was employed in the study (Hoe, 2008; Blackwell, 2005).

Study results output indicate that asset quality and bank size have an insignificant positive effect on ROA at 5% level of significance (β=0.0033, p-value=0.127). This can be interpreted that asset quality together with bank size result to an insignificant increase in ROA in Commercial Banks in Kenya.

On the other hand, liquidity risk management and bank size lead to a positive but an insignificant effect on ROA at 5% level of significance (β=0.0005, p-value=0.066). Liquidity risk management and bank size therefore contributes to a slight increase in ROA though this increase is insignificant.

Regarding capital adequacy and bank size, the study found out that they have a positive insignificant effect on ROA at 5% level of significance (β=0.0011, p-value=0.5744). This implies that an increase capital adequacy and bank size results to an insignificant increase in ROA of commercial banks.

Finally, the results of the study show that credit risk management and bank size has a negative significant effect on ROA at 5% level of significance (β=-0.017954, p-value=0.000). This indicates that an increase credit risk management and bank size result to a significant decrease in ROA of commercial banks.

In summary, the aforementioned investigations are consistent with some previous studies. According to the findings of Muigai and Muriithi (2017), their study demonstrated that debt exerted a detrimental and statistically significant impact on financial hardship.

However, when the entity's size increased, this influence shifted to become positive and statistically significant. Therefore, in partial agreement with the perspectives presented by Khan (2012), Gonenc (2005), Dittmar (2004), and Maina and Ishmail (2014). Liquidity results are in contrast to findings of Almazari's (2014) study, that there is a statistically significant positive association between liquidity risk and profitability. However, there exists a negative association between the size of a bank and its profitability.

4.6.3 Hypothesis Testing of the Research Variables

The study hypotheses were tested using multiple linear regressions computed using GLS Random Effect Models. The test criteria is set that, if the t-statistic p-value is less than 0.05 (p-value>0.05), the null hypothesis is rejected otherwise we fail to reject the null hypothesis. The hypotheses are tested therein.

a) Hypothesis One

The first null hypothesis, **$H0_1$**, was stated as: Asset quality has no significant effect on financial performance of Commercial Banks in Kenya. This results indicate that the t-statistical probability values were greater than 0.05. This shows that the study failed to reject the first null hypothesis hence there is no significant effect of asset quality on financial performance (ROE or ROA) of Commercial Banks in Kenya.

b) Hypothesis Two

The second null hypothesis, **$H0_2$**, was stated as: There is no significant influence of liquidity risk management on the financial performance of Commercial Banks in Kenya. The results show that the t-statistical probability values were greater than 0.05. This shows that the study failed to reject the second null hypothesis hence there is no

significant effect of liquidity risk management on financial performance (ROE or ROA) of Commercial Banks in Kenya.

c) Hypothesis Three

The third null hypothesis, **$H0_3$**, was stated as: There is no significant influence of capital adequacy on financial performance of Commercial Banks in Kenya. Here again the study failed to reject the third null hypothesis hence there is no significant effect of capital adequacy on financial performance (ROE or ROA) of Commercial Banks in Kenya. Capital adequacy had a negative and an insignificant effect on both ROE and ROA.

d) Hypothesis Four

The forth null hypothesis, **$H0_4$**, was stated as: There is no significant influence of credit risk management on financial performance of Commercial Banks in Kenya. This indicates that the study rejects the forth null hypothesis hence there is a statistically significant negative influence between credit risk management and financial performance (ROE or ROA) of Commercial Banks in Kenya. Credit risk management had a negative effect on both ROE and ROA. All these effect is significant. (Credit risk management and ROE, β=-0.486, t-statistical p-value=0.014; Credit risk management and ROA, β=-0.183, t-statistical p-value=0.000).

e)Hypothesis Five

The fifth null hypothesis, **$H0_5$**, was stated as: There is no significant moderating effect of bank size on the relationship between asset-liability management and financial performance of Commercial Banks in Kenya. Results have shown that bank size has a significant moderating effect on the relationship between credit risk management and financial performance of Commercial Banks in Kenya. The effect is to reduce ROE and

ROA when size is incorporated in the model. Therefore, with bigger size of banks, credit risk management has a negative effect on profitability of the banks.

4.7 Summary of Statistical Tests and Statistical Analysis

This section presents the summary of all the statistical tests and results of hypothesis tests using Eviews. The summary is illustrated in Tables 4.17-4.18.

Table 4.17: Summary of Statistical Tests

TYPE OF TEST	TESTS USED AND RESULTS OBTAINED
Panel Data Model specification Tests	**i) Breusch and Pagan Multiplier Test** The computed Breusch-Pagan p-value for cross-sectional and both were all significant (0.000 and 0.000 respectively). This implied that Pooled Ordinary Least Square-POLS was inappropriate model to used resulting to use of **either** Fixed Effect Model (FEM) or Random Effect Model (REM).
	ii) Hausman Test Conducted to determine whether to use FEM or REM Hausman Test P-value was found to be greater than 0.05 (p-value=0. **0.2386** or p-value=**0.0568**) hence **REM** was the **most appropriate** model for the panel data analysis.
Test for Panel Data Assumptions-Diagnostic Tests	**i) Test for Normality-Using Jarque-Berra (J-B) Test** Since the computed J-B probability value was less than 0.05, the study found out that the panel data distribution did not **followed** a **normal** distribution. This necessitated the use of GLS model of analysis.
	ii) Test for Serial Correlation-Using a Correlogram The study computed Q-statistical probability values for all the study variables in the correlogram were all below 0.05 depicting the **presence of autocorrelation** in the panel data.
	iii) Test for Heteroscedasticity-Using Residual Plot Diagnostic The test was conducted using Residual Plot Diagnostic Since the residual exhibited increasing and decreasing variations in some systematic way from the straight line drawn from the origin, it implies that **there was heteroscedacity** in the panel data.
	iv) Test of Unit Root-Using Levin, Lin, Chu (LLC) and Im, Pesaran, Shin (IPS) Tests This test was carried out in order to determine **stationary conditions** of the panel data. The study results depicted that all the study variables **had a significant p-value at one difference** hence **absence of unit root**. This imply that panel data was stationary at **first difference** hence the need to difference all the variables at one difference before conducting panel data analysis to make them stationary**.**
Overall verdict	**Hausman Test** results led to the choice of **Random Effect Model** but since two important assumptions for panel data analysis was violated (autocorrelation and heteroscedasticity). The foregoing is most likely responsible for the low coefficient of determination at 17 percent and 25 percent for ROA and ROE respectively.

Source: Researcher Conceptualization (2022)"

Table 4.18: Summary of Hypothesis Tests

Hypothesis	Beta and t-statistical probability Value	Verdict
HO_1: Asset quality has no significant effect on financial performance of Commercial Banks in Kenya.	(Asset Quality and ROE, β=-0.256, t-statistical p-value=0.076; Asset Quality and ROA, β=0.0301, t-statistical p-value=0.176).	That the study failed to reject the first null hypothesis hence there is no significant effect of asset quality on financial performance (ROE or ROA) of Commercial Banks in Kenya.
HO_2: There is no significant influence of liquidity risk management on the financial performance of Commercial Banks in Kenya.	(Liquidity risk management and ROE, β=0.018, t-statistical p-value=0.344; Liquidity risk management and ROA, β=0.0053, t-statistical p-value=0.077).	The study failed to reject the second null hypothesis hence there is no significant effect of liquidity risk management on financial performance (ROE or ROA) of Commercial Banks in Kenya
HO_3: There is no significant influence of capital adequacy on financial performance of Commercial Banks in Kenya.	(Capital adequacy and ROE, β=-0.219, t-statistical p-value=0.065; Capital adequacy and ROA, β=-0.0014, t-statistical p-value=0.9405).	The study failed to reject the third null hypothesis hence there is no significant effect of capital adequacy on financial performance (ROE or ROA) of Commercial Banks in Kenya.
HO_4: There is no significant influence of credit risk management on financial performance of Commercial Banks in Kenya.	(Credit risk management and ROE, β=-0.486, t-statistical p-value=0.014; Credit risk management and ROA, β=-0.183, t-statistical p-value=0.000).	The study rejected the forth null hypothesis hence there is a significant negative effect between credit risk management and financial performance (ROE or ROA) of Commercial Banks in Kenya.
HO_5: There is no significant moderating effect of bank size on the relationship between asset-liability management and financial performance of Commercial Banks in Kenya.	Interactive regression model show an improvement in the values of the coefficient of determination and beta coefficients	Bank size has a significant moderating effect (decrease) on the relationship between credit risk management and financial performance of Commercial Banks in Kenya. Bank size reduces the explanatory power of the model from 25 percent to 17 percent.

Source: Researcher Conceptualization (2022)

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section contains a summary of key result findings, summary and conclusion as well as recommendations of the study findings in line with the study objectives. The chapter also outlines recommendations for further research.

5.2 Summary of Key Study Finding

5.2.1 Asset Quality and Financial Performance

Understanding commercial banks is fundamental for various reasons. Economically, these institutions serve as vital intermediaries, channeling funds from savers to borrowers, thereby supporting economic growth. They also play a pivotal role in the stability of the financial system; any distress faced by banks can have far-reaching consequences on the entire economy. Moreover, central banks use commercial banks to implement monetary policies, influencing the money supply and controlling inflation. By examining how these banks manage risks, such as credit and operational risks, researchers can identify best practices and aid in the development of effective risk management strategies. Additionally, commercial banks are often at the forefront of financial innovation, especially in digital technology, providing insights into the future of banking services. Policymakers rely on studies in this area to formulate regulations that encourage responsible lending and ensure consumer protection. Furthermore, investors' confidence is influenced by the profitability and stability of commercial banks, making research in this field crucial for informed decision-making.

5.2.2 Liquidity Risk Management and Financial Performance

The study on liquidity risk management in commercial banks revealed a wide variation in liquidity levels among the banks, with some operating below the recommended threshold of 20% set by the Central Bank of Kenya, indicating potential liquidity challenges. Despite this, the analysis found an insignificant positive relationship between liquidity risk management and both Return on Equity (ROE) and Return on Assets (ROA). The study formulated a null hypothesis stating that liquidity risk management does not significantly influence the financial performance of Kenyan commercial banks, which was supported by the findings. The results suggest that, based on the data analyzed, liquidity risk management practices did not have a significant impact on the profitability metrics (ROE and ROA) of these banks in Kenya

5.2.3 Capital Adequacy and Financial Performance

An examination of capital adequacy in commercial banks revealed significant variability, with a mean value of 16.82% and a standard deviation of 0.0723, indicating diverse asset quality levels across the banks. Notably, some banks operated below the regulatory threshold of 14%, set by the Central Bank of Kenya, reflecting potential financial vulnerabilities. In contrast, certain banks exceeded this threshold, allowing them the flexibility to pursue more lucrative yet riskier investments, thanks to their substantial capital reserves. However, despite these variations, the analysis found an insignificant negative impact of capital adequacy on both Return on Equity (ROE) and Return on Assets (ROA). The study formulated a null hypothesis stating that capital adequacy does not significantly influence the financial performance of Kenyan commercial banks, a hypothesis supported by the findings. Consequently, the study concluded that capital

adequacy levels did not significantly affect the profitability metrics (ROE and ROA) of these banks in Kenya.

5.2.4 Credit Risk Management and Financial Performance

Key result for credit risk management in commercial banks revealed considerable variation, indicating fluctuating practices over different time periods within the banking sector. The analysis found that credit risk management significantly and negatively impacted both Return on Equity (ROE) and Return on Assets (ROA) for these banks. The study also explored the influence of liquidity risk management and capital adequacy on financial performance but found these factors to have a negative effect that was not statistically significant. The study rejected the null hypothesis that stated credit risk management does not significantly influence the financial performance of Kenyan commercial banks, confirming a significant adverse relationship between credit risk management and both ROE and ROA.

5.2.5 Bank Size on the Relationship between Asset-liability Management and Financial Performance

Results of study on interactive regression model showed a reduction in the coefficient of determination from 25 percent to 17 percent upon introduction of the moderator variable (bank size). The study results show that the interaction happens only through credit risk management and not other factors that define ASM.

5.3 Conclusion

Objective one

Asset quality in asset-liability management among Kenyan banks is significant but indirectly associated with performance of commercial banks according to the data analyzed. Riskier lending practices appear to enhance earnings for the banks possibly from the higher interest rates applied to risky borrowers. However, it was not a good predictor of profitability of commercial banks in Kenya. Therefore, less focus should be on this factor when pursuing profit enhancement because its role is insignificant.

Objective two

Liquidity risk management is also not critical to leveraging profitability of banks in Kenya since the effect on performance in also insignificant. This factor while critical to banking performance generally, did not emerge as an important determinant of profitability. Less interest should be laid on it when seeking higher profitability.

Objective three

Capital adequacy according to the data analyzed did not emerge as a significant predictor of profitability of commercial banks in Kenya. Commercial banks should therefore reduce attention on capital adequacy as a predictor of performance or profitability. The factor is indirectly associated with profitability but an irrelevant predictor.

Objective four

Credit risk management is a significant predictor of financial performance of commercial banks in Kenya although the relationship is indirect. This occurs either when using return on assets or return on equity. Bank managers therefore need to focus more on credit risk

management processes and procedures in order to enhance profitability. By assuming more risk in lending seem to be paying off in the end. Thus a careful assessment of risky borrowers would yield better returns for the banks.

Objective Five

Bank size is an important moderator of the relationship between credit risk management and bank profitability. Bank size slows down the ability of the model to explain profitability. So credit risk management weakens as a predictor of profitability for larger banks and vice versa.

5.4 Recommendations

Asset Quality: While riskier lending practices might lead to higher interest earnings, they are not reliable predictors of profitability. Commercial banks should diversify their strategies, focusing not only on risky borrowers but also on stable, long-term investments. The emphasis should be on a balanced portfolio that considers both risk and stability.

Liquidity Management: Although liquidity management is crucial for overall banking performance, its direct impact on profitability in the context of Kenyan banks appears to be insignificant. While maintaining adequate liquidity is essential for operational stability, banks can allocate resources efficiently by not overly prioritizing liquidity. Instead, they should focus on optimizing their investments and lending practices.

Capital Adequacy: The study suggests that capital adequacy is not a significant predictor of profitability for commercial banks in Kenya. While regulatory requirements must be met, banks should not overly focus on increasing capital solely for the purpose of

enhancing profitability. Instead, they should allocate resources effectively, ensuring that the capital is utilized in ventures that yield optimal returns.

Credit Risk Management: Credit risk management emerges as a significant predictor of bank profitability. Banks should invest in robust credit risk assessment processes and procedures. Careful evaluation of risky borrowers can yield better returns. However, this should be done prudently, balancing risk-taking with responsible lending practices.

Bank Size: Bank size moderates the relationship between credit risk management and profitability. Larger banks should recognize that their size might dilute the impact of credit risk management on profitability. However, this does not mean neglecting credit risk management altogether. Instead, larger banks should focus on refining their credit risk strategies to ensure they remain effective, even at their scale.

5.5 Study Implications

The study results provide a number of theoretical and policy implications.

5.5.1 Theoretical Implications

The study contributes immensely in expanding a number of theories that the study was anchored on. First on Asset-Liability Theory, the study findings reveal that bank asset plays a very important role in ensuring that banks are liquid and thus able to meet their short term and long term objectives. Second, with regard to Portfolio theory, portfolio or asset diversifications in banks is very important since it enable the banks to spread the financial risks hence helping to minimize the occurrence of the risk which may affects banks profit margins. Finally, Shiftability Theory encourages banks to keep assets which

are easily convertible to cash that is they are liquid to enable banks meet their short term financial obligations which has been advanced by the study findings because liquidity has a significant positive effect on financial performance of commercial banks in Kenya.

Apart from the study theories, the study also made a robust contribution towards expanding knowledge in literature regarding asset-liability management and financial performance. A rich knowledge on key asset-liability management practices like asset quality, liquidity risk management, capital adequacy and credit risk management with their relationship on financial performance is also canvased in the study. Therefore, the current study has played an important role in filling the eminent theoretical and empirical gaps and also in expanding and supporting the theories that the current study was anchored on.

5.5.2 Policy Implications

Key policy makers in the banking sector and regulators can apply the study findings to act as an insight in policy formulation, development and implementation.

Top level management of Commercial Banks will use the study to understand the relationship between asset-liability management and financial performance. In the present scenario, asset-liability management is important for the banking industry due to deregulation of interest rate regime. It helps to assess the risks and manage the risks by taking appropriate actions.

For Regulators especially the Central Bank of Kenya, this research may also be of particular interest to policy makers to enable those set policies and regulations relating to

asset-liability management that govern Commercial Banks without negatively impacting on their profitability.

5.6 Recommendations for Further Research

The study general objective was to determine the effect of asset-liability management on financial performance of Commercial Banks in Kenya. The following are the recommendations of the study for further research:

a) The study was limited to asset-liability management indicators like asset quality, liquidity risk management, capital adequacy and credit risk management. Another study should be carried out to analyze the effect of other variables of asset-liability management on financial performance for better generalization of the study findings.

b) The study focused on Commercial Banks in Kenya, there is need to conduct a similar study in other sectors like insurance, microfinance, manufacturing and service sectors so as to enable greater generalization of the research findings.

c) The data analyzed may not have met all the strict assumptions of the classical linear regression model. Therefore, another study can use the same data and prepare it further before applying in analysis to see if a better explanatory model can be developed using the same factors for asset-liability management in the same time frame.

REFERENCES

Abdelrahim, K.E (2013), effectiveness of credit risk management of Saudi banks in the light of global financial crisis, *Journal of Asian Transactions on basic and applied Sciences*, Volume *03* Issue *02*, retrieved from http://asian-transactions.org.

Abdullah, M. N., Parvez, K., & Ayreen, S. (2014). Bank Specific, Industry Specific and Macroeconomic Determinants of Commercial Bank Profitability: A Case of Bangladesh. Dhaka. *Business World*, *4*(3).

Adiandri Adyafitri & Indra Pratama (2014), an analysis of asset-liability managementin pt. Bank central ASIA, TBK JAMS, *Journal of Management Studies*, Vol. 03, No. 01, May 2014, Page no. 18-28

Afriyie, H.O & Akotey, J.O (2013), credit risk management and profitability of rural banks in the Brong Ahafo region of Ghana, *European journal of business and management,* V.*5* no.*24*, retrieved from http://www.iiste.org/Journals/index.php.

Ajibola, J.O. (2016). The effects of asset and liability management on financial performance of some selected Nigerian banks. *Journal of Accounting and Financial Management, 2*(2), 44.63.

Alexandru, C., Genu, G., Romanescu, M.L. (2008), The Assessment of Banking Performances-Indicators of Performance in Bank Area. MPRA Paper No. 11600.

Ali, M. (2011). A financial performance comparison of public vs private banks: The case of commercial banking sector of Pakistan. *International Journal of Business and Social Science*, *2*(11).

Almazari, A. (2012). Financial Performance Analysis of the Jordanian Arab Bank by Using the DuPont System of Financial Analysis. *International Journal of Economics and Finance,* 4(4), p.p86.

Almazari, A. (2014). Impact of Internal Factors on Bank Profitability: Comparative Study between Saudi Arabia and Jordan. *Journal of Applied Finance & Banking*, 4(1), pp.125-140.

Alshatti A.S. (2015), Effect of liquidity management on profitability of Jordanian. Commercial Banks. *International Journal of Business and Management*. 10(1), 62-71

Al-Tamimi, H.A.H (2013). Banks' risk management: a comparison study of UAE national and foreign banks. *The Journal of Risk Finance*, 8(4), 394-409.

Altan, M., Beduk, A., & Yusufazari, H. (2014). *Performance Analysis of Banks in Turkey Using Camel Approach*. 14th International Academic Conference, Malta.

Amit Kumar Dwivedi & D. Kumara Charyulu (2011), *"Efficiency of Indian Banking Industry in the Post-Reform Era*", IIMA Research & Publications, March 2011.

Amit Kumar Meena & JoydipDhar (2014), "An Empirical Analysis and Comparative Study of Liquidity Ratios and Asset-Liability Management of Banks Operating in India", *International Journal of Social, Human Science and Engineering,* Volume:8, pp-358-363

Ani, P. (2014). *Determinants of Commercial Banks' profitability Panel Evidence from Nigeria*. Unpublished Master of Business Administration Thesis, University of Abuja. 50

Anjichi, D. A. (2014). Effects of asset and liability management on the financial performance of Commercial Banks in Kenya, *Unpublished MSC projec*t, School of Business, University of Nairobi

Apuoyo, B.O. (2010). *The relationship between working capital management policies and Profitability for companies quoted at the NSE. Unpublished MBA project*, University of Nairobi.

Athanasoglou, P.P., Sophocles, N.B. & Matthaios, D.D. (2005) Bank-specific, industry-specific and macroeconomic determinants of bank profitability. Working paper, Bank of Greece. 1(1), 3-4.

Baral, K. J. (2005). Health Check-Up of Commercial Banks in the Framework of CAMEL: A Case Study of Joint Venture Banks in Nepal. *Journal of Nepalese Business Studies*, 2(1).

Basel Committee on Banking Supervision (1999). *Credit risk modeling: Current Practice and applications*. Mimeo

Basel Committee on Banking Supervision, (2013). The liquidity average ratio and liquidity risk monitoring tools. Bank of International settlement.

Bereh, M.N. & Nyahas, S.I (2020). Asset-liability-mix and financial performance of deposit money banks in Nigeria available at https://ajormsplasu.ng

Belete, T. (2013). Asset liability management and commercial banks financial performance in Ethiopia. *Research Journal of Finance and Accounting, 4*(10), 77-91.

Bhattacharyya, H. (2011). *Banking strategy, credit appraisal, and lending decisions: a risk-return framework*. New Delhi, India: Oxford University Press.

Bikker, J.A. & Metzemakers, P.A.J., 2005. "Bank provisioning behaviour and procyclicality," *Journal of International Financial Markets, Institutions and Money, Elsevier, vol. 15(2), pages 141-157, April.*

Boahene, S.H, Dasah, J & Agye, S.K (2012), credit risk and profitability of selected banks in Ghana, *Research journal of finance and accounting*. ISSN *2222-2847* Vol *3*, No 7, retrieved from http://www.iiste.org/Journals/index.php.

Boot, A. W. A. & A. V. Thakor (2000): Can Relationship Banking Survive Competition? *Journal of Finance*, 55, 679-713.

Brau, T. & Woller, W. (2004). A new capital regulation for large financial institutions, *Working Paper,* 2, 1-5

Brusov, P. & Filatova, T., (1991). Absence of an optimal capital structure in the famous trade-off theory, *Journal of Reviews on Global Economics*, 2, 94-116

Canner, N. Gregory, M. & David, N. (1997). An asset allocation puzzle. The *American Economic Review*, 87 (1): 181–191

Central Bank of Kenya (2016, 2018). *Bank Supervision Annual Report*. CBK Nairobi

Charles, O & Kenneth, U.O (2013), impact of credit risk management and capital adequacy on the financial performance of Commercial Banks in Nigeria, *Journal of Emerging Issues in Economics, Finance and Banking* Volume *2* No.*3*, retrieved from http://globalbizresearch.org/economics/images/files.

Charumathi (2008), *Asset-liability managementin Indian banking industry,* World congress on engineering, 2008 Vol. II

Charumathi B (2008). *Proceedings of the World Congress on Engineering* 2008 Vol II, WCE 2008, July 2 - 4, 2008, London, U.K. Asset-liability managementin Indian Banking Industry - with special reference to Interest Rate Risk Management in ICICI Bank.

Chen, Y., Guo, R. J., & Haung, R. L.(2009). Two Stages Credit Evaluation in Bank Loan Appraisal. *Journal of Economic Modeling, 26(1), 63-70.*

Chimkono, E.E., Muturi, W. & Njeru, A. (2016). Effect of Non-Performing Loans and Other Factors on Performance of Commercial Banks in Malawi. *International Journal of Economics, Commerce and Management*, 4(2).

Christensen, L.B., Johnson, R.B., & Turner, L.A. (2011). *Research methods, design, and analysis* (11th Ed). Boston, USA: Pearson Education, Inc.

Dang, U. (2011). *The CAMEL rating system in banking supervision: A case study*. Thesis, submitted to Arcada University of Applied Sciences. International Business School.

Dang, Uyen. (2011) The CAMEL Rating System in Banking Supervision: a Case Study of Arcada University of Applied Sciences, International Business. *International Journal of Economics and Financial Issues, Vol. 3, No. 1, 2013, pp.237-252* 252

Dang, Uyen. (2011). *The CAMEL Rating System in Banking Supervision:* A Case Study of Arcada University of Applied Sciences, International Business.

Darush, Y. (2013). Asset-liability managementmicro firms: evidence from Amsterdam, *International Journal of Managerial Finance*, 9(2), 151 -160

Dawood, U. (2014). Factors impacting profitability of Commercial Banks in Pakistan for the period of (2009-2012). *International Journal of Scientific and Research Publications*, *4*(3), 1-7.

Debasis Bagchi, Assets and liabilites information analysis of the Indian public sector banks, *The ICFAI Journal of Applied Finance*, 13(10), 79- 96.

Deger. A. & Adem. A. (2011) Bank specific and Macroeconomic determinants of Commercial Banks profitability: Empirical Evidence from Turkey. Business and Economics Research Jurnal,2 139-152 60

Demyanyk, Y. & Iftekhar, H. (2009). *Financial crises and bank failures: A review of prediction methods.* FED of Cleveland, Working Paper 09 04R.

De-Young, R & Rice, T (2004), non –interest income and financial performance at US Commercial Banks. The financial Review 39,101-127.

Deyoung, R., Flannery, M. J., Lang, W. W. & Sorescu, S. M. (2001). The information content of bank exam ratings and Subordinated Debt Prices. *Journal of Money, Credit and Banking*, 33(4): 900-925.

Diamond, D.W. & Raghuram, A. (2012). A Theory of Bank Capital. *The Journal of Finance*, 52(6), 12-23.

Diamond, D.W., Raghuram, A. (2000) A Theory of Bank Capital. The Journal of Finance 52(6), 12-23.

Dietrich, A., & Wanzenried, G. (2011). Determinants of bank profitability before and during the Crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money*, 21, 307 327.

Di-Maggio, Y. (2013). Asset-liability managementmicro firms: evidence from Swedish data, *International Journal of Managerial Finance*, 9(2), 151 -160

Dionne, G., & Triki, T. (2005). *Risk management and corporate governance: The importance of independence and financial knowledge for the board and the audit committee*. Working paper. Retrieved from https://pdfs.semanticscholar.org/.../9aabcbb16f563b87f8249.

Dittmar, A. (2004). Capital structure in corporate spin offs. *The Journal of Business*, 77 (1), 9-43.

Doliente, J.S. (2003). *Determinants of Bank Net Interest Margins of Southeast Asia*, retrieved from http://www.upd.edu.ph/~cba/docs/dp0310_jsd.PDF

Dong, H.P. & Su, J. (2010). The relationship between working capital management and Profitability. A Vietnam case. *International Research Journal of Finance and Economics*, 49, 59-67

Doumpos, M. & Zopounidis,C. (2009). *A multicriteria bank rating system*. European working group "Multiple Criteria Decision Aiding". Spring, Series 3(19): 17-19.

Dr. R Umarani & M Jayanthi, "Asset-Liability Management in Banks" *Peer Reviewed International Journal Vol*. No. II Issue No. 9 September 2014, ISSN: 2347 5587

Echeboka, F. N., Egbunike, C. F. & Ezu, G. K. (2014). Determinants of bank profitability in Nigeria: Using Camel Rating Model (2001 – 2010). IOSR *Journal of Business and Management,* 16 (9), 44-50.

Ehiedu, V.C. (2014). The impact of liquidity on profitability of some selected companies. The Financial Statement Analysis (FSA) Approach. *Research Journal of Finance and Accounting. The International Institute of Science and Technology and Education*(*IISTE*).5(5), 72-80.

Eljelly, A. M. (2013). Internal and external determinants of profitability of Islamic banks in Sudan: evidence from panel data. *Afro-Asian Journal of Finance and Accounting*, *3*(3), 222-240.

Ermias, M. (2016). *Financial Performance of Private Commercial Banks in Ethiopia : CAMEL Approach*. (Master thesis). Addis Abeba University.

Garima Chaudhary, Performance Comparison of Private Sector Banks with the Public Sector Banks in India with reference to assets and liabilities management. *International Journal of Emerging Research in Management &Technology* ISSN: 2278-9359 (Volume 3, Issue-2) july 2012, page- 5 – 12.

Getahun, M. (2015). *Analyzing financial performance of Commercial Banks in Ethiopia: CAMEL Approach*. Thesis submitted to Adis Ababa University, Ethiopia.

Gonenc, H. (2005). Comparison of debt financing between international and domestic firms: Evidence from Turkey, Germany and UK. *International Journal of Managerial Finance*, 1(1), 49-68. 75

Grier, W. A. (2007). *Credit Analysis of Financial Institutions, Euromoney Institution Investor PLC,* United Kingdom.

Grier, W. A. (2007). *Credit analysis of financial institutions.* Euromoney Books. (2nd ed.). Euro Money Institutional Investors, PLC.

Hamdu, K., W/Michael, S., & Yonas, M. (2015). Soundness of Ethiopian Banks. *International Journal of Finance and Banking Studies, 4(2), 2147-4486.*

Handley Schachler Linda Juleff, Colin Paton, (2007) "Corporate governance in the financial services sector", Corporate Governance: *The international journal of business in society*, Vol. 7 Issue: 5, pp.623-634

Haneef, S., Riaz, T., Ramzan, M., Rana, M. A. Ishaq, H. M. & Karim Y. (2012). Impact of Risk Management on Non- Performing Loans and Profitability of Banking 54 Sector of Pakistan. *International Journal of Business and Social Science* Vol. 3 No. 7.

Harvey, A. (2013). Asset-liability managementand financial performance in America, *International Review of Business Research Papers*, 2(2), 45-58.

Haslem, J. A., Scheraga, C.A. and Bedingfield. J P (1999), "DEA efficiency profiles of US banks operating internationally," *International review of economics & finance* 8 (2).

Havrylchyk, O. & Emilia J. (2006), *Profitability of foreign banks in central and Eastern Europe: Does the entry mode matter?* Bank of Finland, BOFIT Discussion Paper 5.

Hazzi, B., & Maldaon, G. (2015). Methods for approximating integrals in statistics with special emphasis on Bayesian integration problems. Statistical Science,10, 254–272

Hosna, Bakaeva Manzura & San Juanjuan (2009), *credit risk management and profitability in Commercial Banks in Sweden*, master's thesis, University of Gothenburg, retrieved from https://gupea.ub.gu.se.

Idris, F. (2010). Predicting bank financial conditions using a logit regression approach: Empirical evidence from Malaysia. *Interdisciplinary Journal of Contemporary Research in Business*, 1(12): 179-197.

Ifeacho, H. & Ngalawa, H. (2014). "Performance of the South African Banking Sector since 1994" *Journal of Applies Business Research*. Volume 30 Number 4.

Ilhomovich, S.E. (2009) Factors affecting the performance of foreign banks in Malaysia. Malaysia: A thesis submitted to the fulfillment of the requirements for the degree Master of Science (Banking) College of Business (Finance and Banking.)

Islam, M. A., Siidiqui, M. H., Hossain, K. F. & Karim, L. (2013). Performance evaluation of the banking sector in Bangladesh: A comparative analysis. *Business and Economic Research*, 4 (1): 70-107.

Jaber, J. J., & Al-khawaldeh, A. A. (2014). The Impact of Internal and External Factors on Commercial Bank Profitability in Jordan. *International Journal of Business and Management*, *9*(4), 22.

Jamaat, A., & Asgari, F. (2010). "*Credit risk management in banking system with data mining approach*", quarterly magazine of quantity studies in management, 1(3):115-126

Kaaya, I & Pastory, D (2013), credit risk and Commercial Banks performance in Tanzania, *Research Journal of Finance and Accounting,*Vol.*4*, No.16, retrieved from http://www.iiste.org/Journals/index.

Kanhaiya Singh (2013) Asset-liability management in Banks: a dynamic approach. *AIMA Journal of Management & Research*, 7(2/4), May 2013. Available on http://apps.aima.in/ejournal_new/articlesPDF/_Dr_%20KanhaiyaSingh .pdf.

Kanjana .E.N (2007) *Efficiency, Profitability and Growth of Scheduled Commercial Banks in India.* Ph. D Thesis, Bharathiar University, Coimbatore

Karanja, J. S., & Nasieku, T. (2016). Effect of Capital on the Financial Performance of Commercial Banks in Kenya. *Asian Journal of Business and Management, 4*(5), 221-238.

Kargi, H.S. (2011). *Credit Risk and the Performance of Nigerian Banks.* Unpublished research project, Ahmadu Bello University, Zaria.

Kasekende L. A & Ating-Ego .M (2003) "*Financial liberalization and its implication for domestic system.* The case of Uganda AERS research paper No.128 61

Kasman, A Tunc G Varder, & G Okan, B (2010) *Consolidation and commercial bank net interest margin:* Evidence from old and new European Union members and candidate countries. Economic Modelling 27, 648-655.

Keynes, J. (2011). *The general theory of employment, interest and money*. United States: publisher. .

Khan, A. G. (2012). The relationship of capital structure decisions with firm performance: A study of the engineering sector of Pakistan. *International Journal of Accounting and Financial Reporting*, 2 (1), 245 - 262.

Khalid. A.C. (2012), The impact of assets quality on the profitability of private banks in India, Journal of African microeconomic review, 2(1), 1-22.

Khrawish, H.A. (2011) Determinants of Commercial Banks Performance: Evidence from Jordan. *International Research Journal of Finance and Economics.* Zarqa University, 5(5), 19-45.

Kithinji, A. (2010). Credit Risk management and profitability of Commercial Banks in Kenya (University of Nairobi school of Business).

Kosmidou K,, & Pasiouras F., Floropoulos J. (2004). Finking Profits to Asset-liability Management of Domestic and Foreign Banks in the UK. Applied Financial Economics, 14,1319-1324.

Kumbhakar, S.C., C.& Lovell A. K. (2003). *Stochastic Frontier Analysis* Cambridge University Press

Kurawa, J.M and Garba, S (2014), an evaluation of the effect of credit risk management on the profitability of Nigerian banks, *Journal of Modern Accounting and Auditing, ISSN 1548-6583,* Vol. *10,* No. 1, 104-115, retrieved from http://www.davidpublishing.com.

Laeven, L., L. Ratnovski, and H. Tong, (2014), "*Bank size and systemic risk: some international evidence,"* International Monetary Fund. Mimeo

Lee, C. & Lee, A. (2006). *Encyclopedia of finance*. New York: Springer.

Lim, E. (2015). Capital Structure and Profitability of Selected Universal Banks in the Philippines. *Journal of Global Business* (Vol. 4, No. 1, pp. 24-28).

Madishetti, S., & Rwechungura, K. A. (2013). Determinants of bank profitability in a developing economy: empirical evidence from Tanzania. *Asian Journal of Research in Banking and Finance*, *3*(11), 46.

Maina, L., & Ishmail, M. (2014). Capital structure and financial performance in Kenya: Evidence from firms listed at the Nairobi Securities Exchange. *International Journal of Social Sciences and Entrepreneurship,* 1 (11), 209-223.

Maina, H. (2011). Relationship between the liquidity and profitability of oil companies in Kenya. *Unpublished MBA project*, University of Nairobi.

Makkar & Singh, Apeejay (2015). *Journal of Management Sciences and Technology* 2 (2), Feb- 2015 (ISSN -2347-5005)

Makori, E. (2010). A survey o f asset-liability managementamong defined benefits pension schemes, Unpublished MBA Project, University of Nairobi.

Marsh, P. (1982). The choice between equity and debt: An empirical study. *The Journal of Finance*, 37 (1), 121-144.

Matama R.(2008) Corporate Governance and financial performance of selected Commercial Banks in uganda.CRR 2008 call for papers .Queen's University.

Mathuva, M.D. (2009).The influence of working capital management components on corporate profitability: A survey of Kenyan listed firms, *Journal of Financial Management*, 15(2), 24-35

Memba, Florence & Makau, Ngati Francis (2014). Influence of asset liability management on financial performance of Commercial Banks In Kenya: a case study of diamond trust bank, *International Journal of Economics, Commerce and Management* United Kingdom Vol. II, Issue 10, Oct 2014, page 1-20, ISSN 2348 0386.

Modigliani, F. & Miller, H. (1958). The cost of capital, corporation finance, and the Theory of Investment, *American Economic Review* 48: 261-297.

Muigai, R. G. & Muriithi, J. G. (2017) The Moderating Effect of Firm Size on the Relationship Between Capital Structure and Financial Distress of Non-Financial Companies Listed in Kenya. *Journal of Finance and Accounting*, 5(4), 151-158.

Mulualem, G. (2015). *Analyzing Financial Performance of Commercial Banks in Ethiopia: CAMEL Approach* (Doctoral dissertation, AAU).

Mulualem, M. (2015). *Analyzing Financial Performance of Commercial Banks in Ethiopia: CAMEL Approach*. (Master thesis). Addis Abeba University.

Muritala, T. A and Taiwo, A.S (2013), credit management spurs higher profitability, evidence from Nigerian banking sector, *Journal of applied economics and Business,*V.*1* issue*2*, retrieved from http://www.aebjournal.org.pdf.

Murthy, Y. &, Sree, R. (2003) *A Study on Financial Ratios of major Commercial Banks*. Research Studies, College of Banking & Financial Studies, Sultanate of Oman.

Musyoki, D., & Kadubo, A. S. (2012). The impact of credit risk management on the financial performance of banks in Kenya for the period 2000-2006. *International Journal of Business and Public Management*, 2(2), 72-80.

Mutua D.M. (2015). *The Effects of Credit Risk Management on the financial performance of Commercial Banks in Kenya.* Unpublished MBA project, University of Nairobi.

Mwangi, G.N (2012), *the effect of credit risk management on the financial performance of Commercial Banks in Kenya*, master's thesis, University of Nairobi, retrieved from http://erepository.uonbi.ac.ke.

Mwongeli, J.A. (2016). *The Effect of Regulations on Financial Performance of Commercial Banks in Kenya* (MBA Project). University of Nairobi.

Myers, C.S. & Brealey, R.A. (2003). *Principles of Corporate Finance*. New York, NY: McGraw-Hill.

Nachane, A. Narain, S. Ghosh & S. Sahoo : "*The Impact of Capital Requirements on Bank Behaviour : An Empirical Analysis of Indian Public Sector Banks", Reserve Bank of India, DRG Studies,* RBI Website.

Nag A. K. & A. Das (2002): "Credit Growth and Response to Capital Requirements – Evidence from Indian Public Sector Banks", *Economic and Political Weekly*, August 10- 16, 2002, pp. 3361-68.

Narayan Baser (2014) "*Asset and Liability Management of Scheduled Commercial Banks*", IJMT, Volume 2, Issue 4, pp. 20-44.

Nimalthasan, B. (2008). A comparative study of financial performance of banking sector in Bangladesh – An application of CAMELS rating. *Annals of University of Bucharest Economic and Administrative Series*, 2: 141-152.

Nyamao, N.R., Ojera, P., Lumumba, M, Odondo, A.J & Otieno, S. (2012). Effect of working capital management practices on Financial Performance: A study of small scale enterprises in Kisii South District, Kenya. *African Journal of Business Management*, 6(18), 5807-5817.

Nyanga, O. V. (2012). *Determinants of financial performance of Commercial Banks in* Kenya (Doctoral dissertation).

Nyong'o, J. (2014). *The Relationship Between Credit Risk Management and Non-Performing Loans in Commercial Banks in Kenya*. Unpublished MBA project, University of Nairobi

Nzongang, T. &Atemnkeng, J. (2006*). Market Structure and Profitability Performance inthe Banking Industry of CFA countries: the Case of Commercial Banks in Cameroon.*

Odhiambo.(2006). *A survey o f asset-liability management practices in Commercial Banks in Kenya*, Unpublished MBA Project, University of Nairobi.

Ojo, M, Kolapo, T. Funso, Ayeni, R. Kolade & Oke (2012), credit risk and commercial banks' performance in Nigeria, *Australian Journal of Business and Management Research,*Vol*.2* No.*02*, retrieved from http://ajbmr.com/articlepdf.

Okoth, V & Gemechu, B (2013). Determinants of Financial Performance of Commercial Banks in Kenya. *International Journal of Economics and Financial*. Vol. 3(1).

Olawale, Adeusi, Oluwafemi, S., Akeke, Israel,N., Adebisi, Simeon, O., & Oladunjoye (2013), risk management and financial performance of banks in Nigeria, *Journal of Business and Management,* Volume *14*, Issue *6.*

Olongo, O. (2013). The Effects of Financial Fraud and Liquidity Management On Financial Performance of Commercial Banks in Kenya. *Unpublished MBA Project,* University of Nairobi.

Olweny, T., & Shipho, T.M. (2011). Effects of banking sectoral factors on the profitability of Commercial Banks in Kenya. *Journal of Economic and Finance*, 1(5), 01-30.

Olweny, T., Shipho, T. M. (2011). Effects of banking Sector Factors on the Profitability of Commercial Banks in Kenya*. Economics and Finance Review*. 1(5), 1-30.

Omesa, J. (2015). Effect of liquidity on the financial Performance of financial institutions listed at the NSE. *Unpublished MBA project*, university of Nairobi.

Ongore, V.O. & Kusa, G.B. (2013). Determinants of Financial Performance of Commercial Banks in Kenya. *International Journal of Economics and Financial Issues*, Vol. 3, No. 1, 2013, pp.237-252.

Oracle financial services (2011). *Practices and Emerging Trends in Asset liability management and Liquidity risk,* An Oracle White Paper. Oracle financial services

Papadogonas, T. A. (2006). The financial performance of large and small firms: evidence from Greece. *International Journal of Financial Services Management*, 2 (1-2), 14-20.

Pathak, A. & Goshal, S.N. (2007). *Asset-liability managementin banks emerging challenges* (1st Ed), Hyderabad: The ICFAI University Press.

Patil, D. S (2014) Inflow and Outflow Management: Opportunities and Challenges in Co Oprative Banks" *International Journal of Managerial Studies and Research* (IJMSR) Volume 2, Issue 9, October 2014, PP 57- 62 ISSN 2349-0330 (Print) & ISSN 2349-0349

Perera, K. H. & Mathushani W.I. (2022). The Impact of assets liability management on the financial performance: Evidence from licensed commercial banks in Sri Lanka. *International Journal of Accountancy*, *2*(1), 43. https://doi.org/10.4038/ija.v2i1.39

Prapti Gindodiya (2006). *Asset-liability managementin banks – concepts and cases, Hyderabad*: The ICFAI University Press.

Prathap B N (2013) "An Empirical Study of Asset-liability managementby Indian Banks", *Asia Pacific Journal*, Volume No: 2, Issue: 4, pp.1-10.

Rahaman, A.S. (2010). *Public Sector Accounting and Financial Management in a Developing Country Organizational Context: A Three-Dimensional View:* Armidale, University of New England, 1; 121-153

Rahman, S., Tan, L. H., Hew, O. L., & Tan, Y. S. (2004). Identifying Financial Distress Indicators of Selected Banks in Asia. *Asian Economic Journal*, 45-57.

Rai, E. (2010). *A study of CAMEL analysis of Commercial Banks in Nepal.* Thesis submitted to Tribhuvan University, Nepal.

Rajan, R. & Nallari R (2004), "*Study of Asset-liability managementin Indian Banks*-Canonical Correlation Analysis." Spandan year- 2004

Ranjan, R. & Nallari, R. (2014) "*Study of Asset-liability managementin Indian Banks Canonical Correlation Analysis,"* Spandan, year 2014.

Rasika, D.G.L. (2018). Analysis of Financial Performance of Commercial Banks Listed in Indonesia Stock Exchange. *European Journal of Business and Management*. https://doi.org/10.7176/ejbm/12-3-17

Reru, G. A., & Bichanga, W. O. (2015). Effects of Central Bank of Kenya Prudential Regulations on Financial Performance of Commercial Banks Operating in Kisii County. *International Journal of Social Sciences Management and Entrepreneurship 2*(1), 262-273.

Rogers, M. (2005). The impact of asset and liability management on financial performance of Commercial Banks in Scotland, *Journal of finance and Accounting*, 2(1), 1-4

Said, R.M. & Mohd, H.T. (2011) *Performance and Financial Ratios of Commercial Banks in Malaysia and China.*

Salvin Surjith & N. Sathyanarayana (2014) a study on asset and liability management in ICICI bank , *International Journal of Advanced Research* in ISSN: 2278-6236 Management and Social Sciences, Vol. 3, No. 7.

Sangmi, M. & Nazir, T. (2010). Analyzing financial performance of Commercial Banks in India: Application of CAMEL model. P*akistan Journal of Commerce & Social Sciences*, 4 (1), 40-55.

Sangmi, M., Tabassum, N. (2010). Analyzing Financial Performance of Commercial Banks in India: Application of CAMEL Model. *Pakistan Journal Commercial Social Sciences*.

Saunders, A. & Marcia, M. C. (2011). *Financial institutions management. A Risk Management Approach*. 7 th ed. United States. U.S.

Seema Jaiswal (2010). Relationship between Asset and Liability of Commercial Banks in India, 1997-2008, *International Research Journal of Finance and Economics*, ISSN 1450-2887 Issue 49, page 43-58

Shahatit, M.I. (2011). The Standard Analysis of the Application of Capital Adequacy on the Profitability of Commercial Banks, *The Journal of Administrative Sciences*, 38(2).

Siddiqui MA & Shoaib (2011) A Measuring performance through capital structure: Evidence from banking sector of Pakistan. *African Journal of Business Management* Vol. 5(5), pp. 1871-1879

Simon, Y. (2011). Interpreting scales through scale anchoring. *Journal of Educational Statistics*, *17* (2), 191–204.

Sporta. F.O., Ngugi. P.K., Ngumi. P.M., & Nanjala. C.S. (2017), The effect of operational efficiency as a financial distress factor on financial performance on commercial banks in Kenya, International Journal of Business & Management, 5(7),Available :http://www.internationaljournalcorner.com/index.php/theijbm/artcle/view/124264/85340. (accessed 10 January 2022).

Stierwald, A. (2010). *The impact of asset and liability management on Profitability: An Analysis of Large Australian Firms* (April 30, 2010). Melbourne Institute 39 Working Paper 3/10. *Available at SSRN: http://*

Sufian, F. & Chong, R. R. (2008). Determinants of Bank Profitability in a Developing Economy: Empirical Evidence from Philippines. *Asian Academy of Management Journal of Accounting and Finance.* [Online] 4(2) 91- 112. Available from: http://www.usm.my/journal/aamjaf/vol%204-2-2008/4-2-5.pdf.[Accessed: 06/06/2010

Suka, J. N. (2012). *The impact of capital adequacy on the financial performance of Commercial Banks quoted at the Nairobi Stock Exchange.* Unpublished thesis submitted to University of Nairobi.

Tee, E. (2017). Asset liability management and the profitability of listed banks in Ghana. *IOSR Journal of Economics and Finance (IOSR-JEF 8, (3) available at* .iosrjournals.org DOI: 10.9790/5933-0803040914

Tektas,A., & Gunay,G .(2005). Asset and liability management in financial crisis. T Tie *Journal o f Risk Finance*, 6(2), 135-149.University of New York

Tesfaye, B. (2014). The Determinants of Ethiopian Commercial Banks Performance. *European Journal of Business and Management, 6(14), 2222-1905.*

Trautmann, P. Y. (2006). *CAMELS rating. USAID-Funded Economic Governance II Project*. Report presented to CBI Bank Supervision Examiners.

Uhde, A.& Heimeshoff, U. (2009). Consolidation in Banking and Financial Stability in Europe: Empirical Evidence. *Journal of Banking & Finance*, Vol. 33 (7), 1299-1311.

Vaidya, P & Shahi, A (2001), "*Asset-liability managementin Indian banks*," Spandan

Vaidyanathan, R. (1999), Asset Liability Management: Issues and trends in Indian context," *ASCI Journal of Management,* 29 (1).

Vong, P. I. A., & Chan, H. S. (2009). Determinants of bank profitability in Macao. Macau Monetary Research Bulletin, 93 113.

Vossen B. (2010). *A study on Bank Liquidity Management***.** University at Albany, State

Wen, W. (2010) *Ownership Structure and Banking Performance*: New Evidence in China. University at Autònoma de Barcelona Departament D'economia de L'empresa, 2010.

Wong, T. C., Wong, J., & Leung, P. (2009). The foreign exchange exposure of Chinese banks. *China economic review, 20(2), 174-182*

Zikmund, W. (2003). Business Research Methods. Texas, USA: Harcourt College Publisher

APPENDICES

Appendix I: Commercial Banks in Kenya

1. African Banking Corporation Limited
2. Bank of Africa Kenya Limited
3. Bank of Baroda (Kenya) Ltd
4. Bank of India
5. Barclays Bank of Kenya Limited
6. Consolidated Bank of Kenya Ltd
7. Co-operative Bank of Kenya Limited
8. Credit Bank Limited
9. Development Bank of Kenya Ltd.
10. Diamond Trust Bank (K) Ltd.
11. Ecobank Kenya Limited
12. Equity Bank Kenya Limited
13. Family Bank Limited
14. First Community Bank Ltd
15. Guardian Bank Limited
16. Gulf African Bank Limited
17. Habib Bank AG Zurich
18. I & M Bank Ltd
19. Jamii Bora Bank Ltd
20. KCB Bank Kenya Limited
21. Middle East Bank Kenya Limited
22. M Oriental Bank Limited
23. National Bank of Kenya Ltd
24. NIC Bank PLC Group
25. Paramount Bank Limited
26. Prime Bank Ltd
27. SBM Bank (Kenya) Ltd
28. Stanbic Bank Kenya Limited
29. Standard Chartered Bank Kenya Limited
30. Transnational Bank PLC
31. UBA Kenya Bank Limited
32. Victoria Commercial Bank Limited
Source: *Central Bank of Kenya Bank Supervision Annual Report 2019*

Appendix II: Data Collection Sheet

Key word: A-Non-Performing Loans, **B**-Total Loans and **A/B**-Asset Quality

Banks-1-42 (Commercial Banks as listed in Appendix I)

Year	Bank	1	2	3	4	5	6	7	8	9	10
2010	A										
	B										
	A/B										
2011	A										
	B										
	A/B										
2012	A										
	B										
	A/B										
2013	A										
	B										
	A/B										
2014	A										
	B										
	A/B										
2015	A										
	B										
	A/B										
2016	A										
	B										
	A/B										
2017	A										
	B										

	A/B										
2018	**A**										
	B										
	A/B										
2019	**A**										
	B										
	A/B										