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**A STUDY OF DETERMINANTS OF THE LEVEL OF MORTGAGE  
FINANCING IN KENYA**

**BY**

**CHRISPUS N. MUHIA**

**MBA 53311/14**



**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE AWARD OF A MASTER'S DEGREE, BUSINESS  
ADMINISTRATION OF THE STRATHMORE BUSINESS SCHOOL,  
STRATHMORE UNIVERSITY**

**MAY, 2018**

## **DECLARATION**

I hereby certify that this research study is my original work and has not been presented for examination in any other university or institution of higher learning. Information from other sources has been duly acknowledged.

Chrispus N. Muhia,  
May 2018

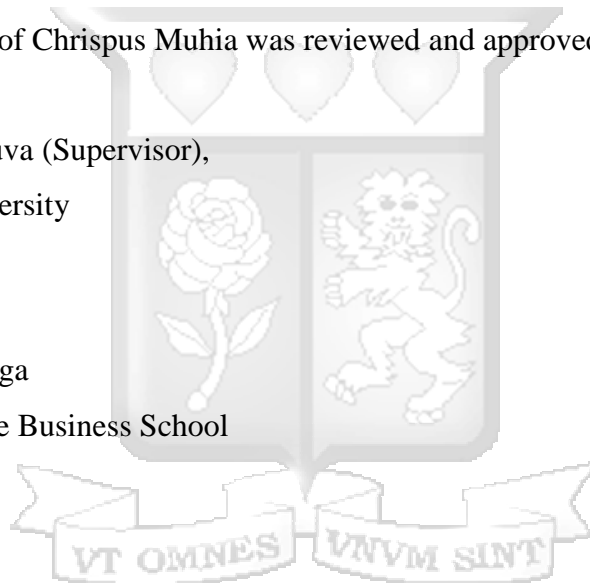
## **Approval**

The dissertation of Chrispus Muhia was reviewed and approved by:

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Strathmore University

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Dean, Strathmore Business School

Prof. Ruth Kiraka  
Dean, School of Graduate Studies  
Strathmore University



## DEDICATION

I dedicate this project to my family for the patience and support they have accorded to me during this period.



## **ACKNOWLEDGEMENT**

This Research project will not have been possible without the assistance of a number of people. I wish to express my gratitude to my supervisor, Dr. David Mathuva, for his relentless and insightful support, to the Strathmore research support department for the constant encouragement and reminders to press on, and to the credit policy team in Barclays Bank of Kenya that took the time to review and debate out my research effort during its development.

Thank You!



## **ABSTRACT**

The objective of the research was to study the determinants of level of mortgage finance in Kenya. The study focused on the effect of four specific factors in influencing these levels. The factors are lender loss experience, market structures, business cycles and funding considerations adopted by mortgage finance providers in Kenya. The study was guided by the following specific objectives; to establish the effect of lender loss rate experience in determining the risk appetite of banks to finance mortgages, to study the influence of market structures adopted by mortgage financiers in Kenya on level of mortgage finance, to study the effect of business cycles in influencing level of mortgage finance in Kenya and to study balance sheet funding effect in influencing the level of mortgage finance in Kenya. A quantitative methodology was employed in the study, using regression analysis to model the relationship of these factors to the level of mortgage finance. The target population for the study was all banks in Kenya. Data was gathered from regulatory and statistical abstracts from the Central Bank of Kenya and the Kenya National Bureau of Statistics. Lender loss experience, market structure and balance sheet funding were found to significantly influence mortgage levels. The study did not find business cycles to be statistically significant in determining level of mortgage finance in Kenya. The research aims to contribute guidance to policy making and business strategy at the corporate level for mortgage lenders, and recommends that practitioners take into account the effects of potential loss rates, balance sheet funding structures and market structures when setting mortgage business policy. The study also aims to contribute policy guidance on determinants influencing level of mortgage finance, at the governmental and regulatory level aimed at tackling the housing problem in Kenya and ensuring a stable, profitable banking system. Financial regulators, planning and treasury officials need to be especially cognizant of these factors given that mortgage finance plays a key role in the health and rate of growth of the overall economy and of the banking sector. A limitation to the study is the short time horizon of four years scoped that may have contributed to the insignificance of business cycles as a determinant as judged by the study results.

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## LIST OF ABBREVIATIONS

|      |                                     |
|------|-------------------------------------|
| BPS  | Basis Points                        |
| BRIC | Brazil, Russia, India and China     |
| CBK  | Central Bank of Kenya               |
| CMOs | Collateralized Mortgage Obligations |
| GDP  | Gross Domestic Product              |
| HECM | Home Equity Conversion Mortgage     |
| HFCK | Housing Finance Company of Kenya    |
| HPI  | House Price Index                   |
| KCB  | Kenya Commercial Bank               |
| KNBS | Kenya National Bureau of Statistics |
| KShs | Kenya Shillings                     |

|       |  |
|-------|--|
| NSE   | Nairobi Securities Exchange                            |
| OECD  | Organization for Economic Co-operation and Development |
| REITs | Real Estate Investment Trusts                          |
| SCB   | Standard Chartered Bank                                |
| UK    | United Kingdom   |
| US    | United States  |



## **CHAPTER ONE**

### **1.0 INTRODUCTION.**

The study sought to investigate the impact of four factors on mortgage finance levels in Kenya. It took into account the fact that the general topic of level of mortgage finance in Kenya has been the subject of several local studies. However, these studies have considered only a handful of factors thus leaving scope for a more complete treatment of the subject. Primary factors like level of interest rates, income levels and property price levels have been considered to some extent in studies already conducted; Mburu, Ka'kumu and Owiti (2015), Kariuki (2015), Kiguru (2015) However, fundamental factors like lender loss rates experience, as measured by the ratio of non-performing mortgages to gross mortgages, market structures, as measured by bank tiers and the growth in the number of bank branches , business cycles, as measured by GDP growth and Inflation rates and funding considerations as measured by the level of customer deposits and shareholder equity have not been scoped in these previous research efforts and formed the subject of this study.

#### **1.1 Background to the Study**

A mortgage is a loan that is collateralized with a specific piece of real property, either residential or commercial. The borrower must make a series of mortgage payments over the life of the loan and the lender has the right to foreclose or lay claim against the real estate in the event of loan default. The interest rate on the loan is called the mortgage rate or contract rate. (Debt Markets, CFA Institute, 2014). Anderson et al (2007) define as the pledge of property for the repayment of debt. Maurer (2008) describes the crafting of the first mortgage contract in history in the year 1189.

Since the early times, man has made relentless efforts to obtain food and shelter. The struggle for these basic needs has increased progressively as the human race advances in numbers and cultural diversity. The universal declaration of human rights of 1948 recognizes the right to adequate housing as an important component of the right to adequate standards of living. This has further been re-affirmed by subsequent various

international instruments including the international covenant on economic, social and cultural rights of 1966, the Istanbul declaration and Habitat agenda of 1996 and the Declaration on Cities and Other Human Settlements in the new millennium of 2001.

As a percentage of Kenya's GDP, the outstanding mortgage balance sheet forms 3.7% of the national accounts (KNBS Statistical Bulletin, 2014). The level of 3.7% is low relative to other countries that Kenya aspires to emulate economically e.g. OECD and BRIC countries. Total credit in Kenya as a percentage of GDP is at 52% (Kenya National Treasury, March 2016), which albeit low compared to other countries where the ratio exceeds 100% (e.g. Germany - 101%, Japan – 179%), underpins the low mortgage finance penetration in the country (52% vs 3.7%).

East African countries have mortgage penetration rates as a percentage of GDP at similar levels to that of Kenya, indicating that the challenge Kenya faces is not unique, but rather faces the Eastern Africa region as a whole. Tanzania has a mortgage loan stock of 2,784 accounts (as at December 2013), translating to 1% of the country's GDP. Uganda likewise has 3,200 mortgage loans outstanding in its financial institutions, making up a penetration rate of 2% to its GDP.

Development of housing remains a challenge to Kenya's national economic development. A key challenge has been under-investment in housing development by both the government and the private sector. The growth of the housing industry is driven by economic factors such as confidence in mortgage facilities, changes in interest rates and inflation, supply and demand of housing units; and demographic factors such as population growth rate and rural – urban migration rates. Housing penetration in Kenya remains at a low level relative to the country's population and Gross Domestic Product (GDP). Reports from the Kenya National Bureau of Statistics (KNBS Statistical Bulletin, 2016) indicate that the country only has 22,000 mortgages issued by commercial banks as at 31st December 2015, with the country's population standing at 44 million individuals. This state of affairs can be attributed to various supply and demand factors that have affected mortgage finance levels. High interest rates by

mortgage financiers have been blamed for the low penetration rates (Njongoro, 2013). However, there is reason to believe there are other contributing factors. This study sought to explore the impact of four factors, being the loss rate experience of mortgage lenders, market structures, business cycles and funding structures of mortgage financiers on the level of mortgage finance levels in Kenya. The study will offer clear policy direction to the government and mortgage finance stakeholders, including financiers in efforts geared towards increasing the level of mortgage finance in the country, which will have a direct contribution to the housing challenges currently faced by the population.

Housing is recognized as a basic human right in the Kenya Constitution 2010. Article 43 1(b) of the constitution recognizes housing as a social right for every Kenyan and as result, the government is committed to making sure that this right is achieved progressively. Increase in the level of mortgage finance serves to fulfill the realization of this progressive right to housing. In addition to being a right, housing contributes to the socio-economic development of the country due to its forward and backward linkages. However, the many challenges facing the sector have resulted in disequilibrium between the supply and demand of housing units.

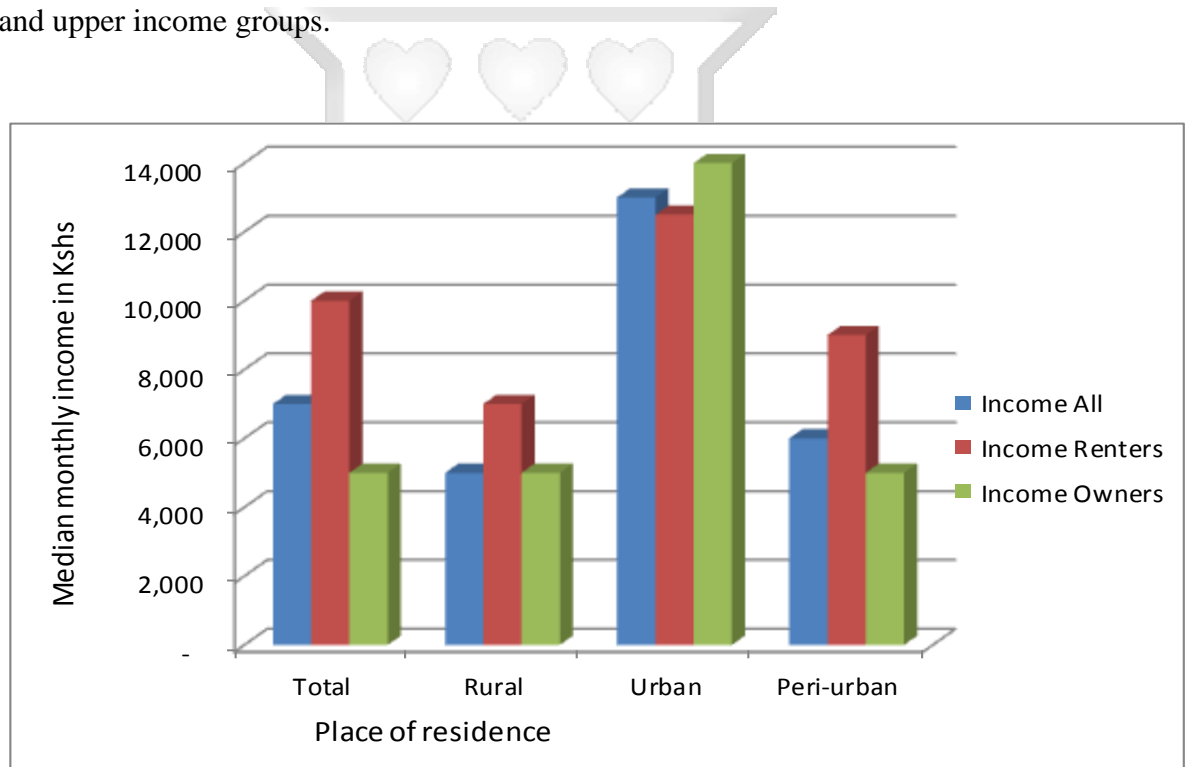
Kenya is experiencing rapid population growth as a result of increased fertility rates (Kenya National Housing Survey, 2012/2013). The number of urban households has increased driven by rural-urban migration and natural population growth, leading to increased demand for housing in urban areas.

**Table 1 Number of Households by place of residence**

|                   |         | Rural     | Urban     | Total     |
|-------------------|---------|-----------|-----------|-----------|
| 2012/2013<br>KNHS | Total   | 5,491,367 | 3,689,349 | 9,180,716 |
|                   | Owners  | 4,810,531 | 1,090,189 | 5,900,720 |
|                   | Renters | 680,836   | 2,599,161 | 3,279,997 |

Source: Kenya National Bureau of Statistics (2014)

The housing sector contributes both socially and economically to the growth of the country. Housing represents a major investment requiring a substantial capital outlay. Ariemba (2011) notes that the cost of land for housing development has sky rocketed locking out many people from the dream of owning a house. Many financiers require the borrower to either own the piece of land where the property will be developed, or to put up upfront a substantial amount of money as a contribution to the mortgage finance deal, what is normally termed as Loan to Value ratio. The marginal and low-income groups face a number of challenges in their quest to secure housing finance to improve their living conditions. Compared to neighbors, Kenya has a more developed and effective finance system. However, it appears that the only beneficiaries from it are the middle and upper income groups.



**Figure 1 Median monthly incomes by tenure and residence**  
*Source: Kenya National Bureau of Statistics, 2014*

Njongoro (2013) observes that the mortgage market in Kenya is still in its early stages as compared to the developed countries where the mortgage market accounts for a big part of the gross domestic product. The Kenyan market is underdeveloped facing numerous challenges but offers significant potential for growth. The potential size of the mortgage

market is currently around Ksh 800 billion, around 13 times the current level (Housing Policy in Emerging Markets, World Bank, 2011).

## **1.2 Problem Statement**

Inadequate housing in Kenya has been identified as an urgent problem that needs to be solved. The supply – demand equation of housing units in the country remains in disequilibrium with only 50,000 housing units delivered annually against a demand of 200,000 housing units (KNBS Statistical Bulletin, 2016). This has created a stock shortfall of 2 million housing units as at end of 2015. The government has identified mortgage finance as a crucial financial instrument that may be used to enhance housing ownership among the Kenyan people (Kenya Vision 2030, 2007). However, the penetration level of mortgage finance continues to be very low, with only 22,000 mortgage loans in a country of 44 million people. Mortgage finance remains a key aspect of enabling deeper housing penetration in Kenya.

Local studies that have been conducted in this area include those by Mburu, Ka'kumu and Owiti (2015) where they argue that although interest rates have traditionally been viewed as the single critical factor that drives the mortgage market and access to more middle income housing, the mortgage market can be viewed as a larger capital market where investors can assess the risk and returns of alternative investment relative to the mortgage market to determine their uptake. Kariuki (2015) posits that the usually cumbersome mortgage application process has a negative impact on growth. The study also tackles the issue of high interest rates and high property prices as being impediments to mortgage finance growth. The Kenya parliament capped the rate of interest rates that commercial banks can charge their clients on 24th of August 2016, providing a relief expected to reduce the impact of this impediment. Kiguru (2015) studies the impact of household income on mortgage finance growth, concluding that mortgages are a preserve of high income households as they can afford the high interest rates and property prices on offer.



The government has identified mortgage financing as a crucial financial instrument that may be used to enhance housing ownership among the Kenyan people (Kenya Vision 2030, 2007). The study aims to contribute towards increasing levels of mortgage finance levels in the country by offering policy makers and lenders insights on the extent of the challenges posed by these four factors, hence providing them with frameworks in which to address the challenges posed by low risk appetite driven by adverse loss rate experiences, sub optimal market structures resulting from corporate strategy, unpreparedness for downturns in business cycles and mismatched asset – liability pressures caused by capital funding misaligned to support mortgage financing.

### **1.3 Research Objectives**

#### **1.3.1 General Objective**

The general objective of this research was to study the determinants of the level of mortgage finance in Kenya.

#### **1.3.2 Specific Objectives**

Based on the broad Objective above, specific objectives of this research were:

- i) To study the effect of lender loss rate experience on level of mortgage finance in Kenya
- ii) To examine the effect of market structures adopted by mortgage lenders in Kenya on level of mortgage finance in Kenya
- iii) To examine the effect of business cycles on level of mortgage finance in Kenya
- iv) To study the effect of balance sheet funding on level of mortgage finance in Kenya

### **1.4 Research Questions**

The study seeks to address the following research questions.

- i. Is the lender loss rate experience for Kenyan mortgage lenders a significant driver of level of mortgage finance in the country?
- ii. Are the market structures adopted by mortgage lenders in Kenya a determinant of the level of mortgage finance in the country?

- iii. Do business cycles affect the level of mortgage finance in Kenya?
- iv. Is the mortgage balance sheet funding approach adopted by mortgage finance institutions in Kenya a driver of the level of mortgage finance in Kenya?

## **1.5 Scope of the Study**

The study focused on the Kenyan Housing environment scoping commercial mortgage providers in the country (41 banks and one Housing Finance institution, HFCK). The study sought to identify the contributory effect of each of the four factors in influencing the level of housing finance in the country over the period starting January 2013 and ending December 2016, and seeks to propose policy guidance at a corporate strategy level, governmental and regulatory levels to spur increase in level of mortgage finance in Kenya.

## **1.6 Significance of the study**

### **1.6.1 To government policy makers**

The study will offer clear policy direction to government policy makers in efforts geared towards increasing the level of mortgage finance in the country and resolving social and economic challenges facing the Kenyan population, which will have a direct contribution to the housing challenges currently faced by the population.

The Kenyan government has highlighted inadequate housing as a major challenge affecting the well-being of the country. The Department of the National Treasury, via a memo titled 'Increasing Private Sector Credit and Mortgage Finance in Kenya' issued on 30th May 2014, identified an urgent need to increase the supply of new and affordable housing units, noting the significant disconnect between the supply and demand of housing units in the country, and the outstanding stock of mortgage accounts in the country. President Uhuru Kenyatta has outlined housing as one of his big four agenda items of his government in his second term in office.

### **1.6.2 To corporate strategists**

The findings of this study will be useful to corporate strategists of mortgage finance companies as they seek to optimize risk-return considerations in driving shareholder return. It will provide them with an independent unbiased view of the effect of the selected economic factors on level of mortgage finance.

### **1.6.3 To the banking regulator – Central Bank of Kenya**

The findings of the study will also be important to the banking regulator, the Central Bank of Kenya as they work on facilitating a growing and stable economy by offering them insights on the impact of lender loss rates, market structures of banks and balance sheet funding considerations on the capacity of banks to execute on their role as mortgage financiers.

### **1.6.4 To academicians and researchers**

The research will also contribute to the general body of knowledge and form a basis for further research.

## **1.7 Organization of the study**

Chapter 1 provides an introduction to the topic, outlining the status of mortgage finance levels in Kenya and offers a comparison with levels in other countries. It spells out the problem statement and outlines the general and specific objectives of the study. Chapter 2 reviews literature related to the study topic and outlines the conceptual framework that guided the researcher in carrying out the study. Chapter 3 outlines the research methodology adopted in carrying out the study while Chapter 4 scopes the data analysis conducted to address the objectives of the study. Chapter 5 gives a summary of the research findings and outlines policy recommendations arrived at as a result of the research study. It also highlights areas of further research that the researcher recommends.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter seeks to review the theoretical grounding of the factors affecting mortgage finance levels in the Kenyan market, with a focus on the four identified variables. It is organized as follows; section 2.1 will provide a theoretical grounding to the work, outlining the context of the theory of supply and demand and the theory of capital markets to the study, section 2.2 will focus on literature review, section 2.2.1 will look at lenders loss rate experience as a driver of mortgage finance levels. Section 2.2.2 will look at market structures, Section 2.2.3 will look at the impact of business cycles on mortgage finance levels. Finally, section 2.2.4 will explore funding elements affecting mortgage finance levels.

#### **2.2 Review of Theories**

The study of Mortgage finance encompasses a substantial body of literature on a number of issues such as supply and demand factors (affordable housing supply, barriers to homeownership and property provision, measuring affordability), housing policy, and infrastructure concerns (e.g. presence of House Price Index). The research effort is anchored on the theory of demand and supply and on the modern portfolio theory posited by Harry Markowitz (1952) as an optimal framework to analyze the level of mortgage finance. The theory of demand and supply has been focused on as the research problem is essentially one of studying the demand-supply equation of housing supply in Kenya, and its trend over the 2013-2016 period. The modern portfolio theory has been focused on as housing presents an investment opportunity for investors who are assumed to make rational choices when making investment decisions, hence the level of housing finance in Kenya depends on the extent to which the investors, in this case lenders and borrowers, perceive housing to be a profitable investment opportunity.

### **2.2.1 Theory of Demand and Supply**

Demand is defined as the power to purchase a good along with the willingness to purchase it. Demand theory stipulates a number of determinants, including price of the good, price of related goods, size of purchasers' income, taste and fashion, expectations and number of buyers. Supply refers to the quantity of output brought for sale in the market at a certain price. The law of supply stipulates that all else equal, as price rises, the quantity supplied rises and vice versa. Marshal (1920) argues that customers attempt to equal prices to their marginal utility, hence customers will demand a good or service at the level at which they feel its marginal utility is highest. Capital is demanded because of its productivity.

The marginal productivity of capital diminishes as more of it is used in production; hence the marginal product curve of capital slopes downwards from left to right. On the other hand, supply of capital, which comes from savings, increases as demand rises. Hence the supply curve of capital rises upwards from left to right. This theory stipulates that demand for capital and supply of capital will determine price (Blang, 1992). Price becomes a critical factor in achieving equilibrium between supply and demand. This theory is useful in this study as it informs the independent variable of lender loss rates as in the case of mortgage finance, price is represented by the interest rate chargeable on mortgage facilities. This interest rate represents the point at which a mortgage financier will find it profitable to extend mortgage finance to a customer. Loss rate experience will directly impact on the level of interest rate the financier will be willing to commit capital, whereas the funding structure of that capital will be critical in determining the acceptable rate of return (interest rate) that the mortgage financier will be willing to take in return for the investment in the mortgage. Business cycles will have an impact on the prevailing interest rates.

### **2.2.2 Modern Portfolio Theory**

Fama (1970) argues that the primary role of the capital market is allocation of an economy's capital stock. He postulates an efficient capital markets as the ideal form, in which prices provide accurate signals for resource allocation, i.e. a market in which firms can make production-investment decisions, and investors can choose to invest in assets that maximize their utility. Modern Portfolio Theory is a hypothesis put forth by Harry Markowitz (Markowitz, H. 1952) based on the idea that risk averse investors seek to optimize returns for a given level of risk.

Shareholders of banks are investors who have entrusted bank management to make investment decisions on their behalf with the aim of enhancing shareholder wealth by achieving an acceptable rate of return on the shareholder equity. In the context of mortgage finance, the modern portfolio theory is important in investigating how mortgage finance institutions make the decision to fund mortgage portfolios given the loss rate experiences and forecasts they anticipate. Funding may be via shareholder equity or via customer deposits. This study seeks to investigate the impact of these funding decisions on the level of mortgage finance in Kenya. Investors and savers in the capital markets invest with expectations of a return within various investment horizons, and the success of corporate strategists in aligning the return-horizon expectations of players in the capital markets while making balance sheet funding decisions, will spell the success or failure of mortgage finance growth in a country, and even the success or failure of the institution itself. Decisions on market structure to be adopted as defined by the rate of growth of bank branches and footprint may have an impact on the institutions returns.

This theory is important in this study as it informs the independent variables of lender loss rate experience, balance sheet funding considerations, and the market structure decisions that corporate strategists choose to deploy on the dependent variable, the level of mortgage finance in the country. .

## 2.3 Review of Empirical Studies

Mortgage markets have become important in economic analysis and macro-economic policy-making. Aguko (2012) concludes that mortgage debt changes may have macro-economic consequences in addition to interest rate setting on mortgage debt having implications for monetary policy. Kidundi (2010) sought to look into the profitability of low cost housing in Kenya. Low-Cost housing was defined to mean that an individual is able to maintain housing for KShs. 3,000 per month. A research by the ministry of housing established that many people were unable to afford a mortgage of KShs. 25,000 per month. The thesis goes into detail to determine the factors that affect the profitability of low cost housing. Various determinants were looked into such as existing government policies, the role of non-governmental organizations, the risk of default when financing low-income housing and infrastructure among others. The thesis concludes that financial institutions in Kenya have the capacity to earn profits if they prudently finance low cost housing and notes success of similar strategies in several other countries. Kidundi is of the opinion that to reduce slums in the country, financial institutions should be willing to take up the financing of low income housing as this could be a profitable venture while at the same time a socially responsible approach to doing business.

Normal loans historically have been expensive and prohibitive to potential borrowers because of high interest rates hence it follows that mortgages will be affected similarly. Njongoro (2013) sought to establish the effect of mortgage interest rate on the level of mortgage financing and a strong negative relationship was realized between mortgage interest rates and level of mortgage financing. However, there could be many more factors hindering the growth of mortgage finance in Kenya other than the interest rates in the economy and this research aims to study other factors at play. The main objective of this study was to examine the impact of the selected economic determinants to the level of mortgage financing in Kenya. The study focused on the effect of four specific factors. The factors are the lender loss rates experience, market structures, business cycles and funding considerations taken by mortgage finance providers in Kenya.

### 2.3.1 Lender Loss Rate Experience

Credit losses arising from unrecovered defaulted mortgages have attracted the attention of practitioners and academia, which has led to various empirical researches. The Basel committee (Basel Committee Working paper 197, 2009) lists factors that enhance loan recovery which include the borrower's financial condition, borrower's ability to pay and the current value of the collateral among other factors. Bello (2013) attempts to investigate the determinants of recovery of defaulted mortgage loans in the Nigerian lending industry. The research sampled 3,197 defaulted mortgages from the period 1999-2011 that were gathered from commercial banks and primary mortgage institutions in Nigeria. Loan recovery rate is defined as the total recovery of defaulted loan divided by the amount outstanding at the date of default. The research paper studied numerous factors and the results reveal that growth in Gross Domestic Product, borrower status, borrower's history of default, length of borrowing, business relationship with bank, loan supervision, age of collateral and location of collateral were significant positive determinants to loan recovery. However, inflation growth rate, interest growth rate, priority of collateral and collateral revaluations are significantly inversely related to loan recovery with loan to value, loan size and loan duration having insignificant positive relationship. Analysis was done using the Logistic Regression model and tested for significance.

Mortgage default is a key factor that mortgage financiers grapple with. Demyank et al (2011) investigated the determinants and consequences of mortgage default using a unique data set of borrower-level credit information from credit reference bureaus. Understanding the determinants that make a borrower delinquent is very useful to lenders and policy makers. The research used individual credit data from Trans Union Consumer Credit database and Loan Performance database from CoreLogic, which contains loan level data on US subprime and Alt- A mortgages. The research looked at 4 types of default definitions: 30-day delinquent, 60-day delinquent, 90+ day delinquent and foreclosure. The research established that data from Trans Union, where scores dubbed VantageScores were calculated, had predictive power in determining default. The study explains that VantageScore, is not a sufficient statistic though it robustly



predicts default for all types of default considered. Demyank et al (2011) also established that higher probability of default increased when the VantageScore showed a decline in current month compared to six months ago. Estimates suggested a one-point drop in VantageScore corresponds to one basis point increase in mortgage default rate for fixed rate mortgages. Point estimates indicate that mortgage rates increase by 51 basis points (bps) following 30 day delinquency, by 25bps after 60 day delinquency, by 14 bps following 90 days past due and 6bps following foreclosure.

Luigi et al (2011) carried out a survey to measure a household's propensity to default on mortgages even if they can afford to pay them when the value of the mortgage exceeds the value of the house. Willingness to default increases both in absolute and relative terms with the size of the home equity shortfall. In 2009, millions of American Household found themselves with a mortgage that exceeded the value of their home. The difference between the value of the mortgage and the value of the house were usually large, which forced some household to hold as much as -50% equity positions. Guiso (2011) finds that the main problem in studying strategic default is being able to identify a default as strategic. Strategic defaulters mask themselves as people who are unable to pay thus difficult to distinguish them from the normal defaulters, when analyzing default data. The research applies a similar strategy as Bajari (2008) who estimated that a 20% decline in home prices would lead to a 15% increase in the probability a borrower would default. The researcher asked respondents two questions. 1. "How many people do you know who have defaulted on their house mortgage?" Those who know at least one, were also asked, 2. "Of the people you know who have defaulted on their mortgage, how many do you think walked away even if they could afford to pay the monthly mortgage?" By taking a ratio of the two, they obtained an estimate of the percentage of actual defaults that are considered "strategic" by the defaulters' acquaintances. They carried out a longitudinal study where in March 2009, the research concluded that 26.4% of defaults appeared to be Strategic, in September 2010, the proportion had increased to 35.1%.

The research concluded that the cost of defaulting strategically is driven by various factors- pecuniary and non-pecuniary. The biggest determinants are the value of the equity shortfall as a percentage of the house value and whether the house was bought more than 5 years ago—a measure of the attachment to (and thus the cost of leaving) the current location. The research also established that blacks, Hispanics and older people are more willing to strategically default, while women are less likely. 82% of respondents concluded that it is morally wrong to engage in strategic default and 9.9% of these are less likely to engage in strategic default according to the research results. Consistent with Fay et al. (2002) and Gross and Souleles (2002), customers are more likely to inflict a loss on others when they have suffered a loss themselves, particularly when they feel the loss was unfair. The results further indicated that strategic defaulters are likely to declare their intention to do so.

Krainer and Laderman (2011) focus on the interaction between mortgage prepayment and delinquency during the period 2001 to 2010. The study shows that when house prices flattened and started to decline, borrowers had increasingly slow prepayments and that this decline in prepayments coincided with a sharp increase in delinquency rates. Low credit score borrowers displayed a pronounced negative correlation between default rates and prepayment rates. During the housing boom of the mid 2000s low credit score borrowers had higher prepayment speeds than borrowers with higher scores. When house appreciation slowed the situation reversed itself.

The research documented that even after controlling risk factors that would impede mortgage prepayment, including loan to value ratios, post-2007 prepayments appeared unaccountably slow. Expected mortgage loan returns are determined by the expected cashflows from monthly mortgage payments. Thus the greatest risk that mortgage lenders and investors face is the disruption or halting of these monthly cashflows due to the borrower prepaying the loan or defaulting on the mortgage. Between 1980 and 2005, the mortgage delinquency rate averaged just above 2%, with the first-lien mortgage delinquency in 2010 at nearly 11%. The research focus shifted to default risk. The typical subprime borrower was one with some form of loan delinquency and financial

distress history. Loan rates for these, were typically high and thus burdensome such that households were unable to repay in the long run. Meeting the repayments obligations the client was able to improve their credit score and increase their equity in the house. Deng et al (2000) explained that accounting for a borrower's prepayment option helps to explain the seemingly slow propensities of borrowers to default during the 1990's. They demonstrated that default hazard is sensitive to interest rate volatility. The empirical question addressed by the research is the extent to which the delinquency rates during the housing bust was related to a decrease in the ability of borrowers to pay.

The research concluded that during the year under study, low credit score borrowers were actually more likely to prepay their mortgages than higher credit score borrowers, when the housing market faltered, low credit score borrowers experienced lower prepayments than borrowers with higher scores. The empirical research established between house prices and prepayment and default, house price declines alone cannot account for the low prepayment rates in the late 2000s, a period when mortgage interest rates were at historic lows. Their model supports the view that once recession was underway, lenders tightened their standards and further constrained prepayment activity, thus not only house price dynamics, but credit supply conditions as well, have played an integral role in housing market performance during the most recent cycle.

### **2.3.2 Market Structure**

Looking further afield, as at end of 2010 the Canadian mortgage market had grown to more than \$1 trillion, representing 40% of the total outstanding private sector credit. It was dominated by 6 banks (Bank of Montreal, Bank of Nova Scotia, Canadian Imperial Bank of Commerce, Royal Bank Financial Group, TD Financial Group and Banque Nationale). Allen et al (2011) examined factors that explain differences in mortgage rates. Key variables considered were loan, borrower and market characteristics. They established that banks with a large branch network have higher rates than those with smaller branch networks, branch network was deemed to imply greater market power. They also concluded that high-income households are less likely to spend time shopping for and negotiating a mortgage.

Understanding how rates are determined was important to the Central Bank, the Competition Authority and other financial regulators. Allen et al (2011) found that the changing market structure of the mortgage industry had implications on competition since banks are horizontally and vertically differentiated. Financial Regulators should as well take keen interest in understanding how loans are priced especially if mortgage related instruments are to be regulated.

The Canadian Mortgage market is simple where many Canadians sign five-year, fixed rate mortgages that are rolled over with five-year, fixed-rate mortgages- for typically 25 years, (Allen et al, 2011). The rates are re-negotiated every 5 years. In this case, the monthly payment is fixed, but the interest portion fluctuates with interest rates. Longer-term mortgages were phased out in Canada after lenders experienced difficulties in interest rate volatility and maturity mismatch. In Canada, a borrower who contributed less than 25% of the mortgage to purchase a house was required to purchase mortgage insurance.

Titman et al (2004) examine the cross-sectional and time-series determinants of mortgage credit spreads as well as the terms of the mortgages. They examine the difference between mortgage rates and Treasury Bond rates with the same maturities. Mixed results were obtained on analyzing the relationship between loan to value (LTV) of a mortgage and mortgage spreads. The negative relationship between mortgage maturity and mortgage spread also violated the theoretical expectation with respect to the intrinsic risk of each mortgaged property and hence mortgage characteristics are likely to proxy for unobserved risk attributes. Lenders are thus likely to require down payments i.e. to reduce the LTV and impose shorter maturities on properties that are likely to be riskier. Determinants of mortgage characteristics such LTV ratio, mortgage amortization rate and maturity are also studied where results indicated that a strong determinant of the LTV and amortization rate is the NOI/value ratio. Consistent with analysis by Titman and Torous (1989), the study establishes that mortgage spreads decrease with increases in Treasury Bond Rates.

Scanlon (2008) observes that in many countries, not only developed countries, house prices have been increasing rapidly; mortgage debt has been on the rise and affordability worsened. In this regard, standard annuity mortgage is being supplanted by mortgages with nonstandard features, such as longer terms or interest only payments. These new features aim to reduce the borrowers' monthly debt service in the initial period of the loan. These new product types enable individuals to enter into owner occupier houses while varying their expenditure patterns, the long term cost to the borrower cannot normally be less than for a standard product. The paper looked at various new innovations in the mortgage segment such as mortgages that reduced repayment amounts and mortgages that have slower debt repayments (lengthening the tenures). The study looks at evidence from 13 developed countries, tracking house prices, debt and affordability, and particularly the availability and market share of mortgages with these features.

The study concludes that these mortgage innovations are in fact more risky, since for example an interest-only borrower does not accumulate an equity interest in the property thus the borrower is more sensitive to shocks and there is increased risk of moral hazards. The research observes that increasing affordability problems as much as wider availability of products has led to the growth in use of both longer term and interest only mortgages. Scanlon however notes that if these products are managed effectively such mortgages can assist households to enter owner-occupier houses thus improving their housing conditions- but at a cost of extending debt into less certain times of life. Purchasers accumulate equity more slowly with interest-only mortgages, and leave themselves open to interest-rate and other shocks for longer periods with extended-term mortgages. The evidence suggests that borrowers may not be fully aware of these problems, particularly because they are most concerned with the size of payments early in the loan.

However, in stable economies, longer term debt in particular is desirable to both the individuals and the economy. This growth in debt, plus changes in composition of the

debt, means that the financial system becomes more vulnerable to any sudden structural changes in incomes, inflation and employment. Clearly, innovations carry with them greater risks for both the mortgagors and the housing market itself.

Although, 6 large banks control the mortgage market in Canada, research indicated that between 1997 and 2004 consumers sought to look for a mortgage through a broker. This saw broker market share increase from 10% to 30% during the period. Allen et al (2011) conclude that consumers have different skills for shopping and negotiating for mortgages and lenders can maximize profits based on observing these preferences and skills. Results indicate that high income customers, loyal customers and customers who have a preference to banks with large branch networks are willing to pay a higher rate of interest for their mortgages.

### **2.3.3 Business Cycles**

Njongoro (2013) observes that the mortgage market in Kenya is still in its early stages as compared to the developed countries where the mortgage market accounts for a big part of the gross domestic product. The Kenyan market is underdeveloped facing numerous challenges but offers significant potential for growth.

Synopses of Selected Research on Housing, Mortgages, and Foreclosures (2008) documents key findings from research and Federal Reserve System policy on selected topics relating to housing, mortgage, loan performance and foreclosures. The report outlines that in recent periods, house prices in many countries have exhibited periods in which inflation adjusted house prices rose for several consecutive years, followed by several years of decline. Tsatsaronis and Zhu (2004) show that between 1970 and 2003, real house prices went through two full cycles of long sequences of price rises followed by sequences of price declines. Empirical studies show the dynamic house prices are attributed to cycles of momentum and reversion. Momentum refers to the tendency of house prices to rise further once they start to rise and fall once they start to fall. Reversion refers to the tendency of the momentum driven, shorter term deviations of house prices to eventually correct in that they revert toward the longer term trend.

Various studies have been used in explaining house prices; Interest rates, real income per capita or its growth rate, GDP growth, demographic measures (such as the age composition or growth rate of total population), job growth, the unemployment rate, the growth rate of inflation-adjusted bank credit, consumer price inflation, construction costs, zoning restrictions, and housing starts. Gerew (2006) provides a way to forecast probabilities of house price declines for individual cities. House price dynamics differ somewhat across local markets, Capozza et al (2002) conclude that both momentum and reversion vary by city with mean reversion being greater in large metro areas and faster growing cities with lower construction costs. Case and Shiller (2003) established during their sample period that income alone explained almost all price changes in the majority of the US states. For academics, house price changes that reflect changes in fundamentals of supply and demand do not connote a bubble; this is because the changes are actually fundamentally expected.

#### **2.3.4 Funding Considerations**

Housing finance is a vital component of a well-functioning housing system in any country (Warnock and Warnock, 2008). The housing finance market impacts on monetary policy, leading to improved functioning of the real estate market, facilitates economic growth, and provides optimal cost of debt to firms and households (Wolswijk, 2005). Bello et al (2013) note that credit is a major input in the making of investments, the availability of which affects the level of development in different sectors of a nation's economy.

Adequate liquidity is vital for banks to be able to extend mortgages to customers. Banks operate under tight liquidity regulations as liquidity is a key indicator of the financial health of these institutions. Liquidity risk can be defined as the risk of being unable to liquidate a position timely at a reasonable price (Muranaga and Ohsawa, 2002). Guglielmo (2008) argues that the balance sheets of banks are growing in complexity and dependence upon capital markets has made liquidity risk management more challenging. He argues that banks having exposures in the capital markets must have a deep understanding of the risks involved.

Zaphaniah (2013) studies the relationship between liquidity risk and financial performance of commercial banks in Kenya. He notes that banks having a large exposure in long term lending may face problems of liquidating the same during times of liquidity pressures. He argues that a bank should respond to funding shortfalls by acting on the asset side of the balance sheet if it is not able to raise more capital. This ideally means restricting long term lending e.g. mortgage lending to ease liquidity pressures.

Solvency risk forms another funding consideration that lenders have to take into account. Solvency risk arises out of lack of sufficient funds to pay depositors in the event of a bank run. Capital to asset ratio indicates the cushion available to a bank against unexpected losses and protects the interests of uninsured depositors (Allen and Gale, 2004). Higher capital to assets ratio builds confidence of bank depositors but may reduce shareholder value due to reduction in return to equity.

Diamond and Rajan (2005) emphasizes that a mismatch in depositors' demands and available capital forces a bank to generate the capital resources at a higher cost. Many banks hence choose to avoid long term lending, e.g. mortgage lending, for this reason. Falconer (2001) argues that a bank with liquidity problems loses a number of business opportunities. This places the bank at a competitive disadvantage compared to more liquid competitors.

## **2.4 Summary of the Literature**

The review of the literature gave insights that economic factors may be driving the level of mortgage finance in Kenya. Previous studies have sought to understand these effects in other markets, and studies done in the Kenyan market have identified the study of economic factors driving mortgage finance uptake as an area requiring further research. Specifically, there is great scope in understanding lender risk appetite by studying loss rate experiences impact on pursuing mortgage financing business lines. A deeper



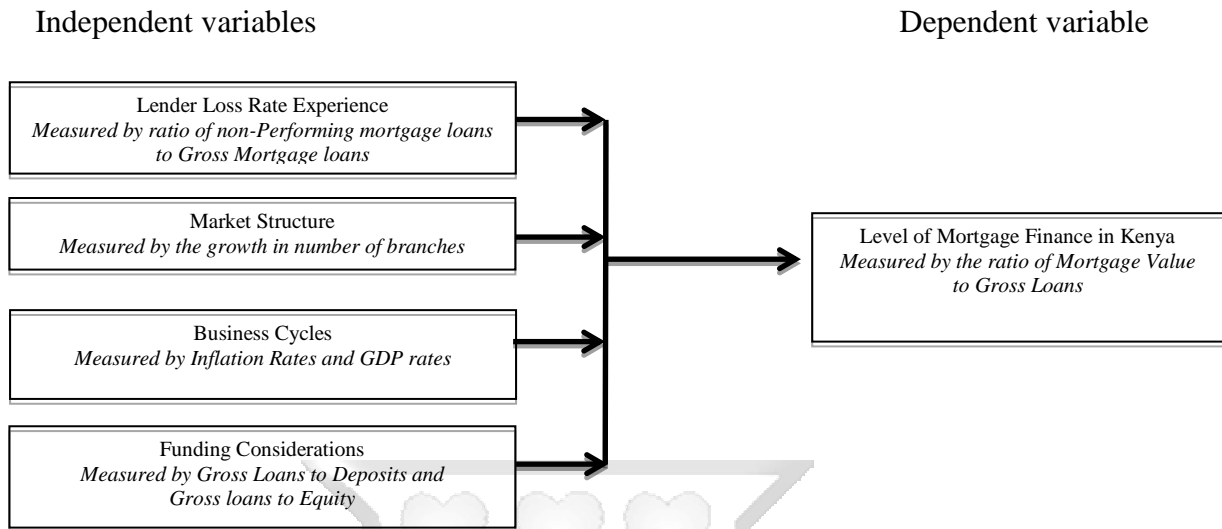
appreciation of market structures and the business models that financial institutions have adopted will yield greater insights on how to optimize the reach to potential customers. As with all markets, the Kenyan one is exposed to business cycles and these have an impact on business performance and hence growth. An understanding of how business cycles affects level of mortgage finance will help practitioners, government and regulatory official be better prepared to respond to the effects of the cycles to mortgage finance uptake. Finally, an understanding of funding structures and considerations will provide vital frameworks to mortgage finance consumers and providers to ensure optimal asset liability matching and access to this critical means of financing housing.

## **2.5 Research Gaps**

The general topic of mortgage finance in Kenya has been the subject of several past research efforts. Ariemba (2011) studied the impact of the high price of land as an impediment to mortgage finance on the back ground of income levels in Kenya. Kariuki (2015) concluded that the cumbersome mortgage application process acts as an impediment to growth of mortgage finance while Mburu, Ka'kumu and Owiti (2015) looked at the level of mortgage interest rates as a determinant of mortgage finance levels in Kenya.

Whereas previous local research focused on the more common economic determinants of mortgage finance growth like interest rate, inflation rates, income levels and house price levels, there is a research gap as far as studying the effect of the economic drivers of lender loss rate experience, business cycles, market structures and balance sheet funding on the level of mortgage finance in Kenya.

## 2.6 Conceptual Framework



**Figure 2 Conceptual Framework**

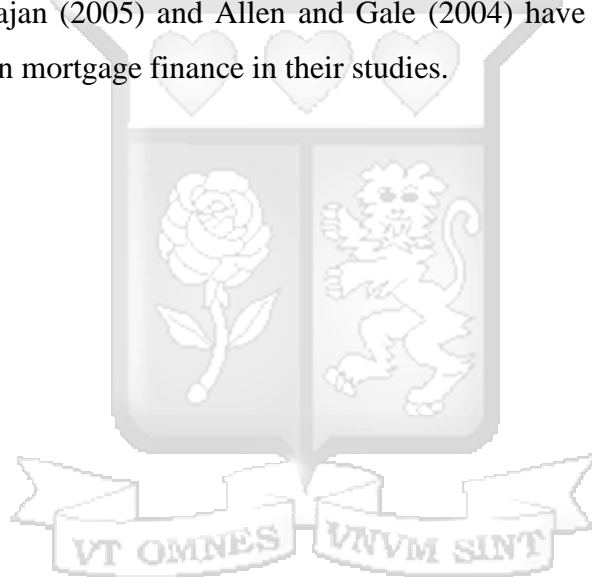
The dependent variable is the level of mortgage finance in Kenya. This level is defined by the ratio of the mortgage portfolio to gross loans experienced by the scoped lenders in the study in the period January 2013 to December 2016. The study measures this variable as an indicator of the penetration levels of mortgage finance in Kenya.

The independent variables of the study are attributes of the four identified factors. Lender loss rate experience is measured by the value of non-performing mortgage loans to total mortgages for the lenders in the period January 2013 to December 2016, where default is defined as mortgage facilities that have been in arrears for more than ninety days. This represents the portion of mortgage portfolios where the lenders are incurring credit losses due to customer default in meeting their loan repayment obligations. Bello et al (2013) studied default rates in the Nigerian market while Demyank et al (2011) studied the drivers of default in the American market.

Market structure is studied by looking at the geographical footprint in terms of number of branches of the scoped mortgage lenders over the period January 2013 to December 2015. Allen et al (2011) studied the effect of bank market structures on mortgage finance in the Canadian market. The effect of business cycles is studied by reviewing macro-

economic variables of inflations rates and GDP over the period January 2013 to December 2016. The study aims to establish if seasonality, as defined by business cycles, is a factor influencing mortgage finance levels in Kenya. Tsatsaronis and Zhu (2004) used these macro-economic variables in studying their effects on house prices in the American market over the period 1970 to 2003.

Funding considerations as a driver of mortgage finance in Kenya is studied by looking at the effect of the size of deposits and equity funding of the scoped mortgage lenders as defined by the ratios of gross loans to deposits and gross loans to equity. The funding sources are expected to influence the ability of lenders to issue mortgage loans. Diamond and Rajan (2005) and Allen and Gale (2004) have considered the impact of these variables on mortgage finance in their studies.



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines how the research was conducted; the blueprint of how data was collected, measured and analyzed. The chapter is divided into the following subsections; research design, target population, sample design used, research instruments, data collection and analysis.

#### **3.2 Research Design**

The study adopted a quantitative research design aimed at establishing the level of mortgage finance uptake in the Kenyan economy, by studying the impact of dependent variables aligned to the four factors of lender loss rates, market structure, business cycles and balance sheet funding. A Multiple regression model is formulated and used to analyse the problem statement. This design was applicable to this study as it seeks to establish the relationship between the four identified independent factors to the level of mortgage finance in Kenya.

#### **3.3 Population and Sample**

The target population for this study are the 41 commercial banks in Kenya and the 1 mortgage finance company (Housing Finance of Kenya, HFCK) which, as per Central Bank of Kenya definition is also considered a bank. The institutions were grouped into three tiers as per the Central Bank of Kenya Market Size Index where tier 1 banks have a market size of >5%, tier 2 banks have a market size index of 1-5% while tier 3 banks have a market size index of <1%. The sampling unit in the study is the bank.

A final sample of 32 lending institutions was scoped after adjusting for banks without a mortgage portfolio, and banks that were not active at the end of the study period.

**Table 2 Population of banks in Kenya**

| Bank category | Number of banks in category | %age |
|---------------|-----------------------------|------|
| Tier 1 Banks  | 8                           | 20%  |
| Tier 2 Banks  | 12                          | 26%  |
| Tier 3 Banks  | 22                          | 54%  |
| Total         | 42                          | 100% |

Source: Central Bank of Kenya (2017)

Lemeshow et al propose that any sample of at least 10% of the population is adequate for a study (Lemeshow, S et al, 1990).

### 3.4 Data Collection

The study utilized secondary data. Secondary data was collected from statistical bulletins from the Kenya National Bureau of Statistics and regulator reports from the Central Bank of Kenya. The table below shows the source of data for each variable scoped in the study.

**Table3: Data Sources**

| Variable                             | Abbreviation    | Variable Description  | Data Source                                     |
|--------------------------------------|-----------------|---|---|
| <b>Dependent variable</b>            | Panel Data      |   |   |
| $Y$                                  | <i>MV_GL</i>    | <i>mortgage value to gross loans</i>                                  | Central Bank of Kenya bank supervision reports  |
| <b>Independent variable</b>          | Panel Data      |   |   |
| <b>(i) Lender loss rate variable</b> |                 |   |   |
| $X1$                                 | <i>RNPLV_MV</i> | <i>ratio of non-performing mortgage loans to gross mortgage loans</i> | Central Bank of Kenya bank supervision reports  |
| <b>(ii) Market structure</b>         | Panel Data      |   |   |
| $X2$                                 | <i>Gr_Br</i>    | <i>growth in branches</i>   | Central Bank of Kenya bank supervision reports  |
| <b>(iii) Business cycle</b>          | Panel Data      |   |   |
| $X3$                                 | <i>Infl_Ra</i>  | <i>inflation rate</i>   | Kenya National Bureau of Statistics statistical |

|                                   |               |                                   |   |
|-----------------------------------|---------------|-----------------------------------|---|
|                                   |               |                                   | bulletins   |
| <i>X4</i>                         | <i>GDP</i>    | <i>GDP growth rate</i>            | Kenya National Bureau of Statistics statistical bulletins |
| <b>(iv) Balance sheet funding</b> | Panel Data    |                                   |   |
| <i>X5</i>                         | <i>GL_Dep</i> | <i>gross loans to deposits</i>    | Central Bank of Kenya bank supervision reports            |
| <i>X6</i>                         | <i>GL_Equ</i> | <i>gross loans to equity</i>      | Central Bank of Kenya bank supervision reports            |
| <b>Control variables</b>          | Panel Data    |                                   |   |
| <i>X7</i>                         | <i>Ln_GL</i>  | <i>natural log of gross loans</i> | Central Bank of Kenya bank supervision reports            |
| <i>X8</i>                         | <i>RoE</i>    | <i>return on equity</i>           | Central Bank of Kenya bank supervision reports            |
| <i>X9</i>                         | <i>T1</i>     | <i>tier 1</i>                     | Central Bank of Kenya industry reports                    |
| <i>X10</i>                        | <i>T2</i>     | <i>tier 2</i>                     | Central Bank of Kenya industry reports                    |
| <i>X11</i>                        | <i>T3</i>     | <i>tier 3</i>                     | Central Bank of Kenya industry reports                    |

### 3.5 Data Analysis

Data collected was sorted, classified and coded, then tabulated for ease of analysis. The data is summarized and categorized according to common themes. Data collected is analyzed using descriptive statistics and regression analysis. Significance studies are carried out to determine the level of contribution to mortgage uptake implied by each identified factor via correlation matrices.

### 3.6 Model Specifications

A multiple linear regression model is used to investigate the relationship between the dependent and the independent variables over the period 2013 to 2016, both at an overall level and at a tiered level for tiers 1, 2 and 3. The regression model takes the following form:

**Equation 1 Multi - Variate regression model**

$$MV\_GL = a + \beta_1 RNPLV\_MV + \beta_2 Gr\_Br + \beta_3 Infl\_Ra + \beta_4 GDP + \beta_5 GL\_Dep$$

$$+ \beta_6 GL\_Equ + \lambda_1 Ln\_GL + \lambda_2 ROE + \lambda_3 T_1 + \lambda_4 T_2 + \varepsilon$$

Where MV\_GL is the dependent variable depicting the level of mortgage finance. The independent variables are RNPLV\_MV (loss rate), Gr\_Br (growth rate of branches), Infl\_Ra (inflation rate), GDP rate, ratio of gross loans to deposits (GL-Dep) and ratio of gross loans to equity (GL-Equ). Ln\_GL, ROE.  $T_1$  and  $T_2$  are control variables while  $a$  = Constant term and  $\varepsilon$  = error term. The beta co-efficients depict the level of influence that the specific independent variable has on the dependent variable if all other independent variable are held constant.

**Table 4 Variable definitions**

| <b>Dependent variable</b>            |          |   |
|--------------------------------------|----------|---|
| Y                                    | MV_GL    | Mortgage Value to Gross Loans                         |
| <b>Independent variable</b>          |          |   |
| <b>(i) Lender loss rate variable</b> |          |   |
| X1                                   | RNPLV_MV | Ratio of Non-Performing Loans Value to Mortgage Value |
| <b>(ii) Market structure</b>         |          |   |
| X2                                   | Gr_Br    | Growth in Branches                                    |
| <b>(iii) Business cycle</b>          |          |   |
| X3                                   | Infl_Ra  | Inflation Rate  |
| X4                                   | GDP      | Growth in Gross Domestic Product                      |
| <b>(iv) Balance sheet funding</b>    |          |   |
| X5                                   | GL_Dep   | Ratio of Gross Loans gto Deposits                     |
| X6                                   | GL_Equ   | Ratio of Gross Loans to Equity                        |
| <b>Control variables</b>             |          |   |
| X7                                   | Ln_GL    | Natural log of Gross Loans                            |
| X8                                   | RoE      | Return on Equity                                      |
| X9                                   | T1       | Tier 1  |
| X10                                  | T2       | Tier 2  |
| X11                                  | T3       | Tier 3  |

### **3.7 Reliability**

Reliability is the extent to which the findings can be replicated or reproduced by other researchers. The data has been collected from publicly available online sources, being the official websites of the Central Bank of Kenya and the Kenya National Bureau of Statistics





## CHAPTER FOUR

### DATA ANALYSIS AND FINDINGS

#### 4.1 Introduction

This chapter presents the findings, analysis and interpretation of collated data seeking to answer the objectives of the study. The sample is an unbalanced panel data set. The specific objectives answered were; to study the effect of lender loss rate experience on level of mortgage finance in Kenya; to study the effect of market structures adopted by mortgage lenders in Kenya on level of mortgage finance; to study the effect of business cycles on level of mortgage finance in Kenya and to study the effect of balance sheet funding on level of mortgage finance in Kenya.

#### 4.2 Final Sample Representation

Data were collected using secondary data for the period 2013 - 2016. Table 4 represents the distribution of the banks sampled.

**Table 5 Final sample representation**

|   | No. of Banks |        |        |       |                        |
|---|--------------|--------|--------|-------|------------------------|
|   | Tier 1       | Tier 2 | Tier 3 | Total | Number of Observations |
| No of Licensed Banks as of Dec 2016       | 8            | 12     | 22     | 42    | 168                    |
| Less banks placed under Receivership      | -            | -      | (2)    | (2)   | (8)                    |
| Less banks without Mortgage Product       | -            | (1)    | (6)    | (7)   | (28)                   |
| Less banks bought out during study period | -            | -      | (1)    | (1)   | (4)                    |
| Banks included in final sample            | 8            | 11     | 13     | 32    | 128                    |
| Observations                              | 32           | 44     | 52     | 128   |                        |

Four observations (overall, tier 1, tier 2, tier 3) are made for each variable for the 32 banks in the final sample to give a total of 128 observations. 76% of the banks in the population were included in the final sample of which 25% were tier 1 banks, 34% were tier 2 banks and 41% were tier 3 banks. 17% of the bank population were excluded as they did not have a mortgage portfolio, 2% of the banks were bought out by competition during period under study while 5% were placed under receivership during the period under study.

### 4.3 Diagnostic Tests for the collected data

#### 4.3.1 Normality test for the Dependent Variable

Part of the assumption of linear regression is that the error terms are normally distributed. That is  $\varepsilon \sim \text{Normal}(0, \sigma^2)$ . The Normal Q-Q Plot was used in assessing linear regression robustness, and the population data is depicted as relatively normal.

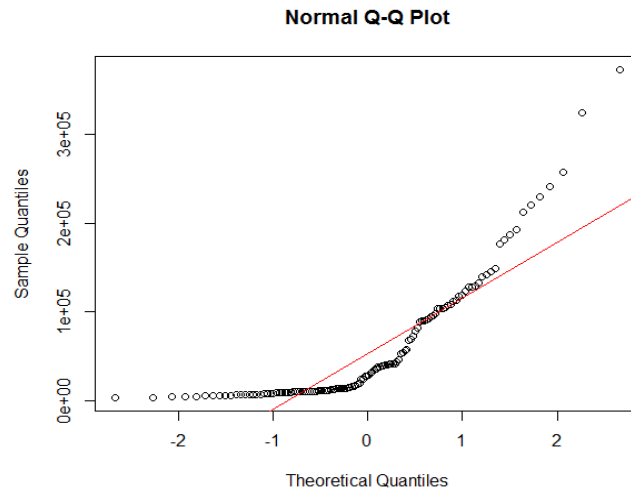


Figure 3 Normal Q-Q Plot for mortgage\_value\_to\_gross\_loans

On log transforming the dependent variable Mortgage\_value/Gross\_Loans, the normality assumption holds. This indicates the underlying population is approximately normal.

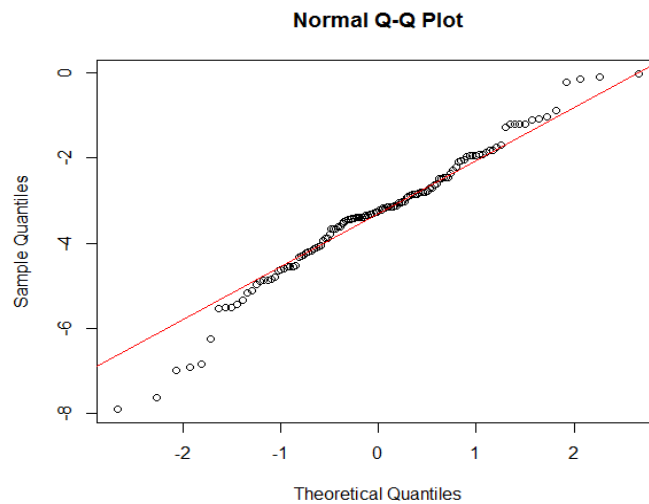


Figure 4 Normal Q-Q Plot transformed log of mortgage-value\_to\_gross\_loans

#### 4.3.2 Multi-Collinearity test for the Dependent Variable

Collinearity is a problem that exists when some (or all) of the independent variables are strongly linearly associated with one another. As a general rule of thumb, strong collinearity is present when correlation is  $> (+/-) 0.8$ . Spearman correlation is used to assess collinearity of the variables and as the highest correlation relationship is  $< (+/-) 0.8$ , we conclude that there is no multi-collinearity in the variables.

#### 4.4 Descriptive Statistics

Table 5 summarizes the descriptive statistics of the study. Kurtosis and Skewness are within normal expectation. This conclusion is also arrived at by studying the standard deviations of the variables which are within normal expectation.

The institutions were grouped into three tiers as per the Central Bank of Kenya Market Size Index where tier 1 banks have a market size of  $>5\%$ , tier 2 banks have a market size index of  $1-5\%$  while tier 3 banks have a market size index of  $<1\%$ .

At an overall model level (all 32 banks in the sample), mortgages form an average of  $9.4\%$  of gross loans that the banks have issued (std dev  $16.7\%$ ). A review of average mortgage portfolio size at a tier level shows great variability with tier 1 banks having an average of  $7.6\%$  mortgages to gross loans (std dev  $5.6\%$ ), tier 2 banks  $13\%$  mortgages to gross loans (std dev  $25.5\%$ ) and  $7.4\%$  mortgages to gross loans for tier 3 banks (std dev  $10.3\%$ ). The largest individual bank mortgage portfolio in tier 1 banks comprises  $18.2\%$  while there is a bank in tier 3 with  $41.7\%$  mortgage book as a percentage of gross loans.

The mortgage loss rate variable is measured by the ratio of non-performing loans to mortgage book. At an overall model level, the average loss rate is  $5.6\%$  (std dev  $7.4\%$ ). Tier 1 banks have better performance than average with loss rates at  $4.1\%$  (std dev  $3.3\%$ ). Tier 2 banks have average mortgage loss rates of  $6.7\%$  (std dev  $7.4\%$ ) while tier 3 banks have average mortgage loss rates of  $5.7\%$  (std dev  $8.9\%$ ).

The market structure variable is measured by the rate of branch growth. At an overall model level, branches grew at an average of 5.7% (std dev 10.2%). However, higher growth rates were registered in tier 2 and 3 banks (7.2% and 6%) with std dev 11.8% and 10.7% respectively, compared to tier 1 banks that grew their branches at 3.5% (std dev 10.2%). Specific banks however had very aggressive branch growth rates with a tier 1 bank growing its branches by 17.4%, a tier 2 bank by 50% and a tier 3 bank by 46.2%.

Inflation and GDP growth rates were fairly stable over the period under study. The banks maintained high ratios of loans to deposits (overall average at 90.9%, std dev 20.5%). Tier 1 banks at 86.2% (std dev 10%), tier 2 banks at 92.6% (std dev 25.9%) and tier 3 banks at 92.5% (std dev 20%). The banks issued loans at 4.4 times cover to equity, with tier 2 banks having loans to equity cover at 4.7 times compared to 3.9 times for tier 1 banks. Tier 1 banks are thus better capitalized and have greater capacity to grow the level of mortgage finance in their loan portfolios.

At an overall level, the banks registered profitability as measured by the return on Equity ratio (ROE) of 15.4% (std dev 18%), with the best performing bank having ROE of 49.4%. tier 1 banks have an average ROE of 30.9% (std dev 6.6%), tier 2 banks 13% (std dev 20%) while tier 3 banks have average ROE of 7.9% (std dev 15.1%). As observed in section 4.2, tier 1 banks comprise 25% of the sample, tier 2 banks 34% while tier 3 banks comprise 41%.

**Table 6 Descriptive statistics**

|                                      |                | Abbreviation | Observations | Mean  | Std. Dev. | Min.   | Max.   | Skewness | Kurtosis |
|--------------------------------------|----------------|--------------|--------------|-------|-----------|--------|--------|----------|----------|
| <b>Dependent variable</b>            |                |              |              |       |           |        |        |          |          |
| MORTAGE_VALUE/GROSS_LOANS            | Overall Sample | MV_GL        | 128          | 0.094 | 0.167     | 0.000  | 0.979  | 3.691    | 17.645   |
|                                      | Tier 1         |              | 32           | 0.076 | 0.056     | 0.004  | 0.182  | 0.503    | 1.779    |
|                                      | Tier 2         |              | 44           | 0.130 | 0.255     | 0.008  | 0.979  | 2.528    | 7.929    |
|                                      | Tier 3         |              | 52           | 0.074 | 0.103     | 0.000  | 0.417  | 1.949    | 5.751    |
| <b>Independent variable</b>          |                |              |              |       |           |        |        |          |          |
| <b>(i) Lender loss rate variable</b> |                |              |              |       |           |        |        |          |          |
| RATIO_NPL_VALUE_TO_MORTA             | Overall Sample | RNPLV_MV     | 128          | 0.056 | 0.074     | 0.000  | 0.375  | 1.871    | 6.521    |
|                                      | Tier 1         |              | 32           | 0.041 | 0.033     | 0.000  | 0.147  | 1.136    | 4.494    |
|                                      | Tier 2         |              | 44           | 0.067 | 0.074     | 0.000  | 0.268  | 1.148    | 3.384    |
|                                      | Tier 3         |              | 52           | 0.057 | 0.089     | 0.000  | 0.375  | 1.861    | 5.862    |
| <b>(ii) Market structure</b>         |                |              |              |       |           |        |        |          |          |
| GROWTH___BRANCHES                    | Overall Sample | Gr_Br        | 128          | 0.057 | 0.102     | -0.099 | 0.500  | 2.125    | 8.241    |
|                                      | Tier 1         |              | 32           | 0.035 | 0.061     | -0.051 | 0.174  | 1.153    | 3.123    |
|                                      | Tier 2         |              | 44           | 0.072 | 0.118     | -0.099 | 0.500  | 2.152    | 7.788    |
|                                      | Tier 3         |              | 52           | 0.060 | 0.107     | -0.091 | 0.462  | 1.728    | 5.856    |
| <b>(iii) Business cycle</b>          |                |              |              |       |           |        |        |          |          |
| INFLATION_RATE                       | Overall Sample | Infl_Ra      | 128          | 0.069 | 0.008     | 0.060  | 0.080  | 0.362    | 1.606    |
|                                      | Tier 1         |              | 32           | 0.069 | 0.008     | 0.060  | 0.080  | 0.362    | 1.606    |
|                                      | Tier 2         |              | 44           | 0.069 | 0.008     | 0.060  | 0.080  | 0.362    | 1.606    |
|                                      | Tier 3         |              | 52           | 0.069 | 0.008     | 0.060  | 0.080  | 0.362    | 1.606    |
| GDP_RATE                             | Overall Sample | GDP          | 128          | 0.057 | 0.002     | 0.054  | 0.059  | -0.687   | 2.000    |
|                                      | Tier 1         |              | 32           | 0.057 | 0.002     | 0.054  | 0.059  | -0.687   | 2.000    |
|                                      | Tier 2         |              | 44           | 0.057 | 0.002     | 0.054  | 0.059  | -0.687   | 2.000    |
|                                      | Tier 3         |              | 52           | 0.057 | 0.002     | 0.054  | 0.059  | -0.687   | 2.000    |
| <b>(iv) Balance sheet funding</b>    |                |              |              |       |           |        |        |          |          |
| GROSS_LOANS_TO_DEPOSITS              | Overall Sample | GL_Dep       | 128          | 0.909 | 0.205     | 0.504  | 1.742  | 1.342    | 6.708    |
|                                      | Tier 1         |              | 32           | 0.862 | 0.100     | 0.660  | 1.016  | -0.304   | 1.828    |
|                                      | Tier 2         |              | 44           | 0.926 | 0.259     | 0.504  | 1.654  | 0.503    | 3.142    |
|                                      | Tier 3         |              | 52           | 0.925 | 0.200     | 0.625  | 1.742  | 2.247    | 9.938    |
| GROSS_LOANS_TO_EQUITY                | Overall Sample | GL_Equ       | 128          | 4.403 | 1.553     | 2.030  | 10.039 | 1.300    | 4.803    |
|                                      | Tier 1         |              | 32           | 3.950 | 0.751     | 2.860  | 6.507  | 1.190    | 5.384    |
|                                      | Tier 2         |              | 44           | 4.781 | 1.657     | 2.030  | 8.740  | 0.353    | 2.364    |
|                                      | Tier 3         |              | 52           | 4.362 | 1.760     | 2.082  | 10.039 | 1.608    | 5.405    |
| <b>Control variables</b>             |                |              |              |       |           |        |        |          |          |

|                   |                |       |     |        |       |        |        |        |       |
|-------------------|----------------|-------|-----|--------|-------|--------|--------|--------|-------|
| LN_GROSSLOANS     | Overall Sample | Ln_GL | 128 | 10.284 | 1.239 | 8.152  | 12.829 | 0.173  | 1.737 |
|                   | Tier 1         |       | 32  | 11.876 | 0.402 | 11.264 | 12.829 | 0.577  | 2.581 |
|                   | Tier 2         |       | 44  | 10.562 | 0.689 | 9.226  | 11.631 | -0.366 | 2.450 |
|                   | Tier 3         |       | 52  | 9.070  | 0.406 | 8.152  | 9.722  | -0.444 | 2.417 |
|                   |                |       |     |        |       |        |        |        |       |
| RETURN__ON_EQUITY | Overall Sample | RoE   | 128 | 0.154  | 0.180 | -0.533 | 0.494  | -1.371 | 5.361 |
|                   | Tier 1         |       | 32  | 0.309  | 0.066 | 0.219  | 0.494  | 1.210  | 4.210 |
|                   | Tier 2         |       | 44  | 0.130  | 0.201 | -0.395 | 0.355  | -1.201 | 3.443 |
|                   | Tier 3         |       | 52  | 0.079  | 0.151 | -0.533 | 0.282  | -2.185 | 8.719 |
| TIER_1            | Overall        | T1    | 128 | 0.250  | 0.435 | 0.000  | 1.000  | 1.155  | 2.333 |
| TIER_2            |                | T2    | 128 | 0.344  | 0.477 | 0.000  | 1.000  | 0.658  | 1.433 |
| TIER_3            |                | T3    | 128 | 0.406  | 0.493 | 0.000  | 1.000  | 0.382  | 1.146 |

#### 4.5 Bi-variate analysis: Spearman's correlations Matrix

Spearman correlation analysis was conducted for the overall sample as depicted in table 7.

**Table 7 Correlation Matrix**

Correlation Analysis:

Spearman rank-order

| Probability                  | MORT<br>AGE_<br>VALUE<br>/GROS<br>S_LOA<br>NS | RATIO<br>_NPL_<br>VALUE<br>_TO_<br>MORT<br>A | GROWT<br>H__BR<br>ANCHES | INFLA<br>TION_<br>RATE | GDP_<br>RATE | GROS<br>S_LOA<br>NS_T<br>O_DE<br>POSIT<br>S | GROS<br>S_LOA<br>NS_T<br>O_EQ<br>UITY | LN_GR<br>OSSLO<br>ANS | RETU<br>RN__<br>ON_E<br>QUIT<br>Y | TIER_1 |
|------------------------------|---|--|--------------------------|------------------------|--------------|---|---------------------------------------|-----------------------|-----------------------------------|--------|
| RATIO_NPL_VAL<br>UE_TO_MORTA | 0.550<br>***                                  |  |                          |                        |              |   |                                       |                       |                                   |        |
|                              | 0.000   |  |                          |                        |              |   |                                       |                       |                                   |        |
| GROWTH__BR<br>ANCHES         | 0.049   | -0.024                                       |                          |                        |              |   |                                       |                       |                                   |        |
|                              | 0.579   | 0.787  |                          |                        |              |   |                                       |                       |                                   |        |
| INFLATION_RAT<br>E           | 0.012   | -0.020                                       | -0.138                   |                        |              |   |                                       |                       |                                   |        |
|                              | 0.889   | 0.824  | 0.121                    |                        |              |   |                                       |                       |                                   |        |
| GDP_RATE                     | -0.010  | -0.050                                       | 0.369**<br>*             | 0.4**<br>*             |              |   |                                       |                       |                                   |        |
|                              | 0.912   | 0.578  | 0.000                    | 0.000                  |              |   |                                       |                       |                                   |        |
| GROSS_LOANS_<br>TO_DEPOSITS  | 0.188<br>**                                   | 0.159<br>*                                   | -0.060                   | 0.110                  | 0.161<br>*   |   |                                       |                       |                                   |        |
|                              | 0.033   | 0.072  | 0.498                    | 0.218                  | 0.069        |   |                                       |                       |                                   |        |
| GROSS_LOANS_<br>TO_EQUITY    | 0.150<br>*                                    | 0.270<br>**                                  | -0.036                   | 0.072                  | 0.053        | 0.325<br>***                                |                                       |                       |                                   |        |
|                              | 0.089   | 0.002  | 0.688                    | 0.421                  | 0.554        | 0.000                                       |                                       |                       |                                   |        |
| LN_GROSSLOAN                 | 0.191   | 0.194  | 0.053                    | 0.020                  | -0.024       | -0.003                                      | 0.138                                 |                       |                                   |        |

|   |             |                   |        |       |       |            |             |              |              |               |
|---|-------------|-------------------|--------|-------|-------|------------|-------------|--------------|--------------|---------------|
| S   | **          | **                |        |       |       |            |             |              |              |               |
|   | 0.030       | 0.028             | 0.553  | 0.824 | 0.790 | 0.975      | 0.120       |              |              |               |
| RETURN__ON_E<br>QUITY   | -0.042      | -<br>0.277<br>*** | -0.048 | 0.005 | 0.061 | 0.163<br>* | -0.102      | 0.693<br>*** |              |               |
|   | 0.638       | 0.002             | 0.590  | 0.953 | 0.493 | 0.065      | 0.254       | 0.000        |              |               |
| TIER_1  | 0.169<br>** | 0.061             | -0.055 | 0.000 | 0.000 | -0.133     | -0.114      | 0.725<br>*** | 0.620<br>*** |               |
|   | 0.056       | 0.496             | 0.536  | 1.000 | 1.000 | 0.134      | 0.199       | 0.000        | 0.000        |               |
| TIER_2  | -0.036      | 0.147<br>*        | 0.120  | 0.000 | 0.000 | 0.068      | 0.199<br>** | 0.178<br>**  | -<br>0.042   | -<br>0.417*** |
|   | 0.686       | 0.097             | 0.178  | 1.000 | 1.000 | 0.445      | 0.024       | 0.044        | 0.639        | 0.000         |
| *** Significant at the 0.01 level<br>** Significant at the 0.05 level<br>* Significant at the 0.1 level |             |                   |        |       |       |            |             |              |              |               |

|   |  |  |                             |
|---|--|--|-----------------------------|
| ***. Correlation is significant at the 0.01 level (2-tailed). | **. Correlation is significant at the 0.05 level (2-tailed). | *. Correlation is significant at the 0.1 level (2-tailed). |                             |
| Key   |  |  |                             |
| -1 to -0.5'   | -0.5 to 0  | 0 to .5  | .5 to 1                     |
| Strong Negative correlation                                   | Weak negative correlation                                    | Weak positive correlation                                  | Strong positive correlation |

Table 6 presents the correlation coefficients for the key variables in this study. The correlation results in the table depict a strong positive correlation between lender loss rates (RNPLV\_MV) and the level of mortgage finance in the country (MV\_GL) ( $p < 0.01$ ). This finding is a priori confirmation of the findings by Bello (2013) in the Nigerian market and Demyank et al (2011) in the American market. Strong positive correlation is also observed between Return on Equity (ROE) and Gross Loans (Ln\_GL) ( $p < 0.01$ ), Tier 1 banks (T1) and Gross Loans (Ln\_GL) ( $p < 0.01$ ), and T1 and ROE ( $p < 0.01$ ).

Weak positive correlation is observed between GDP rate and inflation rate (Infl-Ra) ( $p < 0.01$ ), Gross loans to deposit (GL-Dep) to level of mortgage finance (MV\_GL)

( $p < 0.05$ ), GL\_Dep to lender loss rates (RNPLV\_MV) ( $p < 0.1$ ), GL\_Dep to GDP ( $p < 0.1$ ). Gross loans to equity (GL\_Equ) to level of mortgage finance (MV\_GL) ( $p < 0.1$ ) GL-Equ to RNPLV\_MV ( $p < 0.05$ ), Ln\_GL to MV\_GL ( $p < 0.05$ ), Ln\_GL to RNPLV\_MV ( $p < 0.05$ ), Tier 1 banks (T1) to level of mortgage finance (MV\_GL) ( $p < 0.05$ ), tier 2 banks (T2) to RNPLV\_MV ( $p < 0.1$ ), T2 to GL\_Equ ( $p < 0.05$ ) and T2 to Ln\_GL ( $p < 0.05$ ).

A weak negative correlation is observed between GDP rate and growth in branches (Gr\_Br) ( $p < 0.01$ ), return on equity (ROE) and lender loss rates (RNPLV\_MV) ( $p < 0.01$ ), ROE and GL\_Dep ( $p < 0.1$ ) and tier 1 (T1) and Tier 2 (T2) banks ( $p < 0.01$ ). The highest correlation is between tier 1 banks (T1) and gross loans (Ln\_GL) with a coefficient of 0.725 ( $p < 0.01$ )





## 4.6 Regression Models

Table 8 Regression models

|                                      |              |                          | Method: Panel Two-Stage Least Squares<br>Sample: 2013 2016<br>Periods included: 4 |                    |             |          | Method: Panel Two-Stage Least Squares<br>Sample: 2013 2016<br>Periods included: 4 |                    |             |        |  |                    |             |         |   |                    |             |        |
|--------------------------------------|--------------|--------------------------|---|--------------------|-------------|----------|---|--------------------|-------------|--------|--|--------------------|-------------|---------|---|--------------------|-------------|--------|
|                                      |              |                          | PANEL A   |                    |             |          | PANEL B   |                    |             |        |  |                    |             |         |   |                    |             |        |
|                                      |              |                          | Overall Model   |                    |             |          | Tier 1 Model  |                    |             |        | Tier 2 Model                                     |                    |             |         | Tier 3 Model                                    |                    |             |        |
|                                      |              |                          | Dependent Variable: Y: MORTAG   |                    |             |          | Dependent Variable: Y: MORTAGE_VALUE/GROSS_LOANS                                  |                    |             |        | Dependent Variable: Y: MORTAGE_VALUE/GROSS_LOANS |                    |             |         | Dependent Variable: Y: MORTAGE_VALUE/GROSS_LOAN |                    |             |        |
|                                      |              |                          | Cross-sections included: 32   |                    |             |          | Cross-sections included: 8  |                    |             |        | Cross-sections included: 11                      |                    |             |         | Cross-sections included: 13                     |                    |             |        |
|                                      |              |                          | Total panel (balanced) observations: 128  |                    |             |          | Total panel (balanced) observations: 32   |                    |             |        | Total panel (balanced) observations: 44          |                    |             |         | Total panel (balanced) observations: 52         |                    |             |        |
|                                      |              |                          | Constant added to instrument list   |                    |             |          | Constant added to instrument list   |                    |             |        | Constant added to instrument list                |                    |             |         | Constant added to instrument list               |                    |             |        |
| Variable                             | Abbreviation | Variable Description     | Coefficient   | Std. Error         | t-Statistic | Prob.    | Coefficient   | Std. Error         | t-Statistic | Prob.  | Coefficient                                      | Std. Error         | t-Statistic | Prob.   | Coefficient                                     | Std. Error         | t-Statistic | Prob.  |
| <b>Independent variable</b>          |              |                          |   |                    |             |          |   |                    |             |        |  |                    |             |         |   |                    |             |        |
| <b>(i) Lender loss rate variable</b> |              |                          |   |                    |             |          |   |                    |             |        |  |                    |             |         |   |                    |             |        |
| X1                                   | RNPLV_MV     | RATIO_NPL_VALUE_TO_MORTA | 0.619   | 0.213              | 2.905       | 0.004*** | -0.681  | 0.379              | -1.796      | 0.08*  | 1.663  | 0.639              | 2.603       | 0.014** | 0.381   | 0.161              | 2.365       | 0.02** |
| <b>(ii) Market structure</b>         |              |                          |   |                    |             |          |   |                    |             |        |  |                    |             |         |   |                    |             |        |
| X2                                   | Gr_Br        | GROWTH_BRANCHES          | 0.528   | 0.131              | 4.043       | 0.000*** | -0.020  | 0.179              | -0.111      | 0.913  | 0.736  | 0.268              | 2.741       | 0.01*** | 0.187   | 0.119              | 1.571       | 0.124  |
| <b>(iii) Business cycle</b>          |              |                          |   |                    |             |          |   |                    |             |        |  |                    |             |         |   |                    |             |        |
| X3                                   | Infl_Ra      | INFLATION_RATE           | 1.057   | 1.689              | 0.626       | 0.533    | -0.495  | 1.358              | -0.365      | 0.719  | -1.676   | 3.766              | -0.445      | 0.659   | 1.852   | 1.586              | 1.168       | 0.250  |
| X4                                   | GDP          | GDP_RATE                 | -3.575  | 7.389              | -0.484      | 0.630    | 2.351   | 5.613              | 0.419       | 0.680  | -1.854   | 16.866             | -0.110      | 0.913   | -3.963  | 7.021              | -0.564      | 0.576  |
| <b>(iv) Balance sheet funding</b>    |              |                          |   |                    |             |          |   |                    |             |        |  |                    |             |         |   |                    |             |        |
| X5                                   | GL_Dep       | GROSS_LOANS_TO_DEPOSITS  | 0.374   | 0.065              | 5.741       | 0***     | -0.105  | 0.110              | -0.962      | 0.347  | 0.332  | 0.154              | 2.154       | 0.04**  | 0.143   | 0.067              | 2.129       | 0.04** |
| X6                                   | GL_Equ       | GROSS_LOANS_TO_EQUITY    | 0.016   | 0.009              | 1.735       | 0.08*    | -0.033  | 0.014              | -2.319      | 0.03** | 0.047  | 0.027              | 1.744       | 0.09*   | -0.021  | 0.009              | -2.449      | 0.02** |
| <b>Control variables</b>             |              |                          |   |                    |             |          |   |                    |             |        |  |                    |             |         |   |                    |             |        |
| X7                                   | Ln_GL        | LN_GROSSLOANS            | -0.037  | 0.029              | -1.260      | 0.210    | 0.214   | 0.065              | 3.276       | 0.004  | -0.024   | 0.056              | -0.427      | 0.672   | 0.075   | 0.036              | 2.073       | 0.05** |
| X8                                   | RoE          | RETURN_ON_EQUITY         | 0.180   | 0.098              | 1.828       | 0.070    | -0.284  | 0.175              | -1.624      | 0.119  | 0.465  | 0.202              | 2.302       | 0.03**  | -0.121  | 0.095              | -1.276      | 0.209  |
| X9                                   | T1           | TIER_1                   | 0.081   | 0.101              | 0.808       | 0.421    |   |                    |             |        |  |                    |             |         |   |                    |             |        |
| X10                                  | T2           | TIER_2                   | 0.062   | 0.059              | 1.050       | 0.296    |   |                    |             |        |  |                    |             |         |   |                    |             |        |
|                                      |              | R-squared                | 0.444   | Mean dependent var |             | 0.094    | 0.475   | Mean dependent var |             | 0.076  | 0.678  | Mean dependent var |             | 0.130   | 0.558   | Mean dependent var |             | 0.074  |
|                                      |              | Adjusted R-squared       | 0.386   | S.D. dependent var |             | 0.167    | 0.225   | S.D. dependent var |             | 0.056  | 0.580  | S.D. dependent var |             | 0.255   | 0.450   | S.D. dependent var |             | 0.103  |
|                                      |              | S.E. of regression       | 0.131   | Sum squared resid  |             | 1.959    | 0.050   | Sum squared resid  |             | 0.052  | 0.165  | Sum squared resid  |             | 0.899   | 0.077   | Sum squared resid  |             | 0.241  |
|                                      |              | F-statistic              | 7.650   | Durbin-Watson stat |             | 0.782    | 1.902   | Durbin-Watson stat |             | 0.573  | 6.944  | Durbin-Watson stat |             | 1.295   | 5.179   | Durbin-Watson stat |             | 1.225  |
|                                      |              | Prob(F-statistic)        | 0.000   | Second-Stage SSR   |             | 1.959    | 0.103   | Second-Stage SSR   |             | 0.052  | 0.000  | Second-Stage SSR   |             | 0.899   | 0.000   | Second-Stage SSR   |             | 0.241  |
|                                      |              | Instrument rank          | 16.000  |                    |             |          | 14.000  |                    |             |        | 14.000   |                    |             |         | 14.000  |                    |             |        |

\*\*\* Significant at the 0.01 level

\*\* Significant at the 0.05 level

\* Significant at the 0.1 level

Table 7 investigates the influence of the independent variables on the level of mortgage finance in Kenya over the period 2013 to 2016. To achieve this, we study the association between lender loss rates, business cycles, market structures and balance sheet funding; and the level of mortgage finance at an overall industry level and individually for banks in tiers 1, 2 and 3.

The models in Table 7 are significant, with an adjusted R-Squared of 0.386 for the overall model ( $p < 0.01$ ), 0.580 for tier 2 model ( $p < 0.01$ ) and 0.450 for tier 3 model ( $p < 0.01$ ). The model for tier 1 banks seems to be insignificant at the 10 percent significance level (adjusted R-Squared 0.225). The findings seem to suggest a positive and significant association between the independent variables and the level of mortgage finance in Kenya with market structure playing a key differentiating role in influencing the significance. This result is consistent with the findings of Allen (2013) in the Canadian market.

Interestingly, business cycles as studied using the independent variable of inflation rate (Infl\_Ra) and gross domestic product (GDP) do not seem to have significant influence on the level of mortgage finance in Kenya over the period 2013 to 2016. Overall model: Infl\_Ra (coefficient = 1.057, t-statistic = 0.626, not significant), GDP (coefficient = -3.575, t-statistic = -0.484, not significant); Tier 1 model: Infl\_Ra (coefficient = -0.495, t-statistic = -0.365, not significant), GDP (coefficient = 2.351, t-statistic = 0.419, not significant); Tier 2 model: Infl\_Ra (coefficient = -1.676, t-statistic = -0.445, not significant), GDP (coefficient = -1.854, t-statistic = -0.11, not significant); Tier 3 model: Infl\_Ra (coefficient = 1.852, t-statistic = 1.168, not significant), GDP (coefficient = -3.963, t-statistic = -0.564, not significant).

The findings of the control variables illustrate a significant and positive contribution of return on equity (ROE) for the tier 2 model (coefficient = 0.46, t-statistic = 2.302,  $p < 0.05$ ) and gross loans (Ln\_GL) for the tier 3 model (coefficient = 0.075, t-statistic = 2.073,  $p < 0.05$ ).

#### 4.7 Summary of the Chapter

A quantitative methodology was employed in the study. The target population for the study was all banks in Kenya. However, a sample of 32 banks was included in the study after adjusting for banks that did not have a mortgage population and those that had been placed under receivership within the study period. One bank was acquired by a competitor bank during the period of study and hence was excluded from the final sample of study.

Descriptive statistics show the data to be within normal distribution expectations, and this is confirmed via the normality tests carried out. The regression analysis yields strong predictive results where the models are significant at both the overall level and at the tiered levels. Three of the four factors that the study sought to study as determinants of mortgage finance levels in the country were found to be significant predictors. These are lender loss rates, market structure and balance sheet funding. One factor, business cycle, was not found to be significant as depicted by the regression results.

Loss rates, growth in branches and balance sheet funding considerations are highly significant factors determining the level of mortgage finance across all tiers of banks. The business cycle variables did not appear to be significant drivers of mortgage finance levels for the period under study. The regression model predicts strongly the level of mortgage finance both at the overall industry level and at the banking tiers level as depicted by the R and Adjusted R- Squares and by the F-Statistic probabilities of the four models. The findings are consistent with Marshall's (1920) theory of demand and supply and Markowitz's (1952) modern portfolio theory as the study shows that mortgage lenders will supply (i.e. make a rational investment decision that seeks to optimize returns for a given level of risk) more housing finance when they have a lower loss rate experience (overall model  $p < 0.01$ , tier 1 model  $p < 0.1$ , tier 2  $p < 0.05$ , tier 3 model  $p < 0.05$ ), the market structure is supportive and the balance sheet provides mortgage funding finance capacity.

## **CHAPTER FIVE**

### **DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

Chapter 5 aims to present the summary of the findings, conclusions and recommendations based on the objectives of the study. The study sought to study the economic determinants of level of mortgage financing in Kenya and focused on the effect of four specific factors. The factors are lender loss experience, market structures, business cycles and funding considerations adopted by mortgage finance providers in Kenya. The study was guided by the following specific objectives; to establish the effect of lender loss rate experience in determining the risk appetite of banks to finance mortgages, to study the influence of market structures adopted by mortgage financiers in Kenya on level of mortgage finance, to study the effect of business cycles in influencing level of mortgage finance in Kenya and, to study balance sheet funding effect in influencing mortgage finance in Kenya.

#### **5.2 Discussion**

##### **5.2.1 Effect of Lender Loss Experience on level of mortgage finance**

Non-performing loans represent the credit losses that the banks incur in the course of the business of lending. The non-performing loans attract credit loss impairments, which are reserves held for purposes of cushioning the bank from failure. If the credit losses in the bank exceed the shareholder equity, the banks become technically insolvent and are at the risk of failing, triggered by regulator sanctions or by depositors withdrawing their funds. Reserves held in lieu of non-performing loans impair the ability of banks to carry out additional lending business as banks operate under strict regulatory capital requirements. These outcomes are adverse to the bank investors and to the economy of a country.

The study concludes that lender loss rate experience on mortgages is highly significant at the 0.01 per cent level, both at the overall model and at the tiered levels. It is a key determinant to the risk appetite that a bank has in issuing mortgages. This finding is in

line with the findings by Bello et al (2013) who concluded that loss rates drive mortgage finance viability in the Nigerian market and the finding of Demyank et al (2011) who conclude that the level of mortgage delinquencies in a lenders portfolio impacts the risk appetite of the lender to underwriting mortgage business.

### **5.2.2 Effect of Market Structures on level of mortgage finance**

The study looks at the market structure impact by reviewing the growth in the number of branches for the banks. At an overall models level, it finds the growth of branches to be a highly significant determinant to mortgage finance growth at the 0.01 percent significance level. Significance is however lowered when the model is reviewed at the tiered levels on account the tier classification which is an element of market structuring; only showing significance at the 0.1 per cent level for tier 2 banks which are diverse in terms of the number of branches they have. This finding tie in with the findings of Allen et al (2011) who found out that banks with a large branch network in the Canadian market had greater market power.

### **5.2.3 Effect of Business Cycles on level of mortgage finance**

The study looks at two variables to determine the effect of business cycles on the level of mortgage finance in Kenya, interest rates and inflation rates. Both at an overall model and at a tiered model level, the study does not find these variables to be significant determinants of mortgage finance levels. This could be due to the fact that business cycles take longer time periods to evolve, typically 10 to 15 years, while the study only concentrated on the four years between 2013 and 2016. Another possible conclusion is that the mortgage market in Kenya is still under-developed and hence not influenced by changes in business cycles. This conclusion ties in with the findings of Njongoro (2013) who concluded that the mortgage market in Kenya is still in its early stages as compared to developed markets where the mortgage market accounts for a big part of the gross domestic product.

#### **5.2.4 Effect of Balance Sheet Funding structure on level of mortgage finance**

The study considered two variables in studying the effect of balance sheet funding as a determinant of mortgage finance levels. The two variables are gross loans to deposits and gross loans to equity. The study found the two variables to be significant both at an overall model and at a tiered model level, with the specific exception of the significance of gross loans to deposits for tier one banks that was not found to be a significant variable. These findings tie in with the findings of Muranaga and Ohsawa (2002) who observed that in the Japanese market, liquidity risk (the risk of inability to liquidate a financial position quickly at a reasonable price) is a major concern for banks. A similar finding is by Zaphaniah (2013) who observes that banks having a large exposure in long term funding may face liquidity problems during turbulent market conditions, and by Diamond and Rajan (2005) who conclude that capital demands force under-capitalized banks to avoid long term mortgage lending.

#### **5.3 Conclusion and contribution to knowledge**

In line with the findings of Aguko (2012) who concluded that mortgage finance has macro-economic consequences, the results of this research study advises that in addition to the traditionally reviewed macro-economic factors of interest rates and pricing that have been long thought to drive mortgage finance in Kenya, three of the four factors studied in this research effort play a crucial role in determining the level of mortgage finance. These are mortgage loss rates experienced by the lenders, market structure judged by the growth in branch footprint by the lenders, and balance sheet scale. Only business cycle as a factor was found not to be a significant driver of mortgage levels for the period under study.

## 5.4 Recommendations

Mortgage industry practitioners and regulators alike are urged to take into account the effects of potential loss rates when setting mortgage finance policy and managing the portfolios and to take into account the structure of their banking institutions. Market structures influence information asymmetries and customer reach, hence lenders with bigger branch footprints over the geography will enjoy higher growth rates for the mortgage product and hence higher profitability, all other things held constant, a finding that is in line with Allen (2011) who arrived at a similar finding in the Canadian market.

The analysis shows that the scale of a bank does matter in terms of the balance sheet it commands at its disposal to carry out business. Equity represents the portion of a bank's balance sheet funding that has been provided by shareholders. This contribution is usually via direct funds injection into the business and via retained earnings from prior years' profits. On the other hand, bank deposits provides a cheap source of funding for banking institutions, enabling banks to profitably issue out loans, including mortgage loans to customers. The study results calls for innovation in balance sheet funding as the level of deposits and equity that a bank holds directly influences the amount of mortgage business the lenders can write, other things held constant. This will ensure mortgage business targets and growth ambitions are well supported. This finding is in line with the theory of demand and supply outlined by Marshal (1920). The argument when applied to mortgage financing stipulates that banks will only supply mortgage financing where the marginal utility of doing so, in this case marginal profitability, or minimization of credit losses, is maximized. This finding is also in line with Markowitz's (1952) modern portfolio theory that posits that rational investors (in this case mortgage banks), will lend where return is maximized for a given level of risk.

Financial regulators, planning and treasury officials need to be especially cognizant of these factors given that mortgage finance plays a key role in the health and rate of growth of the overall economy and of the banking sector.

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

Limitations to the study included the fact that it only focused on the four factors of lender loss rate experience, market structures, business cycles and balance sheet funding models. The researcher recognizes that there could be other factors outside these that may not have been the subject of prior research in the field, and yet could be significant drivers of the rate of mortgage finance levels in Kenya. Another key limitation is the fact that the study only focused on one side of the demand-supply equation, studying the factors that influenced banks as mortgage finance suppliers. To get a full picture as to the factors determining the level of mortgage finance in Kenya, demand side factors have a role to play. Whereas previous studies have focused on factors determining the demand of mortgage finance in Kenya (Mburu, Ka'kumu and Owiti (2015), Kariuki (2015), Kiguru (2015), the level of mortgage finance in Kenya is influenced simultaneously by both demand and supply factors.

### **5.6 Suggestions for further Research**

Further research work should be conducted on the effects of regulatory and taxation frameworks in influencing level of mortgage finance in Kenya. Also, as noted from the study on the impact of business cycles on the level of mortgage finance, the short period of four years that the study concentrated on did not yield a significant result as a determinant of mortgage finance levels. Further research could therefore be conducted on the impact of business cycles to mortgage finance levels over longer periods of time. Another area of future research effort is a combined demand – supply model of the factors determining the level of mortgage finance in Kenya.



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**LIST OF APPENDICES**  
**Appendix I: List of Mortgage Providers in Kenya**

| Code | Year | Name of Branches                 | Tier1 | Tier2 | Tier3 | Num<br>ber<br>of<br>mort<br>gages | Value of<br>mortgages | number of<br>non<br>performing<br>mortgage<br>loans | value of<br>non<br>performin<br>g mortgage<br>loans | number<br>of gross<br>loans | Value<br>of<br>gross<br>loans | Num<br>ber<br>of<br>bran<br>ches |
|------|------|----------------------------------|-------|-------|-------|-----------------------------------|-----------------------|---|---|-----------------------------|-------------------------------|----------------------------------|
| 1    | 2016 | Kenya Commercial Bank (KCB)      | 1     | 0     | 0     | 6,496                             | 54,333.00             | 483   | 3,584.00  | 1.293                       | 373,031                       | 198                              |
| 2    | 2016 | Barclays Bank of Kenya           | 1     | 0     | 0     | 1,000                             | 7,539.00              | 17  | 72.00   | 0.230                       | 176,349                       | 108                              |
| 3    | 2016 | Equity Bank Kenya                | 1     | 0     | 0     | 1,746                             | 8,882.00              | 127   | 794.40  | 0.836                       | 221,039                       | 164                              |
| 4    | 2016 | Co-operative Bank of Kenya       | 1     | 0     | 0     | 928                               | 16,161.23             | 73  | 1,167.07  | 1.651                       | 241,395                       | 142                              |
| 5    | 2016 | Standard Chartered Bank          | 1     | 0     | 0     | 2,379                             | 22,900.00             | 65  | 393.00  | 0.520                       | 132,497                       | 42                               |
| 6    | 2016 | Diamond Trust Bank               | 1     | 0     | 0     | 65                                | 678.20                | 3   | 28.20   | 0.013                       | 141,702                       | 63                               |
| 7    | 2016 | Commercial Bank of Africa        | 1     | 0     | 0     | 529                               | 5,035.00              | 36  | 384.00  | 3.264                       | 105,082                       | 35                               |
| 8    | 2016 | CfC Stanbic Holdings             | 1     | 0     | 0     | 1,660                             | 14,972.00             | 117   | 671.00  | 0.029                       | 118,483                       | 27                               |
| 9    | 2016 | National Bank of Kenya           | 0     | 1     | 0     | 405                               | 2,321.00              | 87  | 502.00  | 0.054                       | 68,616                        | 73                               |
| 10   | 2016 | Consolidated Bank                | 0     | 1     | 0     | 97                                | 631.11                | 13  | 112.70  | 0.004                       | 10,317                        | 18                               |
| 11   | 2016 | NIC Bank                         | 0     | 1     | 0     | 182                               | 2,300.00              | 13  | 46.00   | 0.034                       | 112,509                       | 35                               |
| 12   | 2016 | I & M Bank                       | 0     | 1     | 0     | 348                               | 3,491.69              | 13  | 117.47  | 0.012                       | 104,302                       | 36                               |
| 13   | 2016 | ECO Bank                         | 0     | 1     | 0     | 138                               | 922.71                | 26  | 143.66  | 0.008                       | 27,393                        | 31                               |
| 14   | 2016 | Prime Bank                       | 0     | 1     | 0     | 30                                | 319.00                | 2   | 21.00   | 0.004                       | 40,170                        | 20                               |
| 15   | 2016 | Family Bank                      | 0     | 1     | 0     | 353                               | 3,344.07              | 28  | 249.39  | 0.144                       | 53,485                        | 91                               |
| 16   | 2016 | Bank of Baroda                   | 0     | 1     | 0     | 102                               | 854.40                | 2   | 29.03   | 0.003                       | 38,089                        | 14                               |
| 17   | 2016 | Housing Finance Company of Kenya | 0     | 1     | 0     | 5,711                             | 51,754.00             | 509   | 5,862.00  | 0.012                       | 56,786                        | 27                               |
| 18   | 2016 | Bank of Africa                   | 0     | 1     | 0     | 191                               | 3,110.95              | 21  | 293.95  | 0.020                       | 37,480                        | 45                               |
| 19   | 2016 | Bank of India                    | 0     | 1     | 0     | 28                                | 375.96                | -   | -   | 0.001                       | 19,354                        | 7                                |
| 20   | 2016 | ABC Bank (Kenya)                 | 0     | 0     | 1     | 40                                | 920.59                | 3   | 65.60   | 0.002                       | 15,022                        | 13                               |
| 21   | 2016 | Development Bank of Kenya        | 0     | 0     | 1     | 559                               | 3,043.43              | 98  | 1,142.52  | 0.001                       | 10,083                        | 3                                |
| 22   | 2016 | First Community Bank             | 0     | 0     | 1     | 224                               | 990.18                | 37  | 136.74  | 0.002                       | 11,926                        | 18                               |
| 23   | 2016 | Giro Commercial Bank             | 0     | 0     | 1     | 26                                | 247.03                | -   | -   | 0.002                       | 9,287                         | 9                                |
| 24   | 2016 | Guardian Bank                    | 0     | 0     | 1     | 22                                | 541.68                | -   | -   | 0.001                       | 9,604                         | 11                               |
| 25   | 2016 | Gulf African Bank                | 0     | 0     | 1     | 120                               | 957.12                | 15  | 178.93  | 0.007                       | 16,686                        | 19                               |
| 26   | 2016 | Jamii Bora Bank                  | 0     | 0     | 1     | 343                               | 3,439.00              | 61  | 965.00  | 0.024                       | 10,497                        | 27                               |
| 27   | 2016 | Middle East Bank Kenya           | 0     | 0     | 1     | 6                                 | 69.00                 | 1   | 20.00   | 0.001                       | 4,015                         | 5                                |
| 28   | 2016 | Oriental Commercial Bank         | 0     | 0     | 1     | 2                                 | 28.18                 | -   | -   | 0.001                       | 7,109                         | 9                                |
| 29   | 2016 | Paramount Universal Bank         | 0     | 0     | 1     | 27                                | 357.76                | 1   | 23.28   | 0.003                       | 6,243                         | 8                                |

|    |      |                          |   |   |   |   |        |   |   |       |        |    |
|----|------|--------------------------|---|---|---|---|--------|---|---|-------|--------|----|
| 30 | 2016 | Sidian Bank              | 0 | 0 | 1 | 4 | 49.00  | - | - | 0.036 | 14,488 | 39 |
| 31 | 2016 | United Bank for Africa   | 0 | 0 | 1 | 1 | 3.88   | - | - | 0.001 | 3,127  | 4  |
| 32 | 2016 | Victoria Commercial Bank | 0 | 0 | 1 | 6 | 126.00 | - | - | 0.001 | 15,293 | 4  |

*Source (Central Bank of Kenya (CBK) Website)*

