

**THE RELATIONSHIP BETWEEN INTEREST RATES AND MORTGAGE
DEFAULT RATE AMONG FINANCIAL INSTITUTIONS IN KENYA**

BY

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**THIS RESEARCH PROJECT HAS BEEN SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE
OF MASTER OF BUSINESS ADMINISTRATION, SCHOOL OF BUSINESS,
UNIVERSITY OF NAIROBI.**

OCTOBER, 2014

DECLARATION

This research project is my original work and has not been submitted for examination at the University of Nairobi or any other university. Works dully added is highly acknowledged

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

Signature.....Date.....

Dr J. Lishenga

ACKNOWLEDGEMENT

I wish to recognize that I could not have started and completed this research successfully without the direction of my supervisor, Dr Lishenga. The invaluable assistance combined with positive criticism, creative suggestions on what to do at each stage of this research right from the generation of the research idea, to its conceptualization, to the drafting of the research proposal, to the analysis of samples and preparation of the final report my gratitude is boundless.

Secondly, I am heavily indebted to various people and organizations for the success of this research project. The material and non-material support they gave to me during research are highly appreciated. I take this opportunity to express my sincere thanks to each of these people and organizations.

Finally, I appreciate the people who worked on the academic works cited in this study: those in the wider scholarly world and those in the business school. And to my family and friends who have helped, encouraged and inspired me as this research project took shape and was completed, a big Thank you.

DEDICATION

I dedicate this project to my loving sister Lucy Wambui Karuri for believing in me and always encouraging me to become the best I can be. To all my family members, especially my loving mother Esther Wanjiku Karuri ,your prayers and support have brought me to this moment, thank you for making the last two years lively.

ABSTRACT

The objective of the study was to establish the relationship between interest rate and mortgage default rate among financial institutions in Kenya. The study used a descriptive correlation research design. The population of the study comprised all the forty-four commercial banks and one mortgage finance company registered with the central bank.

The study used secondary data collected from the Central Bank of Kenya, Central Bureau of Statistics and Banks published financial statements starting 2009 – 2013. The data obtained was analyzed using multiple linear regression technique.

The study established that there existed a positive relationship between the level of interest and default rate whereby an increase in interest rate increased non-performing loans. From the findings, averages for mortgage default rate for all the banks as obtained from the financial statements reflects an upward rise over the 5 year period.

The study recommends that commercial banks in Kenya should assess their clients and charge interest rates accordingly, as ineffective interest rate policy can increase the level of interest rates and consequently default rate. Commercial banks should also apply rigorous policies on loan advances so as loans are awarded to those with ability to repay.

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ABBREVIATIONS

ARM: Adjustable Rate Mortgages

CBK: Central Bank of Kenya

CPI: Consumer Price Index

GDP: Gross Domestic Product

GCC: Gulf Cooperation Council

FRM: Fixed-Rate Mortgage

N.D.F.I: Non Bank Financial Institution

NPA: Non-Performing Accounts

NPLS: Non-performing loans

NSE: Nairobi Stock Exchange

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The Mortgage Market has grown rapidly over recent years in both value of loans and number of loans. The market has now gone through the initial ‘germination’ stage and is preparing to enter its next development phase. Consideration now needs to be given to the requirements for ensuring continued growth. The mortgage market is the third most developed in Sub-Saharan Africa with mortgage assets equivalent to 2.5 percent of Kenya’s GDP (World Bank, 2011).

In common with much of Africa, Kenya has a large housing gap which is growing every year and is increasingly prevalent in urban areas. The current annual housing deficit is estimated at 156,000 units per annum based on the population growth and urban migration taking place. There is limited data on current levels of construction but according to the Ministry of Housing, it is 50,000 units a year. The deficit is largely filled by the growth in slum dwellings and continued self-construction of poor quality traditional housing. The housing gap can only be partially financed by mortgages, while other solutions are required for lower income groups such as Housing Micro-finance and rental housing (World Bank, 2011).

The prevailing high interest rates as a result of a stringent monetary policy being pursued by CBK as an effort to fight high inflation has dampened the mortgage market further. The macroeconomic environment in 2011 and 2012 had a profound impact on mortgage lenders. As the central bank raised its rates to 18 percent, mortgage loans rose up to 25 percent in the first half of 2012, from an average of 14 percent the previous year. Interest rates on

mortgages have been as high as 32%. This has resulted to interest payable on loans to amount to the initial principal sum advanced within a few years. For long term borrowing as in the cases of real estate development this is not sustainable nor does it encourage borrowing (Ndungu, 2012).

The state has played a very minimal role in provision and stabilizing of housing financing, notwithstanding the fact that housing is a basic human right. Following the liberalization of the banking sector in 1991, interest rates were only technically deregulated as the relevant Banking Law was not amended. This resulted to the lenders charging whatever they deemed adequate to meet their profit maximization goals. The mortgage industry in Kenya has seen the introduction of products such as the fixed rate mortgages that are available for 10-20 years. Further, the RBA in 2009 moved to allow pension contributors to use up to 60% of the contributions to secure a mortgage which is seen as a great innovation that can leverage assets worth more than 290 Billion and increase access for lower earning individual who have accumulated substantial pensions.

A World Bank research (2011) found out that only 11% of Kenyans can afford an average mortgage loan which is considered an entry level house of about sh6.6 million. The growth of housing micro finance in termed as another major innovation of the Kenya mortgage market to provide financing for the low income earners.

1.1.1 Interest Rate

Interest rate is the price a borrower pays for the use of money they borrow from a lender/financial institutions or fee paid on borrowed assets (Crowley, 2007). Interest can be

thought of as "rent of money". Interest rates are fundamental to a 'capitalist society' and are normally expressed as a percentage rate over the period of one year. Interest rate as a price of money reflects market information regarding expected change in the purchasing power of money or future inflation (Ngugi, 2001).

Interest rate spread is defined by market microstructure characteristics of the banking sector and the policy environment (Ngugi, 2001). Risk-averse banks operate with a smaller spread than risk-neutral banks since risk aversion raises the bank's optimal interest rate and reduces the amount of credit supplied. Actual spread, which incorporates the pure spread, is in addition influenced by macroeconomic variables including monetary and fiscal policy activities (Emmanuelle, 2003).

The magnitude of interest rate spread, however, varies across the world. It is inverse to the degree of efficiency of the financial sector, which is an offshoot of a competitive environment. The nature and efficiency of the financial sectors have been found to be the major reasons behind differences in spread in countries across the world. In economies with weak financial sectors, the intermediation costs which are involved in deposit mobilisation and channeling them into productive uses, are much larger (Jayaraman and Sharma, 2003).

1.1.2 Mortgage default Rate

A mortgage is a debt with income producing property such as retail space, office, hotel or multifamily building as collateral (Xudong, 2008). Similarly, a mortgage can be both the instrument that pledges real estate as a security for an obligation and the process of pledging

real estate as security (Hassanein & Barkouky, 2008). Unlike the above scholars who define a mortgage in regards to real estate, Tuma, (2005) generally defines a mortgage as it occurs when owners pledge interest as security or collateral for a loan. This means that a mortgage can apply to any sort of property say a car, land or even a building. It is any encumbrance, charge, debenture or loan agreement, whether legal or equitable, that constitutes a charge over an estate or interest and is registered under the Registration of Titles Act.

Mortgage default is a situation in which a borrower is not making payments on the mortgage and the loan is considered to be in default which can result in the loss of the real estate. CBK defines non-performing loans as the money lent to an individual that does not earn income and full payment of principal and interest is no longer anticipated, principal or interest is 90 days or more delinquent, or the maturity date has passed and payment in full has not been made (Boudriga et al 2009). The issue of non-performing loans has, therefore, gained increasing attentions since the immediate consequence of large amount of NPAs in the banking system is a cause of bank failure.

According to Saunder & Cornett (2010), the recession in the U.S. economy in the early 2000 led to an increase in the rate on NPL particularly the commercial and industrial loans. As the U.S economy improved the rate of NPL fell. Foote et al (2009) observed that the mortgage crisis of 2007 in America was as a result of too much borrowing and flawed financial modeling based on the assumption that home prices only go up. Default rates were much higher for subprime mortgages whose owners have cash flow problems. Down payment

helps to minimize the cost of a mortgage for the length of the financing term by reducing the loan amount.

However, despite the implications of nonperforming mortgages for banking crisis, for investment and economic growth, and for anticipating future banking and financial crises, very few studies have been done on the relationship of interest rate spread on the level of non-performing assets in Sub-Saharan Africa (Caprio and Klingebiel, 2002). (Daumont et al 2004) found the accumulation of nonperforming assets to be attributable to economic downturns and macroeconomic volatility, terms of trade deterioration, high interest rates, excessive reliance on overly high-priced interbank borrowings, insider lending and moral hazard.

Ngugi (2001) analyzing interest rate in Kenya found a widening interest rate spread following interest rate liberalization characterized by high implicit costs with tight monetary policy achieved through increased reserve and cash ratios and declining non-Performing assets.

1.1.3 Interest Rate and Mortgage default Rate

A theoretical relationship between Interest Rate and Mortgage Default Rate has been demonstrated by various theories. Kibuthu 2005 investigated the extent to which borrowing respond to interest fluctuations. The study showed that there exists a strong negative linear relationship between lending rates and volumes of borrowings. The amounts borrowed

increase with declining lending rates, as the private sector will be more willing to take on more credit.

It is accepted that the quantity or percentage of non-performing assets (NPAs) is often associated with bank failures and financial crises in both developing and developed countries (Caprio and Klingebiel, 2002).

In addition, interest rate movements have a differential impact on default for Fixed Repayment Mortgages and Adjustable Repayment Mortgages. Adjustable Repayment Mortgage borrowers tend to default when they face large mortgage payments relative to income, while Fixed Repayment Mortgages borrowers are more likely to default when interest rates are low. This implies that mortgage investors can benefit from portfolio diversification across mortgage types in normal conditions, but not in severe housing downturns.

According to Arbitrage Theory, a simple pricing kernel based on the aggregate value of mortgage backed securities prices risk in the mortgage backed securities market. A pricing kernel based on aggregate consumption or aggregate wealth implies the wrong sign for the price mortgage backed securities risk. Thus it claims that the evidence is consistent with the limits of arbitrage theories that require that the marginal investor is a specialized mortgage arbitrageur.

According to Ruthless theory, the theory assumes that the borrower will default immediately when the value of property drops to the level of mortgage value (ruthless default) rather than waiting until it drops further. A default decision is determined by whether the value of the current mortgage is less than or greater than the current value of the property. This requires the borrower at each decision point to examine the current value of the mortgage and the property.

Double trigger hypothesis views that there is a negative equity which is a necessary condition for default. But it attributes default to the joint occurrence of negative equity and a life event like unemployment.

1.1.4 Financial Institutions in Kenya

Financial institutions facilitate mobilization of savings, diversification and pooling of risks and allocation of resources. However, since the receipts for deposits and loans are not synchronized, intermediaries like banks incur certain costs (Ngugi, 2001). They charge a price for the intermediation services offered under uncertainty, and set the interest rate levels for deposits and loans. The difference between the gross costs of borrowing and the net return on lending defines the intermediary costs as information costs, transaction costs, administration and default costs and operational costs (Rhyne, 2002). Kenya's experience with the financial reform process shows a widening interest rate spread following interest rate liberalization.

This study will be for financial institutions in Kenya that are licensed and regulated pursuant to the provisions of the Banking Act and the Regulations and Prudential Guidelines issued

thereunder (Central bank, 2013). In Kenya, Financial institutions are composed of the Central Bank of Kenya, as the regulatory authority and the regulated include Commercial Banks, Non-Bank Financial Institutions and Forex Bureaus (CBK, 2014). As at 10th February 2014, financial institutions were 44, 43 of which were commercial banks and 1 mortgage finance companies. Commercial banks and mortgage finance companies are licensed and regulated under the Banking Act, Cap 488 and Prudential Regulations issued there under. Out of the 44 commercial bank institutions, 31 are locally owned and 13 are foreign owned. The locally owned financial institutions comprised 3 banks with significant government shareholding 27 privately owned commercial banks and 1 Mortgage finance institution. There has been of late competition among most players in the banking sector in the country. Banks have adopted new technology and have introduced new products that are targeting different market segments.

1.2 Research Problem

A survey by Kassam (2012) financial reports showed only 4.6% of loans last year ended up as non-performing advances. However, the CBK report on Banks (2013) revealed that the NPLs increased by 14.1% from 4.5% in December 2012. This increase in the NPL levels was mainly attributable to the spill-over effects of the high interest rates regime in 2011 and 2012.

Interest rates spiked in December 2011 after CBK increased its key lending rate to a high of 18% to curb inflation rate which had peaked at 19.72% in November 2011. The high interest rates were also attributable to high government borrowing. It is recommended that authorities and banks cut on the interest rate spread. This is the difference between the lending and the

deposit rate to reduce the interest rate volatility. High interest rates cause tremendous difficulties for borrowers which can double the mortgage cost making repayment unaffordable (Pettinger, 2011).

Internationally, there are studies in interest rate and mortgage default rates. These include Maudos et al (2004) who analyzed interest margins in the principal European banking countries over the period 1993–2000 by considering banks as utility maximizers bearing operating costs. They found that factors that explain interest margins are the competitive condition of the market, interest rate risk, credit risk, operating expenses, and bank risk aversion among others.

Elsewhere Angbanzo (1997) tested the hypothesis that banks with more risky assets and higher interest rate risk select lending and deposit rates so as to earn wider net interest margins. He used United States bank data from 1989–93 and found evidence in support of the hypothesis.

Locally, quite a number of studies have investigated the relationship of interest rate spread. A few studies among them, Ngugi (2001) conducting a study on interest rate spread in Kenya found that commercial banks incorporate charges on intermediation services offered under uncertainty, and set the interest rate levels for deposits and loans.

Other studies done on interest rate spread showed that potential savers are discouraged due to low returns on deposits and thus limits financing for potential borrowers (Ndung'u and

Ngugi, 2000). These implications of banking sector inefficiency have spurred numerous debates in developing countries about the determinants of banking sector interest rate spreads.

Dururi (2013) who studied the effects of mortgage diversification on financial performance of commercial banks and the effect of mortgage income on financial performance of commercial banks and to assess the effects of mortgage economic growth on financial performance of commercial banks.

Nzuve (2012) studied on the relationship between house prices and real estate finance in Kenya and focused on house price fluctuations which differs among countries because of the important differences in countries housing systems and the role that the government plays.

Wahome (2010) studied the changing home mortgage market and the unique financing requirements that have brought about the widespread home ownership have caused a continuing evolution in mortgage lending practice. The study sought to establish the effects of mortgage financing on performance of the firms

These studies however did not study the relationship between the interest rate and mortgage default rate. The study will not only help the mortgage providers with pertinent information on how to determine the default rates in a highly unpredictable macroeconomic environment but will also probe on the need for alternative mortgage financing sources in particular the

secondary mortgage market. This study therefore seeks to fill this gap by establishing the links between interest rate and the mortgage rates.

The study will focus on a study period when financial institutions are vibrant to include mortgage products as a competitive advantage to other institutions and when Kenyan citizens are increasingly demanding to own homes. The research was guided by the question: Is there a relationship between interest rates and mortgage default rates among financial institutions in Kenya?

1.3 Research Objective

The general objective of the study is to determine the relationship between interest rates and mortgage default rates among financial institutions in Kenya.

1.4 Value of the study

The study seeks to create more awareness on the need for elaborate knowledge on the relationship of the interest rates and mortgage default rate to the regulators which would form an input in preparing new legislation and improved regulatory framework touching on interest rates.

To the shareholders of the financial institutions, the study will sensitize them on the importance of ensuring that institutions practices good lending for the sake of maximizing their share value with less events of default. Investors are more willing to borrow and repay with ease when interest rates are reasonable.

The study will enlighten the society on the interest rates and the mortgage default rates and hence stands to gain through increased accessibility of cheap credit. Easy access to credit both for investment purposes and personal development raises the standard of living of the society.

The study is also expected to contribute to the existing body of academic knowledge through publishing the results of its key findings, as well as opening up areas of further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the theories of interest rates and mortgage rates. The empirical evidence on the relationship between interest rates and mortgage rates is outlined. Literature review is the analysis of the existing knowledge on a particular line of study. It focuses on the existing studies done by other scholars and researchers and provides some basic knowledge of the research topic.

2.2 Review of Theories

2.2.1 Title Theory and Lien Theory

The mortgage market comprises of primary mortgage market and secondary mortgage market. Primary mortgage market is the market which involves origination and servicing of mortgage loans secured by real estate (Hassanein & Barkouky, 2008). Mortgage secondary market on the other hand allows mortgage originators to sell mortgages that they do not wish to hold in their portfolio and allows ultimate investors to hold mortgages assets without becoming involved in the mortgage origination and servicing.

The lien theory states that a mortgage or a deed of trust will create a mortgage lien upon the title to the real property being mortgaged, while the mortgagor still holds both the legal and equitable title. On the other hand the title theory states that a mortgage is a transfer of legal title to secure a debt, while the mortgagor still retain equitable title. In this theory, the bank is treated as having transferred title to the mortgage, subject to the mortgagee's duty to

recovery if payment is made. The title is said to remain in the mortgagee until the mortgage has been satisfied and foreclosed.

Although the mortgagee has the right of possession to the property, there is generally an express agreement giving the right of possession to the mortgagor. The mortgagee is said to hold the title for security purposes only. The mortgagor is given the right of possession (Buckely & Kalarickal, 2004).

2.2.2 Arbitrage Theory

The theory requires that the marginal investor in a particular asset market be a specialized arbitrageur (Gabaix, 2005). Then the constraints faced by this arbitrageur such as capital constraints feed through into asset prices. It examines the mortgage backed securities market in light, as casual empiricism suggest that investors in the mortgage backed securities market do seem to be very specialized. It shows that risks that seem relatively minor on the aggregate wealth are priced in the mortgage backed securities market.

A simple pricing kernel based on the aggregate value of mortgage backed securities prices risk in the mortgage backed securities market. A pricing kernel based on aggregate consumption or aggregate wealth implies the wrong sign for the price mortgage backed securities risk. Thus it claims that the evidence is consistent with the limits of arbitrage theories that require that the marginal investor is a specialized mortgage arbitrageur.

2.2.3 Ruthless Default Model

The theory assumes that the borrower will default immediately when the value of property drops to the level of mortgage value (ruthless default) rather than waiting until it drops further. A default decision is determined by whether the value of the current mortgage is less than or greater than the current value of the property. This requires the borrower at each decision point to examine the current value of the mortgage and the property. As the value of the property is observable, the borrower's only task is to impute the value of the mortgage. This is done by looking ahead to the next period and all succeeding periods at the array of possible outcomes, depending on the future path of interest rates and property values weighing those according to their likelihood of occurrence and discounting them to the present risk free rate (Vandell, 1995).

The "ruthless" default model, assumes that borrowers default on their mortgage in order to maximize their financial wealth. In this framework negative equity is a necessary, but not sufficient, condition for default. Instead there exists a threshold level of negative equity or the house price such that a rational wealth-maximizing agent will exercise the default option as in Kau, Keenan, and Kim (1994), among others. This theory assumes that the borrower has access to a perfect credit market for unsecured credit such that default is unaffected by liquidity considerations and income fluctuations.

2.2.4 Double Trigger Hypothesis

This theory also views negative equity as a necessary condition for default. But it attributes default to the joint occurrence of negative equity and a life event like unemployment. The

double-trigger hypothesis is well-known among mortgage researchers but it is usually discussed only in words or stylized models as in Gerardi, Shapiro, and Willen (2007), Foote, Gerardi, and Willen (2008) and Foote, Gerardi, Goette, and Willen (2009), among others, and has not been presented as a structural dynamic stochastic model.

The frictionless theory is excessively sensitive to changes in aggregate house prices and predicts a far too strong rise in default rates. In contrast, the double trigger hypothesis is consistent with the evidence. The economic reason is that default rates increase roughly in proportion to the number of borrowers who experience any level of negative equity as predicted by the double trigger theory. In contrast, the predictions of the frictionless theory are based on the number of homeowners experiencing extreme levels of negative equity and this has increased by much more than actual default rates. This is an important result in itself given the disagreement in the literature. It is also an important step towards developing mortgage default models that can be used for policy and risk analysis because such analysis needs to be based on models that are empirically accurate.

2.3 Determinants of Mortgage Default Rates

2.3.1 Interest Rate

Interest rate is one primary economic determinant of non-performing loans. An increase in interest rate weakens loan payment capacity of the borrower therefore non-performing loans and bad loans are positively collated with the interest rates (Nkusu,2011).The interest rate plays a very important role in NPLs growth rate in a country (Hoque and Hossain,2008) examined this issue and according to them non-performing loans are highly correlated with

the high interest rates which enhances the debt burden of the borrowers and causes loan defaults.

Financial institutions facilitate mobilization of savings, diversification and pooling of risks and allocation of resources (Collins et al). However, since the receipts for deposits and loans are not harmonized, intermediaries like banks incur certain costs (Ngugi, 2001). They charge a price for the intermediation services offered under uncertainty and set the interest rate levels for deposits and loans. The disparity between the gross costs of borrowing and the net return on lending defines the intermediary costs which include information costs, transaction costs, administration, default costs and operational costs (Ryne, 2002). Interest rate spread is well defined by market microstructure characteristics of the banking sector and the policy environment (Ngugi 2001).

Nkusu (2011) listed several reasons for high interest rate spread which included lack of sufficient competition, diseconomies of scale due to small size of markets, high operating and fixed costs of funds due to expensive telecommunications, existence of regulatory controls and perceived market risks.

Espinoza and Prasad (2010) examined the macroeconomic determinants of non-performing loans in the GCC banking system according to them high interest rates increase loan defaults but they did not find a statistically significant relationship.

Bloem and Gorter (2001) studied causes and treatment of NPLs, according to them frequent changes in the interest rate policy causes asset corrosion of banks and subsequent capital erosion. According to Dash and Kabra (2010) the banks and aggressive lending policies charging high interest rates from the borrowers incur greater non-performing loans. Collins and Wanjau (2011) also found interest rate as a primary factor boosting non-performing loans.

2.3.2 Inflation

There is an empirical evidence of positive relationship between the inflation in the economy and non-performing loans (Khemraj and Pasha,2009). While Nkusu,(2011) has explained that this relationship can be positive or negative according to the author inflation affects loan payment capacity of borrowers positively or negatively ,higher inflation can enhance the loan repayment capacity of borrower by reducing the real value of outstanding debt ,moreover increased inflation can also weaken the loan payment capacity of the borrowers by reducing the real income when salaries are sticky ,moreover by highlighting the role of inflation in the presence variable interest rate Nkusu (2011) further explains that in this scenario inflation reduces the debt servicing capacity of the loan holders as lenders adjust the lending rates to adjust their real return. So according to literature relationship between inflation and non-performing loans can be positive or negative depending on the economy of operations

2.3.3 Gross Domestic Product (GDP)

There is a significant empirical evidence of negative association between growth in gross domestic product and non-performing loans (Fofack 2005). The growth in the gross domestic

product usually increases the income which ultimately enhances the loan payment capacity of the borrower which in turn contributes to lower bad loan and vice versa (Khemraj and Pasha, 2009).

2.4 Empirical Literature

Numerous studies have looked at the interest rates and mortgage rates of commercial banks. Although the literature is not unanimous in its conclusions, there is clear evidence supporting the opinion that there is a significant relationship between interest rates and Mortgage default rates. Financial institutions use the same information when determining interest rate and mortgage rates.

In economic theory the cost of capital has an important influence on decisions to invest and therefore on business cycles. Since the rate of interest is a major item in capital costs, empirical studies have looked for effects on investment decisions and expenditures. Short term rates are supposed to influence inventory, investment and trade creditors. Long-term rates influence plans for plant and equipment installations and for residential housing (Cagan 1969).

Korean credit policies in the 1960's were effective in reducing the cost of and enhancing the access to funds for private sectors. Export oriented firms had greater access to credit and lower borrowing costs than did domestically oriented firms. The general assessment is that this credit policies fueled the rapid expansion of this sectors especially in their take off stages. The consensus is that exports were the main engine for Korean economic growth in 1960s and 1970s. To the extent that credit support was indispensable to the growth of

exports, credit support must have contributed to Korean rapid economic growth. Loan rate increases were selective leaving out export, agricultural and many categories of investment loans which were discounted by Bank of Korea at to lower rates. Interest rates on loans to exporters remained at 6.5% while the general rate was 26% (Cho Je and Kyung K.M. 1995)

It is often said that Japanese policy authorities adopted a low interest rate policy and this policy enabled the Japanese economy to perform relatively well. The reason is that it provided the private sector with higher investment incentives (Teranishi 1982). This policy was quite effective during the period of rapid economic growth. The interest rates kept lower artificially by the public authority were; the official discount rates by the bank of Japan, interest rate on bank deposits, money market rate, and the banking lending rate.

Saunders and Cornett (2010) identify models for assessing the default risk of individual loan holders. They categorize them under qualitative and quantitative models. The models are used in absence of publicly available information on the quality of the borrower. The qualitative model is further divided into two; borrower specific factors and market specific factors, whereby borrower specific factors include; reputation, leverage, volatility of earnings and collateral. The borrower's reputation involves the borrowing-lending history of the applicant. Leverage is the ratio of debt to equity. It affects the probability of its default because large amount of debt increases borrower's interest charges and pose a significant claim on its cash flows. As with leverage, a volatile earning stream increases the probability that the borrower cannot meet fixed interest and principle charges. Collateral on the other hand is required to back to back up the loan.

According to Kau et al (1993), Adjustable Rate Mortgages (ARM) is a type of mortgage in which the interest charged on the borrowed amount varies based on an underlying index rate. As the index rate varies, so does the monthly payment amount on the mortgage. This is the opposite of the fixed-rate mortgage (FRM) which sets the rate of interest charged over a set term and the payments do not alter. Although the amount of principal and interest paid each month varies from payment to payment, the total payment remains the same which makes budgeting easy for borrowers. The main advantage of a fixed rate loan is that the borrower is protected from sudden and potentially significant increases in monthly mortgage payments if interest rates rise. The downside to fixed rate mortgages is that when interest rates are high, qualifying for a loan is more difficult because the payments are less affordable.

In general, an ARM allows a borrower to obtain a mortgage with an interest rate that is usually lower than a fixed rate type of mortgage, at least at the beginning. The interest rate is usually some fixed amount above an index rate such as the cost of funds. If the ARM is held long enough, the interest rate will surpass the going rate for fixed-rate loans. With an ARM, the monthly payment may change frequently over the life of the loan. Some ARMs are structured so that interest rates can nearly double in a few years. Adjustment frequency refers to the amount of time between interest-rate adjustments (e.g. monthly, yearly, etc.). Interest-rate adjustments are tied to a specific index, or benchmark, such as the interest rate on certificates of deposit or Treasury bills or LIBOR rate. The margin is a rate that is a certain percentage higher than the adjustment index. For example, the adjustable rate may be the rate of the one-year T-bill plus 2%.

Caps are the limits on the amount the interest rate can increase each adjustment period. Some ARMs also offer caps on the total monthly payment. These loans - known as negative amortization loans keep payments low, however these payments may cover only a portion of the interest due. Unpaid interest becomes part of the principal. After years of paying the mortgage, the principal owed may be greater than the amount you initially borrowed. The ceiling is the highest interest rate that the adjustable rate is permitted to become during the life of the loan. ARMs are attractive because they offer low initial payments, enable the borrower to qualify for a larger loan and in a falling interest rate environment, allow the borrower to enjoy lower interest rates (and lower mortgage payments) without the need to refinance.

According to Saunder & Cornett (2010), the recession in the U.S. economy in the early 2000 led to an increase in the rate on NPL particularly the commercial and industrial loans. As the U.S economy improved the rate of NPL fell. Foote et al (2009) observed that the mortgage crisis of 2007 in America was as a result of too much borrowing and flawed financial modeling based on the assumption that home prices only go up. Default rates were much higher for subprime mortgages whose owners have cash flow problems. Down payment helps to minimize the cost of a mortgage for the length of the financing term by reducing the loan amount.

Kinyura (2011) carried out a research on the determinants of lending rates of commercial banks in Kenya. She found out that the cost of funds (loan) was determined by taxation policies, core liquid asset requirement, transaction cost, CBK and its regulatory role,

management fees and staff costs. The research further revealed that interest rates were majorly influenced by inflation, demand for loans, foreign exchange rates and other macro and micro economic environmental factors.

Kibuthu 2011 investigated the extent to which borrowing respond to interest fluctuations. The study showed that there exists a strong negative linear relationship between lending rates and volumes of borrowings. The amounts borrowed increase with declining lending rates, as the private sector will be more willing to take on more credit.

Ngugi (2001) analyzed the interest rates spread in Kenya from 1970 to 1999 and found that interest rate spread increased because of yet-to-be gained efficiency and high intermediation costs. Interest rate spread is defined by market microstructure characteristics of the banking sector and the policy environment Ngugi (2001). Risk-averse banks operate with a smaller spread than risk neutral banks since risk aversion raises the bank's optimal interest rate and reduces the amount of credit supplied. Actual spread, which incorporates the pure spread, is in addition influenced by macroeconomic variables including monetary and fiscal policy activities (Emmanuelle, 2003)

Waweru (2009) conducted a study to investigate the commercial banking crisis in Kenya, causes and remedies .According to the study many financial institutions that collapse in Kenya since 1986 failed due to no performing loans. Using a sample of 30 managers from the ten largest banks ,the study found that national economic downturn perceived as the most important external factor .Customer failure to disclose vital information during the loan

application process was considered to be the main customer specific factor .The study also found that lack of an aggressive debt collection policy was perceived as the main bank specific factor contributing to the loan performing debt problem in Kenya. The researcher only considered one specific factor , that is, disclosure of vital information he did not consider factors like the age of the customer ,the level of income ,the purpose of the loan.

The theory of credit demand and supply as postulated by Balke and Zeng (2011) provides the determining factors of the credit output. The principal determinant of credit is the demand and supply in interest rates. There are also other factors that shift the demand for loans such as inflation rate, money supply in the economy, the GDP, non-performing loans, liquidity ratio, customer deposit and bank capitalization, This theoretical basis is supported by empirical works by Essene and Apgar (2007) who argue that mortgage finance is as a result of the existing macroeconomic environment in the country which determine the operations of financial institutions.

Previous studies by Ngugi and Kabubo (1998) did a study to investigate interest rates structure and their determining factors. According to their study interest rates are influenced by inflationary conditions, open market factors including foreign interest rates and the expected depreciation of local currency, monetary conditions and output levels. They concluded that both inflationary conditions and monetary checks influence interest rates in a positive and significant way.

Barro (1986) investigated the effects of temporary and permanent increase in government expenditure on the rate of interest, money supply, price level and government budget deficit. Using time series data in the United Kingdom his results show that temporary increase government expenditure does affect long-term interest rates positively. Interest rate levels are influenced by markets forces, supply and demand factors, inflation and default risk. Government's policy also plays an important role. While national approaches to interest rate management differ from one country to another and over time, no country permits its interest rates to be determined solely by market forces. Even when interest rates are not actually determined by government, it is not uncommon for government agencies to act as market participants in attempts to achieve desired levels.

After independence in 1963 interest rates were relatively low with inflations averaging 2%. This ensured positive real rates of return on financial assets. However with the onset of the 1973/74 oil crises, Kenya experienced sharp deteriorations in balance of payments. This consequently led to sharp increase in inflation to rates above the prevailing statutory interest rates. This led to upward adjustments in the interest rates. Financial institutions lending and deposit rates were first adjusted in June 1974 and again in 1980. Since then they have been adjusted frequently particularly to take into account the movements in domestic prices.

In mid 1974 the interest rate structure was changed. Saving deposit rates were raised from 3 to 5% while prime lending rates from 7 to 8%. Lending rates were permitted to rise to an effective rate of 10%. Further measures were introduced in April 1977 to increase credit

expansion so as to facilitate growth in production, agriculture manufacturing, and the tourist sectors of the economy (Musoke and Kagame 1990).

A survey by Kassam (2012) financial reports showed only 4.6% of loans last year ended up as non-performing advances. However, the CBK report on Banks (2013) revealed that the NPLs increased by 14.1% from 4.5% in December 2012. This increase in the NPL levels was mainly attributable to the spill-over effects of the high interest rates regime in 2011 and 2012.

Interest rates spiked in December 2011 after CBK increased its key lending rate to a high of 18% to curb inflation rate which had peaked at 19.72% in November 2011. The high interest rates were also attributable to high government borrowing. It is recommended that authorities and banks cut on the interest rate spread. This is the difference between the lending and the deposit rate to reduce the interest rate volatility. High interest rates cause tremendous difficulties for borrowers which can double the mortgage cost making repayment unaffordable (Pettinger, 2011).

The prevailing high interest rates as a result of a stringent monetary policy being pursued by CBK as an effort to fight high inflation has dampened the mortgage market further. The macroeconomic environment in 2011 and 2012 had a profound impact on mortgage lenders. As the central bank raised its rates to 18 percent, mortgage loans rose up to 25 percent in the first half of 2012, from an average of 14 percent the previous year. Interest rates on mortgages have been as high as 32%. This has resulted to interest payable on loans to amount to the initial principal sum advanced within a few years. For long term borrowing as in the

cases of real estate development this is not sustainable nor does it encourage borrowing (Ndungu, 2012).

Hendry (1984) contributions on the asset market approach states that the Mortgage finance is introduced into the asset market approach through the cost of use equation since the mortgage loan interest rate may be regarded as an essential determinant of that cost.

Oduori (2012) observed that the Central Bank Rate and the Credit Loss Ratio have been the most significant determinants of interest rate spreads amongst commercial banks in Kenya. Treasury Bill Rate and Market Structure have also contributed to spreads. He also indicated that many of the factors commonly believed to be critical determinants of interest rate spreads may not in fact have been relevant to the size of the interest rate spreads. In his study he inferred that inflation, bank interest rate and cost to income ratio were insignificant in determination of interest rate spreads in the short term.

Kimutai (2003) concluded that macroeconomic as well as a set of structural factors have been responsible for the inefficiencies and hence individual bank interest rate in Kenya.

According to his study, Treasury bill rates are predictors of banks' interest rate in the short-run but not in the long-run.

Ochami (2004) investigated on the assessment of factors that contribute to the level of non-performing loans in Housing Finance company of Kenya Limited. To achieve the objective of assessment, primary data of the research was collected by way of structured questionnaire

from the staff of Housing Finance company of Kenya limited .The data was then analysed using tables and descriptive statistics ;the deduction there was used to access the factors that contribute to the level of non loans in Housing company Kenya Limited .The study did not test how the credit risk management with given variables impact on the level of non-performing loans through a scientific model like multiple regression model.

Gerlach and Peng (2005) examined the relationship between interest rates and mortgage credit with an application to the Hong Kong housing market. Their results show that the increase in interest rates are positively and significantly related to growth in long term mortgage loans.

Bloem and Gorter (2001) studied causes and treatment of NPLs, according to them frequent changes in the interest rate policy causes asset corrosion of banks and subsequent capital erosion. According to Dash and Kabra (2010) the banks and aggressive lending policies charging high interest rates from the borrowers incur greater non-performing loans. Collins and Wanjau (2011) also found interest rate as a primary factor boosting non-performing loans.

Espinoza and Psadad (2010) examined the macro economic determinants of non-performing loans in the GCC banking system according to them high interest rates increases loan defaults but they did not find statistically significant relationship .Bloem and Gorter (2001) studied causes and treatment of NPL's ,according to them frequent changes in the interest rate policy causes an increase in the bad loans .Asari,et all .(2011) also found significant

relationship between loan defaults also causes asset corrosion of banks with aggressive lending policies charging high interest from the borrowers incur greater non-performing loans. Collins and Wanjau (2011) also found interest rate as a primary factor boosting non-performing loans.

According to Loic and Lea, 2007, the major benefit associated with mortgage financing which include that Mortgage finance improves the operation of the housing market and the economy in a number of ways, both directly by facilitating transactions and indirectly by improving the environment in which transactions take place. In addition Mortgages on themselves can provide good collateral. Mortgage financing has a stronger effect on consumption expenditures than do other forms of savings. House-price increases can lead to stronger increases in consumer demand than do rising stock markets, with the result that housing market trends may be more closely related to overall macroeconomic cycles. As mortgage markets deepen, there are greater opportunities for households to access this wealth. In particular, the ability to refinance allows families to spend the capital gains realized on rapid house -price increases.

Furthermore, Mortgage finance makes it possible for people to acquire affordable housing as they have the option to own their homes and pay for them in affordable installments over time .The mortgage finance sector creates employment directly and indirectly particularly to the construction industry and indirectly to other sectors (Kibirige, 2006).

According to Lea, 1990, mortgage prices are principally determined by real interest rates and risk factors specific to mortgage instruments. Different from the above, mortgages prices are

determined basing on the inflation rates, nominal rates on one hand and housing prices on the other hand (Avlonitis &Indounas, 2005).

There are two basic methods for pricing mortgages namely cost-based and market –driven approach (Meidan, 1995). Determinants of Mortgage pricing include Inflation expectations, Risk which could be the possibility of default, Interest rate risk, Liquidity of marketability, prepayment risk (prepayment fee) and Legislative risk.

Cost-based is widely used in the general financial services sector. It involves calculating both direct and indirect costs for a mortgage, and then a profit element is added to the total costs (Avlonitis &Indounas, 2005). The main advantage of this method is that, if cost structures are known, the pricing task becomes simplified. Market –driven pricing is based on the market price for the service, which is the overriding factor. This type of pricing is generally used in highly competitive environments where many players are offering similar services like mortgage lending (Meidan, 1995).

There are two methods in this category: competitive pricing and differential pricing. Competitive pricing describes a situation in which the price is set according to what the market leader is charging Differential pricing takes into account the ability and willingness of the market segments to `pay.

2.5 Summary of Literature Review

The mixed results of various empirical studies indicate that determinants of interest rate play a role in determining the mortgage default rates. The “ruthless” default model, assumes that borrowers default on their mortgage in order to maximize their financial wealth. In this framework negative equity is a necessary, but not sufficient, condition for default. Instead there exists a threshold level of negative equity or the house price such that a rational wealth-maximizing agent will exercise the default option as in Kau, Keenan, and Kim (1994), among others. This theory assumes that the borrower has access to a perfect credit market for unsecured credit such that default is unaffected by liquidity considerations and income fluctuations.

There is an empirical evidence of positive relationship between the inflation in the economy and non-performing loans (Khemraj and Pasha,2009).While Nkusu,(2011) has explained that this relationship can be positive or negative,according to the author inflation affects loan payment capacity of borrowers positively or negatively ,higher inflation can enhance the loan repayment capacity of borrower by reducing the real value of outstanding debt ,moreover increased inflation can also weaken the loan payment capacity of the borrowers by reducing the real income when salaries are sticky ,moreover by highlighting the role of inflation in the presence variable interest rate

There is a significant empirical evidence of negative association between growth in gross domestic product and non-performing loans (Fofack 2005). The growth in the gross domestic product usually increases the income which ultimately enhances the loan payment capacity of

the borrower which in turn contributes to lower bad loan and vice versa (Khemraj and Pasha, 2009).

Nkusu (2011) listed several reasons for high interest rate spread which included lack of sufficient competition, diseconomies of scale due to small size of markets, high operating and fixed costs of funds due to expensive telecommunications ,existence of regulatory controls and perceived market risks .

The principal determinant of credit is the demand and supply in interest rates. There are also other factors that shift the demand for loans such as inflation rate, money supply in the economy, the GDP, non performing loans, liquidity ratio ,customer deposit and bank capitalization, This theoretical basis is supported by empirical works by Essene and Apgar (2007) who argue that mortgage finance is as a result of the existing macroeconomic environment in the country which determine the operations of financial institutions.

Gaps in literature include lack of clear determinants of the relationship between the interest rate and the mortgage default rates among financial institutions in Kenya. This study sort to provide such literature.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section discussed the research design, target population and sample size, data collection methods and data analysis and presentation.

3.2 Research design

The study will use a descriptive correlation research design. Kothari (2004) this research design is used when the researcher wants to establish the relationship between two or more variables. These aspects will involve examining the relationships among variables. This is a longitudinal survey study to investigate the relationship between the interest rate and mortgage default rate from the selected commercial banks in Kenya.

3.3 Target Population

Target population in statistics is the specific population about which information is desired. According to Mugenda and Mugenda (2003), a population is a well-defined set of people, services, elements, and events, group of things or households that are being investigated.

The target population for this study will consists of all financial institutions operating in Kenya between January 2009 and December 2013. The study will adopt a census study approach due to the small population selected. (Appendix I). These are the 44 banks out of which 43 of which are commercial banks and 1 mortgage finance companies.

Some of the banks have ventured in international market where they have forayed for new business opportunities. This expansion has been due to increased competition in the local

scene and open market policies by regional organizations (Allen et al, 2012). The relationship between the interest rate and mortgage rate will be understood well if the target population will be studied.

3.4 Data collection Methods and Instruments

The study will use secondary quantitative data to analyze the relationship between interest rates and Mortgage default rates. Secondary data will be obtained by abstraction method from C.B.K monthly reports, statistical bulletins and Annual reports obtained from the C.B.K library for the 44 institutions covered. This data will cover the period 2009 to 2013.

The data will comprise of Treasury bill rate (CBR) ,GDP and banks interest rate. In addition we shall get the number of non performing mortgages for each bank on the period 2009 to 2013.

3.5 Data Analysis

The data obtained will be analyzed interpreted and conclusions made using multiple linear regression technique. This model was also used by Ongweso (2005) to establish the relationship between interest rate and non-performing loans.

The Regression equation will be modeled as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu$$

Y is the mortgage default rate which will be measured by dividing the non-performing mortgage loans by the total mortgage loans

β_0 is constant, the value of Y when all Xs are zero

X 1 is the lending interest rate and will be measured by dividing the Total interest income on Mortgages by the average size of the total Mortgages

X2 is the inflation rate as and will be measured from the Consumer Price Index (CPI) as provided by the Government Analysis.

X3 is the Gross Domestic Product (GDP) and will be measured by the Kenya National Bureau of Statistics

$\beta_1 - \beta_3$ are the regression co-efficient or change introduced in Y by each X

μ is the random error term accounting for the of all other variables that affect mortgage loans default but not captured in the model

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Introduction

This chapter presents data analysis and findings of the research. The objective of the study was to establish the relationship between interest rate and mortgage default rate among financial institutions in Kenya. Data was collected from all the banks. Secondary data was collected from the Central Bank of Kenya, Central Bureau of Statistics and Banks published financial statements for a period of five years (2009 – 2013) as well as internet resources and publications.

4.2 Analysis and Interpretation

4.2.1 Descriptive Statistics on Mortgage Default Rate

Table 4.1 Mortgage Default Rate

Year	Mean	Std. Dev.
2009	0.41	0.136
2010	0.56	0.189
2011	0.52	0.028
2012	0.62	0.020
2013	0.65	0.153

Source: Research, (2014)

From the findings in Table 4.1 above, averages for mortgage default rate for the all the banks as obtained from the financial statements reflects an upward rise over the 5 year period, with the highest being 0.65 in 2013. The default rate has risen from 41% in 2009 to 65% in 2013 over a period of 5 years. In addition, the higher the mean ,the lower the standard deviation in different commercial banks.

4.2.2 Descriptive Statistics on Interest Rates

Table 4.2: Descriptive statistics for Interest Rates

Year	Mean	Std. Dev.
2009	7.7	0.16
2010	7.3	0.17
2011	3.6	0.70
2012	8.8	1.18
2013	12.7	2.38

Source: Research, (2014)

From the results in Table 4.2 above, the lowest interest rate value was 3.6 in 2011 while the highest was 12.7 in 2013. On the other hand 2012 and 2013 depicted high standard deviation, implying high variation in interest rates. The unpredictability in interest rates is an evidence of instability in financial markets as these rates are determined by the central bank and the forces of demand and supply.

In addition, as the interest rates increases in Table 4.2 ,the mortgage default rate also increases as depicted in Table 4.1.

4.2.3 Descriptive Statistics on Inflation Rate

Table 4.3: Descriptive statistics Inflation Rate

Year	Mean	Std. Dev.
2009	92.36	3.61084
2010	102.09	1.93610
2011	106.27	1.31245
2012	121.16	6.43061
2013	132.52	1.19321

Source: Research, (2014)

From the findings, it can be noted that the mean values for inflation rate have been on the rise since 2009 rising from 92.36 in 2009 to 132.5 in 2013. It is also evident that there has been a consistent rise in inflation rate while the standard deviation was high in 2012 .

As the inflation rates increases in Table 4.3, the mortgage default rate also increases as depicted in Table 4.1.

4.2.4 Descriptive Statistics on GDP

Table 4.4: GDP

	GDP (Billion)	
Year	Mean	Std. Dev.
2009	211.3	26.14
2010	237.52	16.23
2011	255.6	14.56
2012	299.9	13.58
2013	314.8	11.8

Source: Research, (2014)

From the findings, it can be noted that the annual averages for GDP in billion rose from 211.3 in 2009 to 314.8 in 2013. It is also evident that the growth in GDP is consistent with minimal variability.

As the GDP increases in Table 4.4, the mortgage default rate also increases as depicted in Table 4.1.

From the averages, it is clear that mortgage default rate rose with increase in interest rates, inflation rates and GDP. It thus appeared in tandem with every increase in predictor variable.

4.3 Correlation Analysis

The study used Karl Pearson’s coefficient of correlation to quantify the strength of the relationship between the variables. The Pearson correlation coefficient measures the strength of a linear association between two variables and is denoted by r . The Pearson correlation coefficient, r , can take a range of values from +1 to -1. The Pearson’s coefficient was used to verify the existence or non-existence of linear correlation between and among the variables.

The findings are presented as follows;

Table 4.5: Pearson’s Correlation Coefficient Matrix

	Interest Rates	Inflation Rate	GDP	Mortgage default rate
Interest Rates	1			
Inflation Rate	0.386**	1		
GDP	0.13	-0.361**	1	
mortgage default rate	0.293**	0.363**	0.340	1

** Correlation is significant at the 0.01 level (2-tailed)

Table 4.5 above reveal that there is a significant positive relationship between Interest Rates and mortgage default rate ($r = 0.293^{**}$, $P\text{-value} < 0.01$). This implies that Interest Rates influences mortgage default rate in Kenyan real estate market.

The findings also indicate a significant positive relationship between Inflation Rate and Mortgage default rate ($r = .363^{**}$, $P\text{-value} < 0.01$). Thus, implying that inflation rate influences mortgage default rate in Kenyan real estate market. The findings indicated a positive relationship between GDP and mortgage default rate ($r = 0.3401$) thus, depicting that growth in GDP has no significant effect on mortgage default rate.

The results in table 4.5 above indicate that there was a significant positive relationship between Interest Rates and Inflation Rate ($r = 0.386^{**}$, P-value < 0.01). A significant negative relationship was observed between inflation rate and GDP ($r = -0.361^{**}$, P-value < 0.01). This implies that a rise in inflation rate has negative effect on GDP.

4.4 Regression Analysis

The data obtained was analyzed using multiple linear regression technique.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu$$

Y is the mortgage default rate which will be measured by dividing the non-performing mortgage loans by the total mortgage loans

β_0 is constant, the value of Y when all Xs are zero

X₁ is the lending interest rate and was measured by dividing the Total interest income on Mortgages by the average size of the total Mortgages

X₂ is the inflation rate as and was measured from the Consumer Price Index (CPI) as provided by the Government Analysis.

X₃ is the Gross Domestic Product (GDP) and was measured by the Kenya National Bureau of Statistics

$\beta_1 - \beta_3$ are the regression co-efficient or change introduced in Y by each X

μ is the random error term accounting for the of all other variables that affect mortgage loans default but not captured in the model

Table 4.6: Regression summary of the variables

	Unstandardized		Standardized	T	Significance
	Coefficients		Coefficients		
	Beta	Std. Error	Beta		
(Constant)	0.457	0.560		0.816	0.416
Interest Rates	0.179	0.089	0.182	2.013	0.046
Inflation Rate	0.298	0.139	0.206	2.145	0.034
GDP	0.281	0.104	0.243	2.718	0.008
	R = .459 R Square = .210 Adjusted R Square = .190 F change 10.124 Sig. 0.01				
	Dependent Variable: mortgage default rate				

Source: Research, 2014

4.5 Regression equation

Based on regression coefficients results the regression equation can be written as follows;

$$Y = 0.457 + 0.179 X_1 + 0.298 X_2 + 0.281 X_3 + e$$

Regression analysis reveals the extent to which Interest Rates, significantly predicted the

mortgage default rate. Results in Table 4.6 above indicated that the combination of Interest Rates Inflation Rate and GDP significantly predicted or explained up to 19% of the variance mortgage default rate. In addition, inflation rate was a better predictor of mortgage default rate (beta = 0.298). The above results suggest that Interest Rates, Inflation Rate and GDP greatly influences mortgage default rate in Kenya real estate market.

4.6 Summary and Interpretation of Findings

This study examines the relationship between the mortgage default rate in Kenya. From the findings, averages for mortgage default rate for the all the banks as obtained from the financial statements reflects an upward rise over the 5 year period, with the highest being 0.65 in 2013. In other words, the default rate has risen from 41% to 65% over a period of 5 years.

This agrees with Saunders and Cornett (2010) who identified models for assessing the default risk of individual loan holders and categorized them under qualitative and quantitative models.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The aim of the study was to examine the relationship between interest rate and mortgage default rate among financial institutions in Kenya. The Empirical literature shows that increase in interest rate forces an increase in the rate of mortgage default rate. From the findings, averages for mortgage default rate for the all the banks as obtained from the financial statements reflects an upward rise over the 5 year period. In other words, the default rate has risen from 41% to 65% over a period of 5 years. The unpredictability in interest rates is an evidence of instability in financial markets as these rates are determined by the central bank.

There has been a consistent rise in inflation rate as the standard deviation is so small depicting minimal variability. The growth in GDP is consistent with minimal variability. From the averages, it is clear that mortgage default rate rose with increase in interest rates, inflation rates and GDP. It thus appeared in tandem with every increase in predictor variable. Thus, implying that inflation rate influences mortgage default rate in Kenyan real estate market. The findings indicated a positive relationship between GDP and mortgage default rate thus, depicting that growth in GDP has no significant effect on mortgage default rate.

5.2 Conclusions

The study concludes that averages for mortgage default rate for the all the banks as obtained from the financial statements reflects an upward rise over the 5 year period, with the highest

being 0.65 in 2013. In addition, the default rate has risen from 41% to 65% over a period of 5 years, while the standard deviation depicts minimal variation in default rates in different commercial banks. The study concludes the lowest interest rate value was 7.3 in 2010 while the highest was 12.7 in 2013. In 2012 and 2013 the high standard deviation, implied high variation in interest rates. The unpredictability in interest rates is an evidence of instability in financial markets as these rates are determined by the central bank .

The study is also evident that there has been a consistent rise in inflation rate as the standard deviation is so small depicting minimal variability with concludes that the mean values for inflation rate have been on the rise since 2009 rising from 92.4 to 132.5.

The study also concludes that mortgage default rate rose with increase in interest rates, inflation rates and GDP. It thus appeared in tandem with every increase in predictor variable. The findings also disclosed a significant positive relationship between Inflation Rate and mortgage default rate ($r = 0.363^{**}$, $P\text{-value} < 0.01$). Thus, implying that inflation rate influences mortgage default rate in Kenyan real estate market. The findings indicated a positive relationship between GDP and mortgage default rate ($r = 0.3401$) thus, depicting that growth in GDP has no significant effect on mortgage default rate.

5.3 Policy Recommendations

The study recommends that commercial banks in Kenya should assess their clients and charge interest rates accordingly, an ineffective interest rate policy can increase the level of interest rates and consequently default rate. Given that the type of interest rates charged on

loans (fixed and floating) dictates on the ability and flexibility of borrowers to repay loans, the study recommends that commercial banks should have a mixed interest rate policy as each type has its advantage and disadvantage.

The central banks should apply stringent regulations on interest rates charged by banks so as to regulate the number of mortgage default rate. Commercial banks should also apply rigorous policies on loan advances so as loans are awarded to those with ability to repay and mitigate moral hazards such as insider lending and information asymmetry.

The banks should also enhance periodic/regular credit risk monitoring of their loan portfolios to reduce the level of default rate. Since Mortgage loan interest payments constitute one of the main factors of periodic household cash outflows, the study recommends that households should choose know when to take out mortgage loans or when to renegotiate the loans. Households should also pay attention to the changes in mortgage interest rates and how the relationship between interest rates for different terms changes over time.

The study recommends that banks' should care about the margins on mortgage loan since it's one of banks' major lending activities. Banks should apply efficient and effective credit risk management that will ensure that loans are matched with ability to repay, loan defaults are projected accordingly and relevant measures taken to minimize the same.

5.4 Limitations of the study

This study had several limitations. First, it is possible that the nature of data from the financial statements was impacting the results in an unanticipated manner or limits the power of the tests to detect associations. This may have been created by variation of statistical figures illustrating the key variables measurements.

The study did not use control variable specifications as specified by Richardson et al (2002). It is thus possible that lack of inclusion, cause alterations in interpretation. It is possible that the statements did not indicate low or high interest rates. A control variable is a variable that is held constant in a research analysis. The use of control variables is generally done to check observed relationship between two variables if a direct one or indirect with intervening.

Finally, correlations among the variables may be causing unanticipated results despite the efforts at identifying potential multi-collinearity problems. The study concentrated on the banks only whose difference among themselves is minimal since they compete for the same customer.

5.5 Recommendations for Further Research

This study examined the effect of interest rate volatility on mortgage default rate in Kenya over a period of 5 years. There is a need for further studies to carry out similar tests for a longer time period.

A similar study should also be carried out in other financial institutions for example Building Societies and SACCO's. In addition, more variables depicting the relationship between interest rate and mortgage default rate should be adopted to uphold the study's findings that indeed interest rate volatility influences mortgage default rate.

Further research should also be conducted on other factors that influence default rate for example unemployment and negative home equity. Research on alternative sources of funding in the real estate market that are least affected by interest rate like the Real Estate Investment Trusts in the capital market would offer invaluable information to the real estate developers.

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APPENDIX I: MORTGAGE DEFAULT RATE

2009	2010	2011	2012	2013
0.04	0.680807	0.465	0.56265	0.618915
0.03	0.680807	0.465	0.56265	0.618915
0.07	0.778882	0.215	1.47015	1.617165
0.1	0.241577	0.165	0.19965	0.219615
0.09	0.395307	0.27	0.3267	0.35937
0.08	0.248897	0.17	0.2057	0.22627
0.07	0.761332	0.52	0.6292	0.69212
0.05	0.395307	0.27	0.3267	0.35937
0.06	0.775973	0.53	0.6413	0.70543
0.08	0.204974	0.14	0.1694	0.18634
0.11	0.761332	0.52	0.6292	0.69212
0.12	0.366025	0.25	0.3025	0.33275
0.17	0.278179	0.19	0.2299	0.25289
0.25	0.636884	0.435	0.52635	0.578985
0.3	0.117128	0.08	0.0968	0.10648
0.32	0.351384	0.24	0.2904	0.31944
0.22	0.680807	0.465	0.56265	0.618915
0.17	0.380666	0.26	0.3146	0.34606
0.47	0.680807	0.465	0.56265	0.618915
0.77	0.43923	0.3	0.363	0.3993
0.69	0.058564	0.04	0.0484	0.05324

0.58	0.073205	0.05	0.0605	0.06655
0.47	0.614922	0.42	0.5082	0.55902
0.47	0.600281	0.41	0.4961	0.54571
0.4	0.834537	0.57	0.6897	0.75867
0.31	0.980947	0.67	0.8107	0.89177
0.31	0.658845	0.45	0.5445	0.59895
0.27	0.680807	0.465	0.56265	0.618915
0.2	0.673486	0.46	0.5566	0.61226
0.16	0.087846	0.06	0.0726	0.07986
0.11	1.02487	0.7	0.847	0.9317
0.07	1.098075	0.75	0.9075	0.99825
0.07	0.980947	0.67	0.8107	0.89177

APPENDIX II: INDEPENDENT VARIABLES

Monthly data on interest rates

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
January	8.38	1.58	8.26	8.23	6.00	6.95	8.46	6.56	2.46	20.56
February	7.77	1.57	8.59	8.02	6.22	7.28	7.55	6.21	2.59	19.70
March	6.24	1.59	8.63	7.6	6.32	6.90	7.31	5.98	2.77	17.80
April	6.25	2.11	8.68	7.02	6.65	7.35	7.34	5.17	3.26	16.01
May	5.84	2.87	8.66	7.01	6.77	7.76	7.45	4.21	5.35	11.18
June	3.00	2.01	8.5	6.6	6.53	7.73	7.33	2.98	8.95	10.09
July	1.54	1.71	8.59	5.89	6.52	8.03	7.24	1.60	8.99	11.95
August	1.18	2.27	8.66	5.96	7.30	8.02	7.25	1.83	9.23	10.93
September	0.83	2.75	8.58	6.45	7.35	7.69	7.29	2.04	11.93	7.77
October	1.00	3.95	8.19	6.83	7.55	7.75	7.26	2.12	14.80	8.98
November	1.28	5.06	7.84	6.41	7.52	8.39	7.22	2.21	16.14	9.8
December	1.46	8.04	8.07	5.73	6.87	8.59	6.82	2.28	18.30	8.3

Monthly data on inflation - consumer price index (CPI)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
January	56.21	61.35	70.48	76.22	79.75	86.07	97.55	104.89	110.57	130.82
February	55.91	61.41	69.97	76.19	78.57	87.25	100.00	105.18	112.05	130.76
March	57.24	62.00	70.78	76.62	78.40	88.22	100.96	104.97	114.62	132.51
April	58.21	62.61	72.64	76.23	77.76	90.85	101.84	105.56	118.29	133.74
May	61.23	64.08	73.54	76.48	78.08	92.68	101.84	105.79	119.48	134.09

June	61.96	65.64	73.46	76.44	79.53	92.89	102.05	105.61	120.91	133.06
July	60.46	65.62	73.34	76.30	80.41	92.75	102.33	105.98	122.44	131.92
August	59.27	68.63	73.35	76.87	80.86	93.79	102.94	106.25	123.97	131.51
September	58.85	70.02	73.00	77.23	81.43	94.72	103.42	106.74	125.23	131.89
October	59.44	70.32	72.93	77.54	81.66	95.29	103.68	106.97	127.20	132.46
November	59.69	70.07	73.33	77.82	82.47	96.95	103.87	107.86	129.13	133.33
December	60.28	70.57	74.04	79.46	83.91	96.89	104.66	109.38	130.09	134.25

Annual GDP

Year	GDP
2006	142
2007	162
2008	183
2009	211
2010	237
2011	256
2012	300
2013	314

APPENDIX III: LIST OF COMMERCIAL BANKS IN KENYA

1. Citibank
2. Equity Bank
3. Standard Chartered Bank
4. Barclays Bank of Kenya
5. NIC Bank
6. Kenya Commercial Bank
7. National Bank of Kenya
8. Diamond Trust Bank
9. Co-operative Bank of Kenya
10. CFC Stanbic Bank
11. I&M Bank
12. Bank of India
13. Bank of Baroda
14. Family Bank
15. Prime Bank
16. Commercial Bank of Africa
17. Bank of Africa
18. Consolidated Bank
19. Chase Bank
20. Guaranty Trust Bank
21. EcoBank
22. HFCK
23. Habib A.G. Zurich
24. Victoria Commercial Bank
25. Credit Bank
26. Habib Bank (K) Ltd
27. Oriental Commercial Bank
28. K-Rep Bank
29. ABC Bank
30. Guardian Bank
31. Middle East Bank
32. Equatorial Commercial Bank
33. Trans-National Bank
34. Dubai Bank
35. Fidelity Commercial Bank
36. City Finance Bank
37. Imperial Bank
38. Giro Commercial Bank
39. Oriental Commercial Bank
40. Development Bank Of Kenya
41. Southern Credit Bank
42. Gulf African Bank
43. Eco Bank