

**THE EFFECTS OF BANK SIZE COMPONENTS ON THE CREDIT RISK OF  
COMMERCIAL BANKS IN KENYA**

**BY**

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**DECLARATION**

This research project is my original work and has not been presented at any other University for an award.

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This project has been submitted for examination with my approval as the university supervisor.

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## **DEDICATION**

This research project is dedicated to my beloved parents, Vitalis Ouma Osano and Merab Achieng Ouma, and brother Victor Otieno for the undying support, sacrifice, understanding, and motivation, all of which have made the journey doable.

## **ABSTRACT**

Commercial banks improve and stabilize economies globally, thus leading to economic growth and development. Such benefits manifest in the form of financial intermediation, transaction facilitation, access to funds, and other services such as mortgages and letters of guarantee. Improvement in the stability of banks is, thus, expected to enhance the economy. Among the financial intermediaries operating in Kenya, commercial banks have remained the dominant group. Consequently, their distress or collapse is likely to have a lasting and detrimental repercussion on the domestic bourse, financial system, and economy. Entering into financial hurdles like in the case of Imperial Bank and Chase Bank can result in bank runs, and eventually, a financial crisis as witnessed in the 2007-2009 subprime mortgage crisis. Even though the local banking industry has remained relatively stable for the past three decades, commercial banks have exhibited an increase in NPLs. Thus, this study sought to establish the effects of bank size components on commercial banks' credit risk in Kenya. The study was based on the agency and the stewardship theories. This study adopted a descriptive research design, and the population comprises 42 Kenyan commercial banks as of December 2019. The research utilized secondary data obtained for the period between 2015 and 2019 and analyzed them using a multiple regression model. The study results revealed that asset base had a positive and significant effect on credit risk, while customer deposits had a positive and insignificant effect on credit risk among Kenyan commercial banks. The results further indicated that shareholders' equity had a negative and significant effect on credit risk among commercial banks in Kenya. The results further established a negative and significant association between capital adequacy and Kenyan commercial banks' credit risk. At the same time, liquidity had a positive and insignificant effect on credit risk among Kenyan commercial banks. The study, therefore, concluded that asset base, shareholder equity, and capital adequacy significantly affect Kenyan commercial banks' credit risk levels.

## **ACRONYMS AND ABBREVIATIONS**

**KBA:** Kenya Banker's Association

**CBK:** Central Bank of Kenya

**NPLs:** Non-performing loans

**GLS:** Gross Loans

**GDP:** Gross Domestic Product

**EU:** European Union

**SPSS:** Statistical Package for Social Sciences

**GLS:** Generalized least Square

**GCC:** Gulf Cooperation Council

**VIF:** Variance inflation factor

**ANOVA:** Analysis of Variance

## TABLE OF CONTENTS

|   |     |
|---|-----|
| <b>DECLARATION</b> .....                        | ii  |
| <b>ACKNOWLEDGMENT</b> .....                     | iii |
| <b>DEDICATION</b> .....                         | iv  |
| <b>ABSTRACT</b> .....                           | v   |
| <b>ACRONYMS AND ABBREVIATIONS</b> .....         | vi  |
| <b>TABLE OF CONTENTS</b> .....                  | vii |
| <b>CHAPTER ONE: INTRODUCTION</b> .....          | 1   |
| 1.1 Background of the Study .....               | 1   |
| 1.1.1 Bank Size Components .....                | 2   |
| 1.1.2 Credit risk.....                          | 3   |
| 1.1.3 Bank Size Components and Credit Risk..... | 4   |
| 1.1.4 The Kenyan Banking Sector .....           | 6   |
| 1.2 Research Problem .....                      | 7   |
| 1.3 Research Objectives.....                    | 9   |
| 1.3.1 General Objective .....                   | 9   |
| 1.3.2 Specific Objectives .....                 | 9   |
| 1.4 Value of the Study .....                    | 9   |
| <b>CHAPTER TWO: LITERATURE REVIEW</b> .....     | 11  |
| 2.1 Introduction.....                           | 11  |
| 2.2 Theoretical Review .....                    | 11  |
| 2.2.1 Agency Theory.....                        | 11  |
| 2.2.2 Stewardship Theory .....                  | 12  |

|   |           |
|---|-----------|
| 2.3 Determinants of Credit Risk of Commercial Banks .....       | 13        |
| 2.3.1 Credit Risk Environment .....                             | 14        |
| 2.3.2 Credit Policy .....                                       | 14        |
| 2.3.3 Risk Control Framework .....                              | 14        |
| 2.3.4 Bank Size .....   | 15        |
| 2.4 Empirical Literature .....                                  | 15        |
| 2.5 Conceptual Framework.....                                   | 20        |
| 2.6 Summary of Literature Review and Research Gaps .....        | 21        |
| <b>CHAPTER THREE: RESEARCH METHODOLOGY.....</b>                 | <b>23</b> |
| 3.1 Introduction.....   | 23        |
| 3.2 Research Design.....  | 23        |
| 3.3 Population .....  | 23        |
| 3.4 Data Collection .....                                       | 24        |
| 3.5 Data Analysis .....   | 24        |
| 3.5.1 Analytical Model .....                                    | 24        |
| 3.5.2 Operationalization of Variables .....                     | 25        |
| 3.5.3 Test of Significance .....                                | 26        |
| 3.6 Diagnostic Tests.....                                       | 26        |
| 3.6.1 Normality Test .....                                      | 26        |
| 3.6.2 Multicollinearity Test.....                               | 27        |
| 3.6.3 Homoscedasticity Test.....                                | 27        |
| 3.6.4 Autocorrelation Test .....                                | 27        |
| <b>CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION.....</b> | <b>28</b> |
| 4.1 Introduction.....   | 28        |
| 4.2 Response Rate.....  | 28        |



|   |           |
|---|-----------|
| 4.3 Descriptive Statistics.....                                   | 28        |
| 4.4 Diagnostic Tests.....   | 30        |
| 4.4.1 Normality Test.....   | 30        |
| 4.4.2 Multicollinearity Test.....                                 | 31        |
| 4.4.3 Homoscedasticity Test.....                                  | 31        |
| 4.4.4 Autocorrelation Test.....                                   | 32        |
| 4.5 Correlation Analysis.....                                     | 32        |
| 4.6 Regression Analysis.....                                      | 34        |
| 4.6.1 Model Summary.....  | 34        |
| 4.6.2 ANOVA.....  | 34        |
| 4.6.3 Regression Coefficients.....                                | 35        |
| 4.7 Interpretation of the Findings.....                           | 36        |
| <b>CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS ....</b> | <b>38</b> |
| 5.1 Introduction.....   | 38        |
| 5.2 Summary.....  | 38        |
| 5.3 Conclusion.....   | 39        |
| 5.4 Recommendations.....  | 40        |
| 5.5 Limitations of the Study.....                                 | 41        |
| 5.6 Suggestions for Further Research.....                         | 42        |
| <b>REFERENCES.....</b>  | <b>43</b> |
| <b>APPENDICES.....</b>  | <b>48</b> |
| Appendix I: Commercial Banks in Kenya.....                        | 48        |
| Appendix II: Study Data.....                                      | 49        |

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

Firm size fundamentally is the scale of operations with which a firm serves its customers. Size can manifest in different ways, such as the number and variety of products and services that a firm offers, the number of employees, or the size of facilities it uses to conduct its operations (Terraza, 2015). Firm size plays a quintessential role in the relationship a firm enjoys with its internal and external environment. Occasionally, this has sparked debates on the need to regulate firm size. Credit risk is the likelihood that an individual who has acquired an advance or credit facility or the counterparty to the transaction act in a manner that dishonors the agreed-upon terms and conditions. Such acts usually involve a loanee defaulting the interest payments or engaging in an activity that reduces a loan portfolio's value. Firm size has been linked to credit risk in the sense that, as a firm grows, managerial complexity increases, and firms tend to focus more on increasing the profit and scale of operations at the expense of minimizing risks such as credit risk. This trend was exhibited in the wake of the 2007 to 2009 financial contagion. Besides, managers often focus on increasing firm size to enjoy the prestige of managing huge enterprises, resulting in large entities with significant risk exposure. It is, therefore, possible that credit risk increases with firm size.

This study is anchored on two theories, the stewardship theory and the agency theory. According to agency theory, the interest of shareholders and managers are inherently divergent. Therefore, managers are likely to be growth-oriented for selfish reasons, such as enjoying the prestige of managing large entities. Conversely, the stewardship theory

presupposes that managers are loyal stewards and are continually seeking to serve shareholders' interests, such as increasing profits through firm size and operational growth. Globally, there have been many debates on the need to control and regulate firm size. During and after the 2007-2009 financial meltdown, debates intensified as the firm size was blamed for the collapse of significant banking industry institutions. Subsequently, several research studies have been conducted in the global context on the effect of size on credit risk. Some studies have found bank size to affect commercial banks' credit risk (Adusei, 2015). Locally banks have been exhibiting tremendous growth in the past decades because of deregulation and widespread adoption of technology, causing an exponential increase in their asset bases and loan facilities (CBK, 2018). Given the possible detrimental effect that firm size can have on financial institutions, it is thus prudent to investigate how size can affect banking entities' credit risk. Besides, banks' collapse can have extensive damage to the Kenyan financial system and economy, thus studying the Kenyan context.

### **1.1.1 Bank Size Components**

There are many definitions of firm size in research materials. However, for this research, it is described as the scale of operation with which a bank offers financial services to consumers within a financial system (Terraza, 2015; Laeven, Ratnovski & Tong, 2014). Assessing commercial banks' size is crucial because banks play a central role in all countries and are tightly monitored and regulated for various reasons. Banks' scale of operations is fundamental because banks service all sectors of an economy and are susceptible to stability risks, with far-reaching consequences for the financial markets, the economy, and societal welfare (Laeven, Ratnovski & Tong, 2014). Consequently, specific attention is usually paid to large banks. However, measuring bank size has often been a

widely debated area because many indicators require varied features. When looking at bank size and importance, the official sector documents and current academic research use the balance sheet totals. Industry analysts often use total revenues or market to measure firm size (Laeven, Ratnovski & Tong, 2014). It is thus, essential to select the appropriate measure of size. Schildbach (2017) posits that, the best indicators of measuring banks in the order of importance are revenues, equity capital, market capitalization, and total assets. However, the different measures of size aforementioned have their advantages and drawbacks. For this study, the researcher determined bank size using the natural log of bank size components, including assets, customer deposits, shareholders' equity, and turnover. The bank size components were determined for all commercial banks operating in Kenya (Adusei, 2015; Amidu and Wolfe, 2013).

### **1.1.2 Credit risk**

Credit risk is the chance that a counterparty to a loan or a loanee will fail to observe the terms of a loan, such as default payments (Duffie & Singleton, 2012). Therefore, it presents a risk of loss for the commercial banks due to nonperformance by customers and the respective counterparties on their financial obligations (Chen & Pan, 2012). Commercial banks' credit risk involves commercial and personal loans and advances such as credit guarantees and commitment, financial derivatives valuation, and other holdings. Such uncertainties can be detrimental to banks' financial soundness. Therefore, there is a need to adopt strategies to manage the risk. It is thus prudential to assume risk within a manageable range (Sandada & Kanhukamwe, 2016). One approach to reducing credit risk is introducing collateral. However, in the case of naked loans, the general credit standing and the borrower's good faith guarantee the lending (Sinkey & Greenawalt, 1991). According

to the CBK, most credit facilities in Kenya are unsecured, a significantly alarming situation. This situation is further exacerbated by the advent of mobile lending technology, giving many people with weak credit position access to loans (CBK, 2018). The credit risk of the commercial banks was measured using the ratio of NPLs to the gross advances of the respective banks (Tanda, 2015; Kharabsheh, 2019).

According to existing literature, various measures of credit risk exist. Volk (2013) quantified credit risk as the likelihood of default, as measured by probability values. In the study, Volk (2013) used data from various firms collected between 2007 and 2010. In the process, the researcher determined the probability that borrowers will default in period  $t$  since they failed to default in period  $t=1$ . The researcher used cash flow measures of profitability, solvency, and liquidity to incorporate firm-specific effects in the model. Credit risk can also be determined using the risk-weighted assets to net assets ratio (Hussein & Hassan 2005). This approach is justified because banks usually allocate their assets across varying risk categories, and this practice defines their level of credit risk. Terraza (2015) quantified credit risk as the net loans to total assets ratio. Afriyie and Akotey (2012) used NPLs to measure credit risk among deposit-taking banks in Nigeria. In their research, NPLs comprised overdue loans for 180 days and 90 days and loans that were virtually uncollectable.

### **1.1.3 Bank Size Components and Credit Risk**

Since the 1980s, the world economic system has transitioned through deregulation and technological innovation (Adusei, 2015). Technology has reduced information asymmetry, increased access to the mainstream financial system, and made many assets tradeable. Furthermore, deregulation and innovation made banks grow in size, with some having their

balance sheet almost doubled, thus altering their structure (Laeven, Ratvnski & Tong, 2014). The Kenyan commercial banks have increased their scale of operations, characterized by gradual abandonment of the brick-and-mortar model of operation and shifting to innovations such as agency banking and mobile banking, to grow their customer base and proliferate the scale of operations. According to CBK (2018), the number of loanee accounts has grown within the past ten years. Mobile loans have also increased as Kenyans can easily access credit facilities using the internet and mobile technology services. As of December 31, 2018, there were 7 million active mobile loan accounts worth more than 60 billion, making up 3% of the industry loans (CBK, 2018). Equally, the number of non-performing loans has steadily grown over the past years, increasing credit risk. Concurrently over the same period, the number of mergers and acquisitions has increased, leading to increased bank sizes. The use of technology also facilitates the increase in the scale of operations, and this situation increases the number of loans extended to individuals and entities whose creditworthiness is questionable. Therefore, the growing volume of operations is likely to be increasing the credit risk of banking firms.

According to Pervan and Visic (2012), the underpinning concept that connects credit risk and firm size is economies of scale. Large entities enjoy substantial bargaining control over their suppliers and clients, and usually, they increase their operations to increase their customer base and achieve diversification. Consequently, the banks are increasing the supply of consumer loans and, in many cases, lending individuals who cannot service their loans properly, a situation worsened by unfavorable economic conditions. Based on this conception, a positive association is thus anticipated between the above variables under investigation. However, some research studies posit that small entities are more efficient

than larger entities (Diaz & Sanchez, 2008), which contradicts the position held by other research regarding an increase in size and financial soundness.

#### **1.1.4 The Kenyan Banking Sector**

Kenya has an adequately developed banking sector (CBK, 2018). The sector, which the CBK regulates, had 43 banking entities consisting of a mortgage finance entity, commercial banks, and representative branches of international banks in December 2019 (CBK, 2019; Appendix II). The commercial banks were 42 in number, and among them, the CBK had taken statutory control over Charterhouse Bank Limited, while two banks, Imperial and Chase Banks, were in receivership phase. As of the end of 2018, the sector's aggregate assets, excluding the banks under statutory management and receivership, were Kshs 4.4 trillion. The number of local private commercial banks was 22, while that of the local public banks was 3, and these accounted for 63.8% and 3.2% of the sector's net assets, respectively (CBK, 2019). The distribution of commercial bank branches also decreased within the same period, with Nairobi registering the highest number (CBK, 2018).

Regarding the commercial banks' market share analysis, the Kenyan banks belong to three main peer categories according to the regulator's composite index (CBK, 2018). When computing the index, the CBK typically uses the number of loan and deposit accounts held by customers, the net balance sheet assets, capital reserves, the liability of deposits amounts, reserves, and the number of accounts for both deposits and loans. Entities with an index of 5% and beyond belong to the large banks' category, while banks with indices below 1% are in the small banks' category. Banks that have a composite index between 1% and below 5% are considered medium banks. According to this weighting, the Kenyan commercial banking segment had nine large banks controlling 70.28% of the market share,

10 medium banks controlling 21.22% of the market share, and 21 small banks controlling the remaining 8.50% (CBK, 2018). Within the sector, all the banking entities are unionized under the Kenyan Bankers Association (KBA), which lobbies for the industry's interest and makes a continuous effort to solve its members' different matters. Kenyan banks are also required to observe the relevant laws and are therefore required to comply with the Companies Act of 2015, The Central Bank Act of 2015, and the Banking Act of 2015 guide them.

The CBK, using its composite weighted index, classifies commercial banks in Kenya into three tiers ranging from one to three (CBK, 2019). The tier 1 entities mainly consist of old banks that have existed for many years, amassed significant assets in billions of dollars, and have millions of customers. There are 7 banks in tier 1 one category, which control 50% of the banking market (Appendix I), and have a composite index of 5% and above (CBK, 2020). The second tier institutions are medium-sized entities with an index of between 1% and 5%. Such banks are 10 in number and control approximately 41.7% of the banking market. Finally, the tier three group consists of 25 small banks, controlling the remaining 8.4% segment (Appendix I).

## **1.2 Research Problem**

Globally, banking entities perform the role of improving and stabilizing economies, thus leading to prosperity (Jokipii & Monnin, 2013). Such benefits manifest in financial intermediation between savers and borrowers, which creates capital, thus ensuring economic growth and development. Other roles that banks perform include transaction facilitation and access to funds. Bank stability is therefore vital and should be a key objective in any given economy or financial sector. In Kenyan, the banking sector and the



financial services market are drivers of the economic pillar of Vision 2030, which warrants the need to ensure that they are financially sound and stable.

Just as global banks have continued to grow in size, banks in developing nations like Kenya continue to display the same trend. Improvements such as the adoption of advanced technology and systems for the past two decades have increased banks' scale of operations, making them more extensive. As a result, Kenyan banks have shifted from traditional brick and mortar to contemporary modes such as mobile banking, internet banking, and automated teller machines (Aduda & Kingoo, 2012). Similarly, the number of loans issued to consumers has significantly increased over the years (CBK, 2018).

Moreover, some banks are resorting to mergers and acquisitions to improve their financial health and attain synergy (Joash & Nganjiru, 2015). In such instances, growth has been accompanied by an increased scale of operations, such as lending to individuals unable to service their loans, a situation heightened by the cutthroat competition among commercial banks. By the end of 2018, Kenyan banks had an aggregate of 7,185,965 loan accounts, gross loans of 2.483 trillion, and total non-performing loans (NPLs) of 316.712 billion, with household and trade sectors having 14% and 25% share of the NPLs, respectively (CBK, 2018).

Nonetheless, banks experienced significant instability in the past, especially during the 2007-2009 financial crisis, when many banks collapsed. The presented evidence to explain the variables responsible for the financial crisis showed that large banks were responsible for the meltdown, which significantly impacted all economies worldwide (Adusei, 2015). This evidence sparked debates concerning the need to regulate the size of banks to avoid another systemic meltdown. Globally, various studies have investigated bank size and

credit risk relationship. According to Adusei (2015), containing such financial institutions' size is essential to ensure their stability. Locally, there are limited studies on firm size and credit risk association, yet banks' growth remains upward. Thus, it is vital to establish the implications that Kenyan banks' growing size is likely to have on their credit risk as banks are continually involved in risk management. Such clarification may help avoid crisis and instability if firm size affects credit risk (Adusei, 2015) This research, therefore, attempts to ascertain if firm size components affect the credit risk of commercial banks operating in Kenya.

### **1.3 Research Objectives**

#### **1.3.1 General Objective**

To determine the effects of bank size components on the credit risk of commercial banks in Kenya.

#### **1.3.2 Specific Objectives**

- i. To determine the effect of asset base on credit risk
- ii. To determine the effect of shareholders' equity on credit risk
- iii. To establish the effect of customer deposits and credit risk

### **1.4 Value of the Study**

This paper is anticipated to benefit the current as well as future scholars by offering an in-depth understanding of the effect of bank size on credit risk, thus adding to the existing research. Consequently, thus be able to evaluate the need for monitoring and managing the relationship, if any, between size and the credit risk.

The paper will help commercial banks understand how firm size affects their credit risk. Consequently, bank managers will be able to adopt appropriate tactics and strategies necessary to manage credit risk. As a result, the banks remain financially sound as drivers of the economy and economic pillar of Vision 2030.

Furthermore, this paper is expected to influence policy. It will benefit policymakers, such as the CBK, to initiate appropriate policies by explaining how firm size affects credit risk, thereby adopting the strategies to regulate the sector and ensure its stability and prosperity.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter examines the theories informing the research. It also provides an empirical review whereby the studies done by other scholars in the area under investigation are examined in depth. The chapter begins with theoretical literature followed by a section on the analysis of existing empirical works, which comprise local, regional, and international studies. It then proceeds to illustrate the conceptual framework and summarize the entire section.

#### **2.2 Theoretical Review**

The theoretical review provides the theories attributed to other scholars' areas of study, as evidenced by the existing literature. This agency theory and stewardship theory inform this study.

##### **2.2.1 Agency Theory**

This theory, originated by Jensen and Meckling (1976), focuses on the agency relationship, which is the association between the agent and the principal. In this relationship, the principal delegates responsibility and authority to make decisions to the agent. In today's corporate world, the agent can be the manager, while the principal is the shareholder. It stems from what is known as the agency problem, a corporate finance concept that suggests that executive action typically deviates from maximizing shareholders' wealth (Jensen & Meckling, 1976). Therefore, managers and shareholders have incongruent goals, and without proper incentive, they are likely to self-aggrandize and build their own

empires. Such action may include too much risk-taking and building large enterprises to enjoy the prestige associated with it.

Since managers' action is directed towards personal gain (Jensen & Meckling, 1976), the increase in the firm size of institutions such as commercial banks is because of the managers' empire building. Therefore, bad governance inherently characterizes large banks, and managers usually increase firms' size to receive personal benefits such as the status of managing a big entity and increased compensation. For entities to address this problem, they need to monitor management's behavior as the agents to harmonize the principal and the agent's divergent goals. The agency theory thus predicts a negative correlation between the study variables. Nonetheless, agency theory is not without criticism. According to critics, the primary assumption of maximizing value is a partial worldview, and it overlooks the significant complexity of organizations, and this is dangerous and dehumanizing (Perrow, 1986). The theory also oversimplifies the agency relationship and provides a narrow contextual application, namely, the American corporate environment.

### **2.2.2 Stewardship Theory**

Davis, Donaldson, and Schoorman (1997) originated this theory, and they first presented it in the management literature in 1997. The theory originated as a criticism of agents' hypothesized shirking and selfishness in most of the literature, which seemingly was a terrible idea in the public caricature (Davis, Schoorman & Donaldson, 1997). As a postulate of the theory, executives and subordinates desire to meet all principals' requirements and prioritize collectivist behavior. Therefore, a steward wants to be loyal and useful and always put an organization's needs above personal interest. The theory

views an agent as a trusted member of the organization and is actively concerned with collective goals rather than individual needs.

Since there is congruency of goals, the agent is not likely to act opportunistically. The focus of the theory is to understand the attributes of and the conditions for good stewardship. This postulate thus reshapes the foundation of the agent-principal relationship. A stewardship structure is, therefore, cooperative, collective, and creates positive outcomes in the organization. Unlike the agency theory, which suggests that a self-aggrandizing and near-term increase in size may affect the firm size in the long haul, the stewardship theory posits that managers grow companies to achieve structure, convenience, and stability. Therefore, the theory suggests a direct relationship between the study variables.

However, like any theory, critics have established various limitations of the theory. According to critics, stewards' role, in theory, is oversimplified, thus unrealistic (Keay, 2017). Managers will not always assume the role of good stewards. They may occasionally use their powers and privileges to make decisions that favor their personal interest as under agency theory.

### **2.3 Determinants of Credit Risk of Commercial Banks**

The Basel Accord of 1999 posits that an appropriate credit risk strategy should cover the areas of credit risk environment, credit risk controls, credit risk measuring and monitoring process, and extending credit under a sound credit policy. However, these tactics may differ in their application across different banks. Banks size is also considered to contribute to credit risk, which manifests in the form of managerial perception and laxity.

### **2.3.1 Credit Risk Environment**

The credit risk environment shapes the level of risk of an entity. The top management usually establishes this environment, and it involves reviewing and implementing the organization's credit risk strategy. Managers should ensure they implement the credit risk policies, which the boards of directors have instituted. Furthermore, banks must determine and control all the risks they face. Lack of a controlled risk environment is thus likely to subject a bank to unnecessary credit risks.

### **2.3.2 Credit Policy**

The Basel Committee of 1999 held that banks need a defined and sound credit granting practices. Such practices need to identify the target market segments and give an understanding of the borrowers and counterparties. Moreover, they should determine the limits for extending credit to borrowers depending on their characteristics and as a safety measure to minimize default risks. Banks also need to establish the procedure for extending loans to new applicants, refinancing, and renewing existing loans. Banks should also be careful with Individuals and businesses with questionable credit background.

### **2.3.3 Risk Control Framework**

The risk control framework also shapes credit risk. Banks need to have a system that monitors the credit-issuing process and practices. They should have information systems and monitoring systems to control the credit-issuing activities. These measures help to monitor the loan granting process and to adopt corrective measures when there is a need. Banks also need to anticipate changes in the economic environment to understand individuals' risk exposure and institute the necessary buffers.

### **2.3.4 Bank Size**

As banks increase in size, bureaucracy and organizational complexity can cause lax in the credit policies. The increased competition usually makes banks seek various ways to gain more market share and remain dominant such as aggressively issuing out loans. Often banks resort to issuing unique loans to individuals whose credit standings are questionable, as was seen in the subprime mortgage crisis. Moreover, many large banks in a concentrated market can cause unsafe credit policies to stay competitive. Besides, managers may assume that their institutions are proofed from collapsing since the regulator can rescue them during distress.

### **2.4 Empirical Literature**

Adusei (2015) tried to fill a research void created by a lack of previous research on the link between bank size and the financial soundness of the banks operating in urban and rural Ghana. Using a quantitative research design, Adusei (2015) analyzed the already available secondary from 112 banks in the Ghanaian commercial banking market. The timeline for the research was between 2009 and 2013. The researcher then employed the Z-score to measure stability among the target population. Among the many possible size measures, Adusei settled on the natural log of net assets to represent the size variable. Finally, the researcher undertook a regression analysis using SPSS, and the findings thus affect the ongoing conversation on restricting the scope of commercial banks.

Laeven, Ratvnoski, and Tong (2016) investigated the stability-size connection among commercial banks using international data from various countries. The investigators focused their attention on systematic and standalone variables and their influence on risk. The research adopted a quantitative research design and used secondary data from 52



countries and a sample size of 1,343 financial institutions. The researcher, to synthesize the data, employed the SPSS toolkit. According to the findings, banks' systematic risk grows as they increase in their size, and thus, it is related to bank size. The study, therefore, contributes to the ongoing debate on the need to establish system-wide risk-based capital requirements on banks.

Köhler (2015) analyzed how business models affected the banking entities' stability and soundness within the 15 European Union (EU) countries. After using secondary data and SPSS toolkit to synthesize the acquired secondary data, the findings showed that the stability and soundness of banks in the region increased as banks sought more non-interest income. The study incorporated both listed and unlisted banks since the latter category is where most EU banks fall. According to the findings, banks become more stable if they venture into non-interest income. This trend was shared among cooperative and savings banks.

Among the investment banks studies by Köhler (2015), instability increased their non-interest income. Therefore, it is essential to categorize banking institutions depending on their operations model when examining the correlation between non-interest incomes and banking stability. Based on the analyzed data, the overall finding was that commercial banking entities' bank size and financial stability had a negative correlation. However, according to the researcher, there was a need for further research on other business models to enable a more generalized conclusion.

Altaee, Talo, and Adam (2013) studied commercial banks' stability within the Gulf Cooperation Nations (GCC). The research focuses on the after, during, and before the financial crisis. The researchers used Z-score in the place of the predictor variable in

assessing the soundness and stability. During the analysis, various microeconomic and macroeconomic factors were adopted in ascertaining how they affect the stability of banking firms. The population for the investigation comprised all banking entities, both Sharia-compliant and conventional banking firms. The study timeline was between 2003 and 2010 to include the time before the crisis when the contagion was active and after it ended. The research findings indicate no stability shifts among the banks in the post, during, and pre-crisis periods. Nonetheless, the traditional banking firms seemed to have greater financial strength than their Sharia-compliant counterparts did in the pre-meltdown phase. In conclusion, it was established that a lack of a statistically relevant association in the firm size and stability relationship, thus making their findings inconclusive.

Bhattarai (2016) researched how lending risk affected the performance of commercial banking entities in Nepal. To conclude, the researcher analyzed data obtained from 14 Nepalese banks for the period between 2010 and 2015. Bhattarai used SPSS to implement the analytical model. According to the findings, an inverse relationship between NPLs and company performance is significant. Consequently, risk measures affect firm performance among Nepalese commercial banking entities.

Tehulu and Olana (2014) used empirical data in their study to address the issue of limited research on firm-specific causes of credit risk among commercial banking entities in Ethiopia. The fact that credit risk significantly threatens the development of commercial banking institutions also motivated the study. The researcher used balanced panel data from 10 commercial banking entities and a GLS regression to analyze it. The study period of the research was between 2007 and 2011. According to the regression output, the variable of bank size and credit risk had an inverse and statistically significant association.

Sandada and Kanhukamwe (2016) investigated the factors responsible for increasing credit risk among Zimbabwe's commercial banking entities. The research aimed to determine variables that had a role in increasing credit instability in the Zimbabwean banking segment. The population comprised the financial institutions operating in Zimbabwe, and these included thirteen commercial banks, one savings bank, and three building and savings society. The study anchored itself on quantitative research design and analyzed the available data using SPSS.

Sandada and Kanhukamwe (2016) studied the growing credit risk in Zimbabwe, and all banks in the country made up the population. According to the regression output, the most deterministic factors were the bank-specific factors accompanied by macroeconomic elements. Based on the researcher's comments, the alarming increase in Zimbabwe's credit default levels motivated the investigation. Therefore, the findings were crucial for understanding how to address the problems associated with increased credit risk. Banks should thus manage the bank-specific variables like the size to contain Zimbabwe's growing credit risk levels.

Mpofu and Nikolaidou (2018) investigated the variables responsible for commercial banking entities' credit risk within 22 nations in the African, sub-Saharan region. The researchers examined macroeconomic contributors to instability in the form of credit risk within various countries. The scholars adopted a quantitative approach and used secondary data for the analysis. The duration covered by the research was between 2000 and 2006. The data synthesis outcome depicted a significant reduction effect on NPLs to gross loans ratio when the real GDP rate increased.

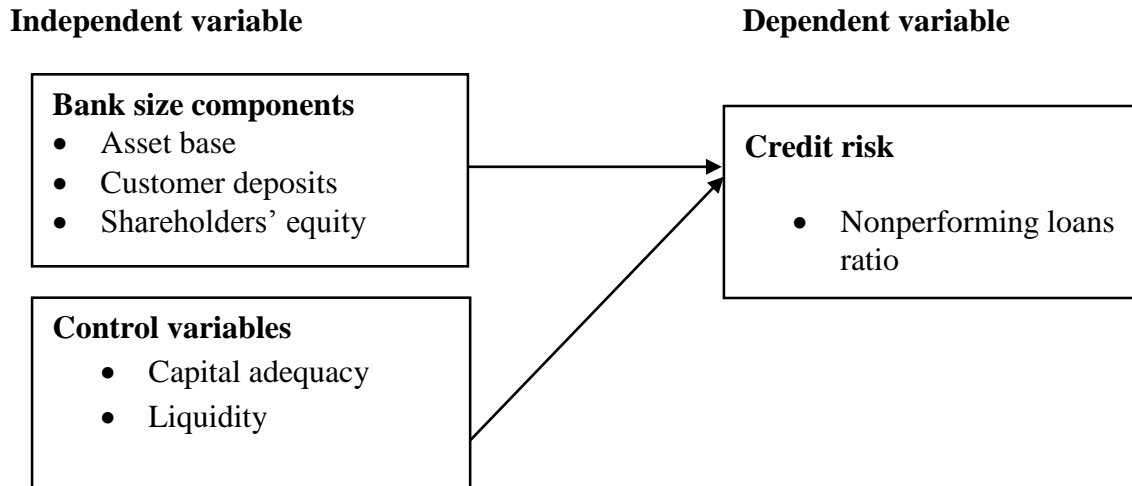
Odundo and Orwaru (2018) did an empirical study to bridge the gap caused by limited local studies on the association between the variables of economic stability and firm size among commercial banking firms. The research objective was to ascertain whether size significantly affects Kenya banks' financial stability as represented by capital strength, return on assets, and reliance on deposits. Using a correlation design, the researchers targeted all the banking firms listed on the Kenyan bourse between 2011 and 2017. According to the SPSS regression output, economic stability and firm size variables were significantly negatively correlated among commercial banking firms. This finding backs the ongoing debate on the need to regulate the size of commercial banking firms. However, the research limitation is its failure to incorporate all elements forming the population, thus making it fully representative of the banking industry.

According to Warue (2013), firm-specific factors have a notable effect on the NPLs among commercial banking entities in the Kenyan banking segment. This conclusion was reached following the researcher's effort to determine a possible link between NPLs, which acted as the predicted factor, and firm-specific and macroeconomic elements as the predicted variables. The study population consisted of 44 commercial banking entities that were operational between 1995 and 2009, and the research design was of a quantitative kind. Furthermore, using an econometrics approach by incorporating fixed-effect and pooled pane models, the predictor and predicted variables' relationship was determined. Thus, managers ought to focus their energy on monitoring and control such variables. The bank-specific factors analyzed in the research included bank structure, credit risk management techniques, and quality management.

According to the findings of Adusei (2015), the study variables are positively correlated. The study, therefore, supports the agency theory, which envisages a positive relationship between two variables of company size and economic stability. The findings of Laeven, Ratvnoski also support the Agency theory, and Tong (2016), Köhler (2015), Tehulu and Olana (2014), Sandada and Kanhukamwe (2016), Odundo and Orwaru (2018), and Warue (2013) supported the same prediction by the Agency theory. Banks should, therefore, incur agency costs and monitor their size according to these studies. Conversely, the studies by Bhattarai (2016) suggested an inverse relationship between the research variables being investigated. Therefore, this finding supports the stakeholders' theory and refutes the idea of empire building by managers at the shareholders' expense. Furthermore, Altaee, Talo, and Adam (2013) established a lack of a significant connection between the study variables, thus supporting none of the theoretical literature.

## **2.5 Conceptual Framework**

This conceptual framework of this study comprises bank size components as the independent variable measured using asset base, customer deposit, and shareholders' equity. In contrast, credit risk determined using the non-performing loans ratio was the dependent variable. The study also incorporated capital adequacy and liquidity as control variables. Figure 2.1 shows the conceptual framework.



**Figure 2.1: Conceptual Model**

**Source: Author (2020)**

## **2.6 Summary of Literature Review and Research Gaps**

This research study was anchored on three underlying theories: the agency and stewardship theories, all of which attempt to elucidate the association between the size of banking entities and their performance. International and local empirical studies then complement the above theories. The chapter then concludes with a conceptual framework, and the research gap the paper intends to bridge. Debates have heightened regarding the need to regulate banks' size and the upward trend in NPLs. Nonetheless, the local studies on the variables are significantly limited. The available regional and global studies available research suggest mixed findings on the relationship between the study variables, particularly among commercial banking entities. Some studies have established a positive relationship between firm size and credit risk (Saunders, Strock & Travlos, 1990; Megginson 2005; Chen, Steiner & Whyte, 1998). Other studies, such as Tehulu and Olana (2014), propose a negative association between the variables. Furthermore, other studies have established a lack of a statistically relevant relationship between the variables (Altaee,

Talo & Adam, 2013). Moreover, the theoretical reviews also show opposing perspectives, especially the agency and the stewardship theory. As demonstrated by the appositions and limited local research, these research gaps form the basis for this research.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This section presents the study methodology the researcher has adopted. It then introduces the population under investigation and its attributes, the data collection method, the research design, the data type, and the statistical analysis tool. Lastly, it describes the techniques used to analyze data as well as the regression diagnostics.

#### **3.2 Research Design**

Researchers can adopt various research designs to guide their research, and the choice usually depends on the nature of the investigation (Zikmund, Carr & Griffin, 2013). This study assumed a descriptive research design, under which the investigator collected data with the sole purpose of exploring the effect of one variable on another. In this particular study, the scholar aims at explaining the relationship, if any, between the variables under scrutiny (Creswell & Creswell, 2017). The research utilized secondary data for the period between 2015 and 2019.

#### **3.3 Population**

This study's population consists of all commercial banks in Kenya, which were operational between 2015 and 2019. According to CBK (2019), Kenya had 42 commercial banks in December 2019 (Appendix I). The population of Kenya banks was small, which made a census study more feasible. When the population is small, a selected sample is likely to be unrepresentative of the population under investigation. Thus, since the population of the banking entities in Kenya was relatively small and variable, it was suitable to adopt the census approach.



### **3.4 Data Collection**

The research utilized secondary data obtained from the yearly financial publications of the banking entities and the CBK. The data to be obtained covered the period between 2015 and 2019 and entailed data on assets, customer deposits, capital adequacy, liquidity, shareholder equity, loans and advances, and gross NPLs. Five years was used, as the duration was sufficient for commercial banks to change the scale of their operations significantly.

### **3.5 Data Analysis**

Data analysis begins once the researcher gets the appropriate data and ends when the researcher processes and interprets it (Harding, 2018). The study used multiple regression to analyze the relationship between firm size components and credit risk for all Kenyan commercial banks.

#### **3.5.1 Analytical Model**

The study employed a multivariate model to ascertain the effect, if any, between the study variables. The model is designed to test the relationship between local commercial banking entities' bank size components and their corresponding credit risks. The regression model that was adopted in analyzing data was as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \varepsilon$$

Whereby;

$Y$  = the NPLs to Gross Loans,

$\beta_0$  = a constant and represent the value of  $Y$  when  $X$  equals zero,

$X_1$  = Natural log (Ln) of the banks' total assets

$X_2$  = Natural log (Ln) of customer deposits

$X_3$  = Natural log (Ln) of shareholders' equity

$X_4$  = Capital adequacy

$X_5$  = Liquidity

$\beta_1, \beta_2, \beta_3, \beta_4,$  and  $\beta_5$  represents the regression coefficients

$\varepsilon$  is the error term.

### 3.5.2 Operationalization of Variables

The metric that determined credit risk, which was the y-variable, was the ratio of NPLs to gross loans. On the other hand, the logs of assets, shareholders' equity, and customer deposits represented firm size components, which was the independent variable. Capital adequacy and liquidity ratios were incorporated as control variables.

**Table 3.1: Operationalization of Variables**

| <b>Variable</b>             | <b>Indicator</b>     | <b>Operational definition</b>   | <b>Measures</b>   |
|-----------------------------|----------------------|---|---|
| <b>Dependent variable</b>   | Credit risk          | Risk of loss for the commercial banks due to nonperformance by customers                                  | The ratio of NPLs to gross loans and advances   |
| <b>Independent variable</b> | Bank size components | The scale of operation with which a bank offers financial services to consumers within a financial system | Natural log (ln) of assets<br>Natural log (ln) of customer deposits<br>Natural log (ln) of shareholders' equity |
| <b>Control variables</b>    | Capital adequacy     | Is the minimum amount of capital the firm should maintain   | Capital adequacy ratio  |

|  |           |   |                 |
|--|-----------|---|-----------------|
|  |           | to conduct business prudently n<br>it is an important consideration                                     |                 |
|  | Liquidity | Entails the cash balance at the<br>bank's disposal to settle the<br>short-term maturing<br>obligations. | Liquidity ratio |

**Source: Researcher (2020)**

### **3.5.3 Test of Significance**

The F-test and T-test were used to assess for statistical significance. The F test assessed the significance as well as the sustainability of the regression equation. Similarly, the t-test assessed the individual significance of the regression coefficients.

### **3.6 Diagnostic Tests**

This research performed various diagnostics to ascertain if the assumptions of linear regression hold before performing data analysis and interpreting results. This paper checked for the assumption of normality, homoscedasticity, autocorrelation, and the absence of multicollinearity.

#### **3.6.1 Normality Test**

For a researcher to make a valid inference from a regression analysis, an assumption of normality is made (Haddad, Rached, Jajou & Hage, 2019). Normality means that the distribution of the residuals of the regression follows a normal distribution. Using the relevant data, the researcher used the Shapiro-Wilk to confirm the normality of the variables. The test should not be significant for the assumption of normality to hold.

### **3.6.2 Multicollinearity Test**

If two or more independent variables are linearly related, there is multicollinearity (Haddad, Rached, Jajou & Hage, 2019). It is usually a problem since it undermines the significance of the independent variable. The research used the variance inflation factor (VIF) values to check for multicollinearity for every predictor variable. When testing the multicollinearity the assumption, the VIF values equal to or greater than 10 demonstrates multicollinearity, and thus, the assumption is violated.

### **3.6.3 Homoscedasticity Test**

Homoscedasticity test is typically used to determine if the residuals are equally distributed, or bundle up or spread out for specific values (Reddy & Surma, 2015). Heteroscedasticity needs to be taken into account for efficient inference in regression models. The test was carried out to determine the variability in variables by observing the error terms. The Breusch-Pagan / Cook-Weisberg test was used in assessing homoscedasticity.

### **3.6.4 Autocorrelation Test**

Autocorrelation (serial correlation) occurs when the observation pair's error terms are not independent of each other (Wooldridge, 2015). This test was done to ascertain the behavior of the error term in subsequent years. The research study used the Breusch-Godfrey test to assess for serial correlation.

## **CHAPTER FOUR**

### **DATA ANALYSIS, RESULTS AND INTERPRETATION**

#### **4.1 Introduction**

This chapter presents the findings and outcomes of the analyzed data. It thus comprises the results of the descriptive statistics and the test of assumption under diagnostic tests. The chapter further presents the outcomes of regression analysis and correlation analysis results and, finally, an interpretation of the study results.

#### **4.2 Response Rate**

The study targeted the 42 commercial banks as of December 31, 2019. However, the researcher managed to obtain complete data from only 36 commercial banks, which had been in operation for the entire five-year period. During the study period, some banks were acquired, other merged, new banks were also licensed, with others, being statutory managed and subsequently liquidated. The 36 banks led to an 85.71% response rate, sufficient for the study since it was more than 50% (Mugenda & Mugenda, 2008). According to Mugenda and Mugenda (2008), a 50% response rate is satisfactory for analysis and publication, a 60% response rate is good, and a 70% is excellent.

#### **4.3 Descriptive Statistics**

This section presents the summary statistics results comprising the maximum and minimum values, the mean, standard deviation, kurtosis, and skewness. Table 4.1 represents the results

**Table 4.1: Descriptive Statistics**

| <b>Variable</b>      | <b>N</b> | <b>Min</b> | <b>Max</b> | <b>Mean</b> | <b>Std.<br/>Dev.</b> | <b>Skewness</b> | <b>Kurtosis</b> |
|----------------------|----------|------------|------------|-------------|----------------------|-----------------|-----------------|
| Credit risk          | 180      | .000       | .795       | .16385      | .143187              | 1.706           | 2.989           |
| Assets base          | 180      | 8.541      | 18.054     | 11.25676    | 2.032438             | 1.403           | 2.411           |
| Customer deposits    | 180      | 7.574      | 13.177     | 10.48068    | 1.372849             | .175            | -1.140          |
| Shareholders' equity | 180      | 6.314      | 11.491     | 9.00427     | 1.316755             | .170            | -1.197          |
| Capital adequacy     | 180      | -.220      | .540       | .21167      | .095831              | -.133           | 2.570           |
| Liquidity            | 180      | -.017      | 1.032      | .41362      | .183886              | .409            | .653            |

**Source: Study Data (2020)**

According to Table 4.2 above, the average value for credit risk was 0.16385 (SD=0.143187), with a minimum value of 0.000, indicating the absence of non-performing loans and a maximum of 0.795, respectively. The mean value of 0.16385 indicates that the average non-performing loan ratio (NPLR) for the banks during the considered study period was 16.385%. Subsequently, the asset base average value was 11.25676 (SD=2.032438), with a minimum value of 8.541 and a maximum value of 18.054. The mean value for customer deposits was 10.48068 (SD=1.372849), while its minimum and maximum values were 7.574 and 13.177, respectively. Shareholders' equity had an average value of 9.00427 (SD=1.316755), a minimum value of 6.314, and a maximum value of 11.491, whereas the average value for capital adequacy was 0.21167(SD=0.095831), with

its minimum and maximum values being -0.220 and 0.540, respectively. The average value for liquidity was 0.41362 (SD=0.183886), with minimum and maximum values of -0.017 and 1.032, respectively. Finally, all the kurtosis and skewness values lie between -3 and +3, thus indicating that the study's data was distributed normally.

#### 4.4 Diagnostic Tests

Various diagnostics tests were carried out to ascertain whether the linear regression assumptions were held before performing data analysis and interpreting results. Thus, the assumptions of normality, homoscedasticity, autocorrelation, and the absence of multicollinearity were assessed.

##### 4.4.1 Normality Test

Normality entails an assessment of the distribution of the residuals of the regression follows a normal distribution. The researcher used the Shapiro-Wilk to confirm the normality of the variables. The results were as follows

**Table 4.2: Normality Test**

|                       | Shapiro-Wilk |     |      |
|-----------------------|--------------|-----|------|
|                       | Statistic    | df  | Sig. |
| Standardized Residual | .447         | 180 | .078 |

**Source: Study Data (2020)**

The Shapiro-Wilk test results in table 4.2 show that the P-value was  $0.078 > 0.05$ , respectively. This value indicates that the null hypothesis of the data not being normally distributed was rejected. The findings thus indicate that the study's data was normally distributed.

#### 4.4.2 Multicollinearity Test

In this study, VIF values for every predictor variable was used to test for multicollinearity.

Table 4.3 presents the results.

**Table 4.3: Multicollinearity Test**

| Variable             | Tolerance | VIF   |
|----------------------|-----------|-------|
| Assets base          | .598      | 1.671 |
| Customer deposits    | .444      | 2.252 |
| Shareholders' equity | .549      | 1.821 |
| Capital adequacy     | .432      | 2.314 |
| Liquidity            | .639      | 1.565 |

**Source: Study Data (2020)**

The outcome of the multicollinearity test in Table 4.3 indicates that the asset base had a VIF value of 1.671, while customer deposits, shareholders' equity, capital adequacy, and liquidity had VIF values of 2.252, 1.821, 2.314, and 1.565, respectively. A threshold value of 10 is typically recommended to indicate multicollinearity. Therefore, since VIF values were less than 10, there was no multicollinearity among the study variables.

#### 4.4.3 Homoscedasticity Test

This test is typically done to ascertain the variability in study variables by observing the error terms. In this study, the Breusch-Pagan/Cook-Weisberg test was used to test for homoscedasticity. Table 4.4 presents the results

**Table 4.4: Homoscedasticity Test**

| Breusch-Pagan test for heteroscedasticity |
|---|
| Test statistic: LM = 3.586505,            |



|  |
|--|
| with p-value = $P(\text{Chi-square}(5) > 3.586505) = 0.464848$ |
|--|

**Source: Study Data (2020)**

According to the Breusch-Pagan test outcomes in table 4.4 above, the P-value is 0.464848 > 0.05, thus a rejection of the null hypothesis that the data is not homoscedastic. The values indicate that the data is not heteroscedastic.

**4.4.4 Autocorrelation Test**

An autocorrelation test was carried out to determine the behavior of the error term in subsequent years. The study used the Breusch-Godfrey test to assess for serial correlation.

Table 4.5 shows the results

**Table 4.5: Autocorrelation Test**

|   |
|---|
| <b>Breusch-Godfrey test for first-order autocorrelation</b> |
| Test statistic: LMF = 0.2578382                             |
| with p-value = $P(F(1,173) > 0.2578) = 0.61160$             |

**Source: Study Data (2020)**

The Breusch-Godfrey test outcomes for first-order autocorrelation in table 4.5 show a P-value of 0.61160 > 0.05, thus a rejection of the null hypothesis, that the data is serially correlated. The outcomes imply that autocorrelation is not present in the data set.

**4.5 Correlation Analysis**

A correlation analysis was also performed to ascertain the association among the study variables. Table 4.6 shows the outcomes.

**Table 4.6: Correlation Matrix**

|  | <b>Credit risk</b> | <b>Assets base</b> | <b>Customer deposits</b> | <b>Shareholders' equity</b> | <b>Capital adequacy</b> | <b>Liquidity</b> |
|--|--------------------|--------------------|--------------------------|-----------------------------|-------------------------|------------------|
| Credit risk  | 1                  |                    |                          |                             |                         |                  |
| Assets base  | -.042              | 1                  |                          |                             |                         |                  |
| Customer deposits  | -.320**            | .624**             | 1                        |                             |                         |                  |
| Shareholders' equity   | -.442**            | .580**             | .558**                   | 1                           |                         |                  |
| Capital adequacy   | -.432**            | -.214**            | -.170*                   | .015                        | 1                       |                  |
| Liquidity  | -.246**            | .156*              | .318**                   | .356**                      | .423**                  | 1                |
| **. Correlation is significant at the 0.01 level (2-tailed). |                    |                    |                          |                             |                         |                  |
| *. Correlation is significant at the 0.05 level (2-tailed).  |                    |                    |                          |                             |                         |                  |

**Source: Study Data (2020)**

Table 4.6 shows that the association between asset base and credit risk was weak and negative (-0.042), whereas the correlation between customer deposits and credit risk was also weak and negative (-0.320), respectively. Furthermore, the correlations between shareholders' equity, capital adequacy, liquidity, and credit risk are weak and negative, as shown by correlation coefficients of -0.442, -0.432, and -0.246 correspondingly. Based on the results, all correlation coefficients were less than 0.7; hence, the signal that multicollinearity was not present among the study variables.

## 4.6 Regression Analysis

A regression model was derived to determine the relationship between the variables. The outcomes were as follows

### 4.6.1 Model Summary

**Table 4.7: Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .649 <sup>a</sup> | .422     | .405              | .110449                    |

a. Predictors: (Constant), Liquidity, Assets base, Capital adequacy, Shareholders equity, Customer deposits

b. Dependent Variable: Credit risk

#### **Source: Study Data (2020)**

According to Table 4.7, the value for R squared (coefficient of determination) was 0.422, and this indicates that the considered explanatory variables (liquidity, assets base, capital adequacy, shareholders equity, customer deposits) accounted for 42.2% of the variation in the credit risk (dependent variable). Thus, the other variation (57.8%) is explained by other variables not considered in the study.

### 4.6.2 ANOVA

**Table 4.8: ANOVA**

| Model |            | Sum of Squares | df | Mean Square | F      | Sig.              |
|-------|------------|----------------|----|-------------|--------|-------------------|
| 1     | Regression | 1.547          | 5  | .309        | 25.368 | .000 <sup>b</sup> |

|          |       |     |      |  |  |
|----------|-------|-----|------|--|--|
| Residual | 2.123 | 174 | .012 |  |  |
| Total    | 3.670 | 179 |      |  |  |

a. Dependent Variable: Credit risk

b. Predictors: (Constant), Liquidity, Assets base, Capital adequacy, Shareholders equity, Customer deposits

**Source: Study Data (2020)**

The ANOVA results in table 4.8 show an F statistics value of 25.368, which is significant, as shown by a P-value of  $0.000 < 0.05$ , respectively. The model is thus fit and suitable to analyze the relationship between the variables.

#### 4.6.3 Regression Coefficients

**Table 4.9: Regression Coefficients**

| Model                | Unstandardized |            | Standardized | t      | Sig. |
|----------------------|----------------|------------|--------------|--------|------|
|                      | Coefficients   |            | Coefficients |        |      |
|                      | B              | Std. Error | Beta         |        |      |
| (Constant)           | .636           | .087       |              | 7.341  | .000 |
| Assets base          | .012           | .005       | .173         | 2.326  | .021 |
| Customer deposits    | .028           | .029       | .272         | .992   | .323 |
| Shareholders' equity | -.091          | .028       | -.834        | -3.200 | .002 |
| Capital adequacy     | -.582          | .131       | -.390        | -4.442 | .000 |
| Liquidity            | .080           | .056       | .103         | 1.422  | .157 |

a. Dependent Variable: Credit risk

**Source: Study Data (2020)**

According to the coefficient results, asset base had a positive ( $B=0.012$ ) and significant ( $P\text{-value} = 0.021 < 0.05$ ) effect on credit risk. In comparison, customer deposits had a positive ( $B=0.028$ ) and insignificant ( $P\text{-value} = 0.323 > 0.05$ ) effect on credit risk among Kenyan commercial banks. The results further indicate that shareholders' equity had a negative ( $B=-0.091$ ) and significant ( $P\text{-value} = 0.002 < 0.05$ ) effect on credit risk among Kenyan commercial banking entities. The results further indicate a negative ( $B=-0.582$ ) and significant ( $P\text{ value}=0.000 < 0.05$ ) between capital adequacy and Kenyan commercial banks' credit risk. Lastly, liquidity had a positive ( $B=0.080$ ) and insignificant ( $P\text{ value}=0.157 > 0.05$ ) effect on credit risk among Kenyan commercial banks.

#### **4.7 Interpretation of the Findings**

Based on the study findings, asset base had a positive ( $B=0.012$ ) and significant relationship with credit risk among Kenyan commercial banks. Thus, this finding indicates that a unit increase in the bank's asset base positively and significantly increases bank performance by 0.012 units. This finding agrees with Laeven, Ratvnoski, and Tong (2016), who indicated that banks' systematic risk grows as they increase in their size, and thus, it is related to bank size. Sandada and Kanhukamwe (2016) concluded that banks should manage the bank-specific variables like the size to contain the growing credit risk levels. Secondly, the study found that customer deposits had a positive ( $B=0.028$ ) but insignificant relationship with credit risk among Kenyan commercial banks. Therefore, this finding indicates that unit increase in customer deposits positively but insignificantly increases bank performance by 0.028 units. A study by Köhler (2015) indicated that commercial banking entities' bank size and financial stability had a negative correlation. Bhattarai (2016) also found an inverse relationship between NPLs and company performance.

Thirdly, study results established a negative ( $B=-0.091$ ) and significant relationship between shareholders' equity and credit risk among Kenyan commercial banks. Therefore, this finding indicates that unit increase in shareholders' equity negatively and significantly reduces bank performance by 0.091 units. In their study, Altaee, Talo, and Adam (2013) established a lack of a statistically relevant association between firm size and stability. Tehulu and Olana (2014) documented that bank size and credit risk had an inverse and statistically substantial association.

Further, the findings revealed a negative ( $B=-0.582$ ) and significant relationship between capital adequacy and credit risk among Kenyan commercial banks. Thus, the finding indicates that a unit increase in capital adequacy negatively and significantly reduces bank performance by 0.582 units. However, Laeven, Ratvnoski, and Tong (2016) indicated that capital adequacy positively affects banks' profitability, demonstrating that capitalization can readily cushion the firm against financial losses in a volatile deposit-taking business environment.

Lastly, the findings established that liquidity had a positive ( $B=0.080$ ) and an insignificant relationship with credit risk among Kenyan commercial banks. Therefore, this finding indicates that unit increase in bank liquidity positively but insignificantly increases bank performance by 0.080 units. However, Blankenburg and Palma (2009) indicated that liquidity significantly affects the entity's profitability. Moreover, they held that the enterprise should have adequate cash balances as it greatly affects the earnings since part of it is given out as dividends to the shareholders.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION, AND RECOMMENDATIONS**

#### **5.1 Introduction**

This section presents a comprehensive summary of the study results, the conclusions as per the research findings, recommendations, study limitations, and further research suggestions.

#### **5.2 Summary**

This study sought to determine the effects of bank size components on commercial banks' credit risk in Kenya. The study was based on the agency and stewardship theories. This study adopted a descriptive research design, and the population comprised of the 42 Kenyan commercial banks as of December 2019. The research utilized secondary data obtained for the period between 2015 and 2019 and analyzed using the multiple regression model. Complete data was obtained from 36 commercial banks, which had been in operation for the entire five-year period hence an 85.71% response rate, which was considered sufficient for the study.

The summary statistics results revealed that the mean value for credit risk was 0.16385, while the average value for asset base was 11.25676. According to the results, the mean value for customer deposits was 10.48068, whereas shareholders' equity had an average value of 9.00427. Further, the average value for capital adequacy was 0.21167, whereas the average value for liquidity was 0.41362, respectively.

The correlation results revealed that the correlation between asset base and credit risk was weak and negative. Similarly, the correlation between customer deposits and credit risk

was also weak and negative, respectively. The correlations results also indicated that credit risk negatively correlated with shareholders' equity, capital adequacy, and liquidity.

The regression coefficient results revealed that asset base had a positive and significant (effect on credit risk, while customer deposits had a positive and insignificant effect on credit risk among Kenyan commercial banks. The results further indicate that shareholders' equity had a negative and significant effect on credit risk among commercial banks in Kenya. The results further indicate a negative and significant between capital adequacy and Kenyan commercial banks credit risk. Lastly, liquidity had a positive and insignificant effect on credit risk among Kenyan commercial banks.

### **5.3 Conclusion**

According to the analysis output, there is a positive and significant relationship between asset base and credit risk among Kenyan commercial banking entities. Based on this finding the study concludes that asset base positively and significantly enhances commercial banks' performance in Kenya. Additionally, the study established a positive but insignificant relationship between customer deposits and credit risk among Kenyan commercial banks. Concerning this finding, the study concludes that customer deposits lack a statistically significant effect on credit risk among Kenyan commercial banks.

The study results revealed a negative and significant relationship between shareholders' equity and credit risk among Kenyan commercial banks. Based on this finding, the study concluded that shareholders' equity had a negative and statistically significant effect on credit risk among Kenyan commercial banks. Further, the findings revealed a negative and significant relationship between capital adequacy and credit risk among Kenyan commercial banks. Thus, the study concludes that capital adequacy has a negative and



statistically significant effect on Kenyan commercial banks' credit risk. Finally, the findings established that liquidity had a positive and insignificant relationship with credit risk among Kenyan commercial banks. Regarding this finding, the study concludes that liquidity lacks a statistically significant effect on credit risk among Kenyan commercial banks.

#### **5.4 Recommendations**

The research results led to the conclusion that a bank's asset base positively and significantly enhances the performance of the local commercial banks. The study thus recommends that the managers of such banks should invest more funds in projects with positive net present values to grow and enhance their assets base to enhance their performance and use the assets to generate additional revenues, which in turn reduces credit risk.

Secondly, the study concluded that customer deposits lack a statistically significant effect on credit risk among Kenyan commercial banks. However, the study recommends that Kenyan banks manage effective strategies to mobilize deposits since deposits are critical for financial intermediation, and banks can lend significant amounts of money if they have adequate deposits.

Furthermore, the study concluded that shareholders' equity had a negative and statistically significant effect on the credit risk of the Kenyan commercial banking entities. The study thus recommends that the management of Kenyan banks use shareholders' equity as their financing source since it less risk and reduces the banks' credit risk and financing risks.

The study concluded that capital adequacy negatively and significantly affected the credit risk of Kenyan commercial banks. Therefore, the study recommends the managers of

commercial banking entities ought to keep ensure that they keep high levels of capital adequacy as capital adequacy acts as a buffer when a bank faces any type of risk, including credit risk.

Finally, the research concludes that liquidity lacks a statistically significant effect on credit risk among commercial banking entities in Kenya. However, it recommends that the management of such commercial banking entities should keep optimum liquidity levels to avoid regulatory sanctions and ensure that they have adequate liquidity to meet any arising obligations.

### **5.5 Limitations of the Study**

First, this study was primarily based on secondary data from the five years between 2015 and 2019. Secondary data, however, has several limitations, one of them being that secondary data is historical and does not reflect the existing business and economic conditions. Secondary data is also obtained from financial statements based on specific accounting assumptions, which may vary among organizations, making comparisons difficult.

Second, commercial banks belong to the financial sector, which comprises several other institutions like SACCOs, insurance firms, collective investment schemes, and microfinance institutions. Thus, the findings are ungeneralizable to other financial institutions since different firms have different bank size components and face different risk types. The study was also carried out in Kenya; thus, the findings are limited to the study context and the measures therein.

Finally, the study targeted the 42 commercial banks as of December 31, 2019. However, some banks had not been in operation for the considered study period while others had

been acquired. Some had also had merged with few others placed under statutory management, making it impossible to obtain a 100% response rate. In addition, some of the banks had incomplete information making it difficult to attain the desired sample.

### **5.6 Suggestions for Further Research**

The model summary of this research revealed that the independent variables (liquidity, assets base, capital adequacy, shareholders equity, customer deposits) explained 42.2% of the variation in Kenyan commercial banks' credit risk levels. This indicates that other factors not included in the study also affect credit risk levels among Kenyan banks. Thus, the study recommends further research on macroeconomic and bank specific variables that may shape credit risk levels among Kenyan banks.

The study used quantitative secondary data collected over five years, making it historic and lagged in nature. Thus, the study recommends additional research, using qualitative data from the bank management and other staff on whether bank size components affect banks' credit risk levels. Besides, a questionnaire can also be used to collect data from bank staff to seek their views on the research variables.

The study context was commercial, a subsector in the financial intermediation sector comprising other firms like SACCOs, microfinance, and insurance firms. This makes it difficult to generalize the findings to the entire financial sector. Thus, a similar study can be carried with the context being widened to cover all Kenyan financial institutions.

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## APPENDICES

### Appendix I: Commercial Banks in Kenya

- 1) Standard Chartered Bank
- 2) Absa Bank
- 3) Kenya Commercial Bank
- 4) Cooperative Bank of Kenya
- 5) Equity Bank
- 6) NCBA Bank
- 7) Diamond Trust Bank
- 8) Stanbic Bank
- 9) Family Bank
- 10) Credit Bank
- 11) Prime Bank
- 12) Bank of Africa
- 13) Fidelity Bank
- 14) Ecobank
- 15) Guarantee Trust Bank
- 16) Bank of India
- 17) National Bank
- 18) I&M Bank
- 19) Bank of Baroda
- 20) Guardian Bank
- 21) Development Bank of Kenya Ltd
- 22) Middle East Bank
- 23) M-Oriental Commercial Bank
- 24) Paramount Bank
- 25) Transnational Bank
- 26) Victoria Commercial Bank
- 27) Habib A.G. Zurich Bank
- 28) Gulf African Bank

- 29) First Community Bank
- 30) UBA Bank
- 31) Spire Bank
- 32) Consolidated Bank of Kenya
- 33) DIB Bank Kenya Limited
- 34) Jamii Bora Bank
- 35) Mayfair Bank Limited
- 36) African Banking Corporation Ltd
- 37) Guarantee Trust Bank
- 38) Bank of Africa
- 39) Sidian Bank
- 40) SBM Bank
- 41) Charterhouse Bank Limited (Under Statutory management)
- 42) Imperial Bank (Under receivership)

**Source: Central Bank of Kenya**

**Appendix II: Study Data**

| <b>Credit Risk<br/>(NPLR)</b> | <b>Asset base<br/>(LnAssets)</b> | <b>Ln_Custome<br/>r deposits</b> | <b>Ln_Equity<br/>capital</b> | <b>Capital<br/>adequacy<br/>ratio</b> | <b>Liquidit<br/>y ratio</b> |
|-------------------------------|----------------------------------|----------------------------------|------------------------------|---------------------------------------|-----------------------------|
| 0.187                         | 17.196                           | 10.055                           | 8.137                        | 0.154                                 | 0.311                       |
| 0.245                         | 17.119                           | 9.954                            | 8.177                        | 0.158                                 | 0.330                       |
| 0.230                         | 17.027                           | 9.888                            | 8.058                        | 0.151                                 | 0.340                       |
| 0.200                         | 16.945                           | 9.685                            | 8.005                        | 0.160                                 | 0.271                       |
| 0.176                         | 16.934                           | 9.666                            | 7.951                        | 0.165                                 | 0.214                       |
| 0.563                         | 17.600                           | 10.414                           | 8.361                        | 0.108                                 | 0.487                       |
| 0.449                         | 17.709                           | 10.298                           | 8.815                        | 0.160                                 | 0.437                       |
| 0.386                         | 17.808                           | 10.360                           | 9.044                        | 0.158                                 | 0.363                       |
| 0.342                         | 17.841                           | 10.448                           | 9.038                        | 0.162                                 | 0.422                       |
| 0.258                         | 18.054                           | 10.768                           | 9.047                        | 0.164                                 | 0.415                       |
| 0.088                         | 11.873                           | 11.671                           | 10.041                       | 0.327                                 | 0.784                       |

|       |        |        |        |       |       |
|-------|--------|--------|--------|-------|-------|
| 0.094 | 11.720 | 11.518 | 9.924  | 0.347 | 0.781 |
| 0.063 | 11.473 | 11.198 | 9.793  | 0.323 | 0.656 |
| 0.089 | 11.325 | 11.080 | 9.563  | 0.305 | 0.674 |
| 0.076 | 11.130 | 10.877 | 9.330  | 0.271 | 0.615 |
| 0.094 | 11.044 | 10.748 | 9.651  | 0.484 | 1.032 |
| 0.073 | 11.046 | 10.594 | 9.487  | 0.439 | 0.844 |
| 0.021 | 10.944 | 10.351 | 9.361  | 0.540 | 0.684 |
| 0.014 | 10.775 | 10.193 | 9.163  | 0.457 | 0.610 |
| 0.020 | 10.649 | 10.111 | 8.879  | 0.423 | 0.565 |
| 0.069 | 12.832 | 12.379 | 10.725 | 0.166 | 0.198 |
| 0.078 | 12.691 | 12.241 | 10.678 | 0.164 | 0.354 |
| 0.075 | 12.511 | 12.135 | 10.682 | 0.180 | 0.334 |
| 0.065 | 12.467 | 12.092 | 10.648 | 0.179 | 0.283 |
| 0.036 | 12.392 | 12.016 | 10.590 | 0.179 | 0.341 |
| 0.101 | 12.587 | 12.173 | 10.570 | 0.183 | 0.584 |
| 0.095 | 12.580 | 12.189 | 10.451 | 0.174 | 0.543 |
| 0.072 | 12.424 | 11.938 | 10.406 | 0.169 | 0.524 |
| 0.059 | 12.277 | 11.712 | 10.317 | 0.183 | 0.546 |
| 0.029 | 12.247 | 11.591 | 10.249 | 0.187 | 0.740 |
| 0.043 | 11.478 | 11.042 | 9.855  | 0.272 | 0.793 |
| 0.031 | 11.358 | 10.899 | 9.874  | 0.276 | 0.752 |
| 0.046 | 11.495 | 11.072 | 9.912  | 0.256 | 0.645 |
| 0.029 | 11.546 | 11.043 | 9.885  | 0.264 | 0.948 |
| 0.044 | 11.387 | 11.035 | 9.873  | 0.283 | 0.761 |
| 0.122 | 13.112 | 12.843 | 11.116 | 0.186 | 0.510 |
| 0.084 | 12.356 | 12.113 | 10.427 | 0.157 | 0.475 |
| 0.073 | 12.344 | 12.092 | 10.360 | 0.173 | 0.504 |
| 0.073 | 12.331 | 11.978 | 10.221 | 0.184 | 0.433 |
| 0.067 | 12.281 | 11.909 | 10.030 | 0.179 | 0.393 |
| 0.357 | 9.381  | 9.079  | 7.598  | 0.135 | 0.273 |

|       |        |        |        |        |        |
|-------|--------|--------|--------|--------|--------|
| 0.301 | 9.464  | 9.025  | 6.830  | 0.010  | 0.218  |
| 0.295 | 9.507  | 9.065  | 6.974  | 0.051  | 0.217  |
| 0.198 | 9.541  | 9.158  | 7.246  | 0.079  | 0.258  |
| 0.253 | 9.556  | 9.210  | 7.387  | 0.094  | 0.328  |
| 0.117 | 13.016 | 12.705 | 11.253 | 0.158  | 0.448  |
| 0.118 | 12.932 | 12.623 | 11.132 | 0.154  | 0.415  |
| 0.074 | 12.866 | 12.562 | 11.131 | 0.227  | 0.335  |
| 0.047 | 12.771 | 12.466 | 11.003 | 0.228  | 0.332  |
| 0.030 | 12.744 | 12.483 | 10.806 | 0.213  | 0.316  |
| 0.105 | 9.983  | 9.730  | 8.012  | 0.150  | 0.260  |
| 0.085 | 9.787  | 9.482  | 7.960  | 0.145  | 0.210  |
| 0.090 | 9.579  | 9.300  | 7.888  | 0.159  | 0.296  |
| 0.081 | 9.412  | 9.120  | 7.808  | 0.228  | 0.327  |
| 0.068 | 9.240  | 8.891  | 7.238  | 0.149  | 0.165  |
| 0.422 | 9.639  | 8.530  | 8.286  | 0.315  | 0.094  |
| 0.343 | 9.636  | 8.630  | 7.962  | 0.232  | 0.016  |
| 0.251 | 9.700  | 8.740  | 7.983  | 0.236  | -0.017 |
| 0.257 | 9.706  | 8.664  | 7.974  | 0.251  | 0.017  |
| 0.232 | 9.738  | 9.176  | 7.953  | 0.273  | 0.431  |
| 0.065 | 12.864 | 12.543 | 10.859 | 0.209  | 0.548  |
| 0.057 | 12.842 | 12.230 | 10.722 | 0.211  | 0.535  |
| 0.061 | 12.803 | 12.157 | 10.669 | 0.190  | 0.499  |
| 0.039 | 12.701 | 12.041 | 10.503 | 0.185  | 0.502  |
| 0.045 | 12.512 | 11.746 | 10.309 | 0.175  | 0.390  |
| 0.224 | 11.230 | 10.968 | 8.790  | 0.135  | 0.639  |
| 0.245 | 10.905 | 10.709 | 8.765  | 0.166  | 0.702  |
| 0.506 | 10.887 | 10.685 | 8.770  | 0.160  | 0.639  |
| 0.219 | 10.761 | 10.381 | 8.897  | 0.194  | 0.335  |
| 0.083 | 10.867 | 10.448 | 8.931  | 0.250  | 0.400  |
| 0.795 | 8.834  | 8.423  | 6.314  | -0.206 | 0.083  |

|       |        |        |        |        |       |
|-------|--------|--------|--------|--------|-------|
| 0.604 | 9.129  | 8.776  | 6.937  | -0.220 | 0.101 |
| 0.448 | 9.319  | 8.827  | 7.080  | 0.127  | 0.142 |
| 0.159 | 9.533  | 9.053  | 7.505  | 0.163  | 0.227 |
| 0.407 | 9.580  | 9.247  | 7.635  | 0.175  | 0.275 |
| 0.071 | 13.421 | 12.850 | 11.155 | 0.174  | 0.547 |
| 0.107 | 13.259 | 12.739 | 11.012 | 0.140  | 0.579 |
| 0.084 | 13.170 | 12.607 | 11.033 | 0.165  | 0.548 |
| 0.072 | 13.068 | 12.533 | 10.866 | 0.197  | 0.476 |
| 0.040 | 12.967 | 12.374 | 10.767 | 0.202  | 0.322 |
| 0.163 | 11.276 | 10.969 | 9.426  | 0.187  | 0.331 |
| 0.184 | 11.113 | 10.778 | 9.344  | 0.195  | 0.307 |
| 0.218 | 11.143 | 10.767 | 9.359  | 0.199  | 0.346 |
| 0.131 | 11.149 | 10.633 | 9.443  | 0.208  | 0.308 |
| 0.063 | 11.306 | 11.047 | 9.387  | 0.189  | 0.144 |
| 0.203 | 10.278 | 9.768  | 9.083  | 0.263  | 0.473 |
| 0.199 | 10.139 | 9.663  | 9.042  | 0.270  | 0.464 |
| 0.103 | 10.227 | 9.625  | 9.061  | 0.269  | 0.501 |
| 0.074 | 10.603 | 9.715  | 9.032  | 0.260  | 0.535 |
| 0.101 | 10.620 | 9.648  | 8.975  | 0.271  | 0.569 |
| 0.474 | 9.840  | 9.688  | 7.288  | 0.081  | 0.351 |
| 0.547 | 9.791  | 9.560  | 7.148  | 0.091  | 0.411 |
| 0.452 | 9.762  | 9.601  | 7.444  | 0.153  | 0.436 |
| 0.352 | 9.613  | 9.446  | 7.351  | 0.140  | 0.242 |
| 0.254 | 9.590  | 9.421  | 7.386  | 0.153  | 0.224 |
| 0.104 | 9.704  | 9.479  | 7.916  | 0.222  | 0.477 |
| 0.106 | 9.692  | 9.498  | 7.847  | 0.227  | 0.486 |
| 0.117 | 9.668  | 9.482  | 7.773  | 0.202  | 0.414 |
| 0.082 | 9.596  | 9.418  | 7.703  | 0.196  | 0.407 |
| 0.083 | 9.589  | 9.433  | 7.593  | 0.176  | 0.374 |
| 0.159 | 10.467 | 10.233 | 8.441  | 0.171  | 0.338 |

|       |        |        |        |       |       |
|-------|--------|--------|--------|-------|-------|
| 0.114 | 10.414 | 10.170 | 8.405  | 0.187 | 0.327 |
| 0.101 | 10.352 | 10.169 | 8.394  | 0.162 | 0.349 |
| 0.097 | 10.209 | 9.988  | 8.384  | 0.187 | 0.410 |
| 0.088 | 10.115 | 9.853  | 8.263  | 0.158 | 0.358 |
| 0.118 | 10.120 | 9.882  | 8.032  | 0.273 | 0.779 |
| 0.092 | 9.977  | 9.621  | 8.019  | 0.246 | 0.757 |
| 0.104 | 9.837  | 9.431  | 7.952  | 0.271 | 0.000 |
| 0.029 | 9.743  | 9.374  | 7.995  | 0.210 | 0.000 |
| 0.027 | 8.601  | 8.834  | 7.672  | 0.269 | 0.000 |
| 0.122 | 12.661 | 12.345 | 10.964 | 0.212 | 0.463 |
| 0.143 | 12.573 | 12.270 | 10.776 | 0.182 | 0.470 |
| 0.127 | 12.389 | 11.797 | 10.464 | 0.182 | 0.357 |
| 0.070 | 12.257 | 11.550 | 10.173 | 0.181 | 0.373 |
| 0.011 | 12.163 | 11.550 | 10.173 | 0.192 | 0.340 |
| 0.118 | 13.709 | 13.177 | 11.436 | 0.190 | 0.371 |
| 0.072 | 13.479 | 13.072 | 11.491 | 0.195 | 0.333 |
| 0.081 | 13.380 | 12.995 | 11.396 | 0.166 | 0.290 |
| 0.076 | 13.297 | 12.865 | 11.302 | 0.199 | 0.375 |
| 0.068 | 13.232 | 12.759 | 11.301 | 0.169 | 0.483 |
| 0.224 | 10.183 | 9.753  | 8.314  | 0.179 | 0.420 |
| 0.224 | 10.140 | 9.715  | 8.303  | 0.144 | 0.354 |
| 0.227 | 9.868  | 9.454  | 8.145  | 0.165 | 0.243 |
| 0.170 | 9.946  | 9.524  | 8.261  | 0.232 | 0.255 |
| 0.128 | 9.858  | 9.502  | 8.252  | 0.247 | 0.322 |
| 0.146 | 9.044  | 8.830  | 7.053  | 0.312 | 0.242 |
| 0.479 | 8.587  | 8.291  | 7.054  | 0.449 | 0.561 |
| 0.444 | 8.541  | 8.271  | 7.058  | 0.426 | 0.479 |
| 0.297 | 8.563  | 8.293  | 7.083  | 0.316 | 0.311 |
| 0.200 | 8.644  | 8.318  | 7.141  | 0.332 | 0.326 |
| 0.549 | 11.626 | 11.373 | 9.374  | 0.115 | 0.461 |

|       |        |        |        |       |       |
|-------|--------|--------|--------|-------|-------|
| 0.658 | 11.651 | 11.495 | 8.844  | 0.037 | 0.431 |
| 0.528 | 11.607 | 11.457 | 8.860  | 0.054 | 0.363 |
| 0.437 | 11.655 | 11.482 | 9.305  | 0.072 | 0.297 |
| 0.173 | 11.740 | 11.614 | 9.298  | 0.140 | 0.307 |
| 0.122 | 13.112 | 12.843 | 11.116 | 0.186 | 0.510 |
| 0.136 | 12.247 | 11.813 | 10.346 | 0.187 | 0.483 |
| 0.112 | 12.236 | 11.780 | 10.273 | 0.199 | 0.467 |
| 0.112 | 12.040 | 11.554 | 10.319 | 0.216 | 0.387 |
| 0.103 | 12.018 | 11.564 | 10.183 | 0.206 | 0.292 |
| 0.207 | 9.425  | 9.126  | 8.021  | 0.344 | 0.553 |
| 0.103 | 9.261  | 8.873  | 8.028  | 0.309 | 0.337 |
| 0.105 | 9.266  | 8.918  | 8.016  | 0.339 | 0.368 |
| 0.120 | 9.202  | 8.845  | 7.983  | 0.387 | 0.393 |
| 0.055 | 9.047  | 8.735  | 7.714  | 0.310 | 0.431 |
| 0.195 | 9.254  | 9.045  | 7.484  | 0.413 | 0.245 |
| 0.190 | 9.199  | 8.966  | 7.431  | 0.285 | 0.422 |
| 0.157 | 9.163  | 8.953  | 7.473  | 0.274 | 0.409 |
| 0.125 | 9.151  | 8.945  | 7.405  | 0.274 | 0.430 |
| 0.161 | 9.262  | 8.996  | 7.337  | 0.228 | 0.420 |
| 0.123 | 11.597 | 11.306 | 10.105 | 0.414 | 0.771 |
| 0.077 | 11.498 | 11.160 | 10.045 | 0.373 | 0.715 |
| 0.058 | 11.244 | 10.960 | 9.571  | 0.225 | 0.486 |
| 0.046 | 11.087 | 10.806 | 9.290  | 0.222 | 0.395 |
| 0.011 | 11.082 | 10.836 | 9.074  | 0.173 | 0.374 |
| 0.156 | 12.619 | 12.339 | 10.774 | 0.177 | 0.626 |
| 0.183 | 12.559 | 12.317 | 10.750 | 0.195 | 0.666 |
| 0.133 | 12.561 | 12.271 | 10.705 | 0.185 | 0.587 |
| 0.131 | 12.431 | 12.137 | 10.690 | 0.209 | 0.569 |
| 0.120 | 12.363 | 12.055 | 10.619 | 0.212 | 0.537 |
| 0.359 | 9.140  | 8.868  | 7.505  | 0.202 | 0.322 |

|       |        |        |       |       |       |
|-------|--------|--------|-------|-------|-------|
| 0.279 | 9.234  | 8.954  | 7.565 | 0.196 | 0.348 |
| 0.240 | 9.239  | 8.971  | 7.665 | 0.302 | 0.371 |
| 0.127 | 9.247  | 8.987  | 7.637 | 0.208 | 0.366 |
| 0.200 | 9.255  | 8.935  | 7.617 | 0.215 | 0.339 |
| 0.243 | 9.686  | 8.844  | 7.715 | 0.254 | 0.758 |
| 0.128 | 9.638  | 8.666  | 7.684 | 0.332 | 0.735 |
| 0.046 | 8.780  | 8.004  | 7.679 | 0.388 | 0.565 |
| 0.022 | 8.631  | 7.574  | 7.670 | 0.387 | 0.344 |
| 0.021 | 8.959  | 8.328  | 7.020 | 0.238 | 0.521 |
| 0.051 | 10.493 | 10.181 | 8.757 | 0.202 | 0.344 |
| 0.031 | 10.384 | 10.052 | 8.693 | 0.211 | 0.311 |
| 0.001 | 10.165 | 9.835  | 8.633 | 0.227 | 0.286 |
| 0.000 | 10.017 | 9.661  | 8.529 | 0.255 | 0.314 |
| 0.000 | 9.904  | 9.549  | 8.164 | 0.193 | 0.271 |
| 0.319 | 10.941 | 10.529 | 9.234 | 0.143 | 0.208 |
| 0.309 | 11.011 | 10.442 | 9.123 | 0.154 | 0.209 |
| 0.165 | 11.120 | 10.516 | 9.207 | 0.172 | 0.207 |
| 0.109 | 11.183 | 10.549 | 9.188 | 0.196 | 0.211 |
| 0.077 | 11.180 | 10.643 | 9.115 | 0.181 | 0.280 |

**Source: Study Data**