THE EFFECT OF INTEREST RATE VOLATILITY ON MORTGAGE DEFAULT RATE IN KENYA

BY

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DECLARATION

This research project is my original work and has not been submitted for award of a degree in any other university.

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DEDICATION

I dedicate this project to Gladys Wanjiru Ngacha, my dear mother for believing in me and always encouraging me to become the best I can be. To all my family members, your prayers and support have brought me to this moment and to my former classmate Naomi Kirungu, thank you for making the last two years lively.

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ABSTRACT

The mortgage market in Kenya has increased from 7,600 in 2006 to 20,000 homes in 2012 but hikes in interest rates has slowed down mortgage uptake. 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 objective of the study was to establish the effect of interest rate volatility on mortgage default rate 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 2008 – 2012. 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 and mitigate moral hazards such as insider lending and information asymmetry.

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LIST OF ABBREVIATIONS

ARM	Adjustable Rate Mortgage
CBK	Central Bank of Kenya
CBR	Central Bank Rate
FRM	Fixed Rate Mortgage
GDP	Gross Domestic Product
MBS	Mortgage Backed Securities
MPC	Monetary Policy Committee
NPL	Non-performing Loans
REITS	Real Estate Investment Trusts

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The mortgage market in Kenya has increased from 7,600 in 2006 to 20,000 homes in 2012 but hikes in interest rates has slowed down mortgage uptake. 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, 2013).

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 (2010) 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 Volatility

Interest rates are set by the Monetary Policy Committee (MPC) and are used to control inflation. Therefore, the mortgage interest repayments can easily change from month to month but banks take the opportunity to keep the mortgage rates high and not pass the base cut on to the consumer as fast as they raise the rates (Mutero, 2007). Mortgage rates are determined by the lender in most cases and can either be fixed or variable. Mortgage rates rise and fall with interest rates and can drastically affect the real estate market. The borrower's credit score can often play a role in the rate charged on a mortgage and the mortgage size loan they are able to obtain. The rate charged ultimately determines the cost of the mortgage and the amount of the monthly payment. Therefore, borrowers should always seek the lowest rate possible. The Central Bank of Kenya Annual Report (2011) noticed a shift towards variable rate mortgages, which make up 90 percent of all mortgages issued in 2011. It is likely that this shift was due to the volatility of the interest rate in the period, and contributed to a slowing growth in Kenya's residential mortgage market. High levels of inflation and interest rates in 2011 and 2012 affected house prices severely, especially for those with variable interest rates. Borrowers who had taken out loans at the edge of their affordability found they were unable to manage the increased monthly costs.

1.1.2 Mortgage Default Rate

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. Unemployment is considered the biggest cause of mortgage defaults. CBK defines non performing loans as loans which the principle and interest has not been paid over three months from the due date specified in the contract (CBK website). 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.

1.1.3 Effect of Interest Rates Volatility on Mortgage Default Rate

Interest rates are the single most critical factor in driving the mortgage market and access to more middle income housing. Credit risk is measured by expressing the non performing advances as a percentage of the total gross advances**.** A moderate numbers of ARM defaults tend to occur as result of high interest rates, while the reverse is true for FRMs. High interest rates lead to an increase in the mortgage payments required for ARMs, inducing some individuals to default, especially early on when accumulated financial savings are small. On the other hand, for FRMs, low interest rates imply lower rental payments compared to mortgage

payments, which induces default. However, such default tends to occur on average later in the life of the mortgage, and at slightly lower levels of house prices.

Furthermore, as previously documented, interest rate movements have a differential impact on default for FRMs and ARMs. ARM borrowers tend to default when they face large mortgage payments relative to income, a result of high interest rates and low labor income. FRM borrowers are more likely to default when interest rates are low.

Default waves occur for all mortgage types when house prices experience dramatic declines, but smaller numbers of defaults occur with high interest rates for ARMs and with low interest rates for FRMs. This implies that mortgage investors can benefit from portfolio diversification across mortgage types in normal conditions, but not in severe housing downturns.

1.1.4 Mortgage Industry in Kenya

Kenya has a dynamic mortgage industry, which is growing rapidly and become increasingly competitive. The Central Bank of Kenya reports that about 71 percent of mortgage lending was by five institutions. The main providers of mortgages are Kenya Commercial Bank (KCB), Housing Finance, East African Building Society, Standard Chartered Bank, Barclays Bank and Stanbic Bank. KCB is the market leader with about 30 percent of the market share. In 2011, Equity Bank launched a mortgage product specifically targeted at low income groups. The product focuses on those with a monthly income of at least Ksh20 000. The deal involves a partnership with a construction company that will build low cost houses of about. Mortgage financing is already emerging as Equity Bank's fastest growing product category.

The introduction and use of mortgage security issuance in Kenya and other emerging markets can improve housing affordability, increase the flow of funds to the housing sector and better allocate the risks inherent in housing finance. Walley (2011) advised that economies with pools of contractual savings funds, mortgage securities can tap new funds for housing. Institutional investors (pension, insurance funds) with long term liabilities are potentially important sources of funds for housing as they can manage the liquidity risk of housing loans more effectively that short-funded depository institutions. An increase in the supply funding through capital markets through issuance of mortgage securities can increase liquidity or mortgages, thereby reducing the risk for originators and the risk premium charged by lenders. The ability to dispose of an asset within a reasonable time and value, a crucial factor to mobilize long term resources, is a service that capital markets, as opposed to banking systems can provide. A frequently expressed reluctance of primary market financial institutions to offer housing loans is a lack of long-term funds. Access to the long term funds mobilized by institutional investors can reduce the liquidity risk of making long term housing loans, increasing their affordability and improving the access to funds for home buyers

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. “With the increase in interest and inflation rates, non performing advances were expected to go higher which was not the case. This shows the risk in the Kenyan market is low”. Kenyan borrowers promptly repay loans despite stiff interest rates and high inflation presenting a lower credit risk investments compared to other parts of the world. 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)

In his study Nzuve (2012) on the relationship between house prices and real estate finance in Kenya focused on house price fluctuations which have been witnessed by the several booms and busts have led to financial instability 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 unique financing requirements 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

Dururi (2013) 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.

These studies however did not study the impact of the interest rate volatility on mortgage default rates which have been viewed to cause the slow uptake of mortgage loans and defaults of the same. The study will not only help the mortgage providers with pertinent information on how to reduce 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.

1.3 Research Objectives

The general objective of the study was to establish the effect of interest rate volatility on mortgage default rate in Kenya. Specifically the study sought to establish how Adjustable Rate Mortgages (ARMs) affect the non-performing loans book.

1.4 Value of the Study

The study would assist borrowers with knowledge on the various mortgage rates available in the market and how to choose a mortgage rate suitable for their personal financial needs and options available to avoid foreclosure. The study will also provide in the mortgage lenders with options available to reduce default rate and have stable predictable mortgage income. Other researchers will find the information valuable in building on the need towards alternative sources of funding for real estate development in Kenya and hence the need for the government to facilitate the development of a secondary mortgage market through the Nairobi Securities Exchange (NSE).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The most notable constraint to the mortgage market in Kenya is the access to long term funds. The absolute low level of incomes/informality and credit risk are listed as second and third respectively with high interest rates also being regarded as a major constraint. The lack of affordability is a combination of factors which includes the low levels of income (especially in rural areas), and the high and volatile level of inflation and relatively high margins charged by banks. Issues on the supply side also create a price barrier for many, where the cost of even the most basic new house is out of reach for the vast majority.

2.2 Review of Theories

2.2.1 Title Theory and Lien Theory

The lien theory states that a mortgage or a deed of trust will create 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 retains 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 (MBS) market in light, as casual empiricism suggest that investors in the MBS market do seem to be very specialized. It shows that risks that seem relatively minor on the aggregate wealth are priced in the MBS market. A simple pricing kernel based on the aggregate value of MBS securities prices risk in the MBS market. A pricing kerned based on aggregate consumption or aggregate wealth implies the wrong sign for the price MBS 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 Review of Empirical Studies

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.

Gaitho (2010) carried out an investigation on the causes of non-performing loans in Kenya. She found out that the main causes of NPL were the national economic downturn which lead to depression for business in general; reduced buying ability of consumers; insider lending; and owner concentration; inadequate procedures of credit risk assessment and credit management; misuse of loans; and legal delays. Akahenge (2011) carried out research on the determinants of NPL among commercial banks in Kenya. His study found out that poor credit analysis by banks, sources of income, interest rates charged by banks, loan repayment period, staff turnover and other behavioral aspect like morality of individual were the major causes of loan default which resulted in NPLs in banks. 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. Increase in spread in the post-

liberalization period was attributed to the failure to meet the prerequisites for successful financial reforms, the lag in adopting indirect monetary policy tools and reforming the legal system and banks' efforts to maintain threatened profit margins from increasing credit risk as the proportion of non-performing assets. The high non-performing assets were attributed to poor business environment and distress borrowing, owing to the lack of alternative sourcing for credit when banks increased the lending rate, and the weak legal system in enforcement of financial contracts.

As a result, banks increased their lending rates but were reluctant to reduce the lending rate when the Treasury bill rate came down because of the declining income from assets. They responded by reducing the deposit rate, thus maintaining a wider margin as they left the lending rate at a higher level. Postulating an error correction model and using monthly data for the study period, Ngugi (2001) found that for Kenya, rising inflation resulting from expansionary fiscal policy, tightening of monetary policy, yet-to-be realized efficiency of banks and high intermediation costs explained interest rate spreads.

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)

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.

Goodman and Thibodeau (2009) found out that interest rate increase were related to factors such as inelastic supplies of owner occupied housing. Muth (1960) states that housing supply is supposed to be rigid in the short term and demand adjusts to the level of the housing stock available at the time as shown in the Hendry (1984) and Poterba (1984) contributions on the asset market approach. 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.

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 ration, 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.

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 o 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 spreads in Kenya. According to his study, Treasury bill rates are predictors of banks' interest rate spread in the short-run but not in the long-run. Tenant and Folawewo (2007) examined the macroeconomic and market determinants of interest rate spreads in low and middle income countries. In their paper, market determinants are captured using three variables – the structure and development of the banking sector (proxied by the bank/GDP ratio and real per capita/GDP); proscribed reserve requirements (proxied by the ratio of reserves to deposits) and the impact of the market size (proxied by the annual percentage in the CPI), extent of government dependence on the domestic banking sector for financing of its deficit (proxied by public sector borrowing as a percentage of total loans) and the Treasury Bill rate. The implication of their findings is that many of the factors commonly believed to be critical determinants of interest rate spreads may not be as relevant as perceived.

Ongweso (2005) studied on the relationship between interest rates and non-performing loans and found out there existed a positive relationship between the level of interest and non-performing loans, whereby an increase in interest rates increased non-performing loans, a test of significance however revealed a weak relationship between the two.

2.6 Summary of Literature Review

Deficiencies in a lender's ability to capture or understand risks mean that lenders have to charge a high risk premium. This is due to the fact that credit bureaus do not yet offer comprehensive credit histories, there is a high level of informality, and the value of collateral is tempered by

deficiencies in the foreclosure process, resale market and the valuation process. Funding is ranked as the biggest obstacle but the facts suggest a relatively liquid banking sector with a low loan to deposit ratio. The issue is the availability of long term funds and the mismatch between short term deposits and the longer term mortgage loans. However, the current ratios suggest that banks could engage in further maturity transformation before hitting limits. Some of the large lenders however are constrained and certainly if current levels of growth continue, the rest of the sector will be also.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter set out various stages and phases that were followed in completing the study. It entails a blueprint for the collection, measurement and analysis of data. Specifically, the following subsections were included: research design, target population, data collection and finally data analysis.

3.2 Research Design

Claire et al (1962) defined research design as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.

The study used a descriptive correlation research design. Kothari (2004) this research design was used when the researcher wants to establish the relationship between two or more variables. The researcher used theories or at least hypotheses to account for the forces that caused a certain phenomenon to occur.

3.3 Population

A population was a complete set of individual, cases or objects with some common observable characteristics (Mugenda, 1999). The population of the study comprised all the forty-four commercial banks and one mortgage finance company registered with the central bank. Of these, 31 were locally owned and 13 were foreign owned. The local owned institutions

comprised three banks with significant state shareholding, 27 commercial banks and one mortgage finance institution. A census was conducted on the forty-four financial institutions that offered mortgage finance as listed by the Mortgage Company.

3.4 Data collection

The study used secondary data collected from the Central Bank of Kenya, Central Bureau of Statistics and Banks published financial statements starting 2008 – 2012. The data comprised of Treasury bill rate (CBR), banks interest rate, GDP (economic growth rate) and CPI (inflation rate)

3.5 Data Analysis

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

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

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

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

X_1 is the lending interest rate volatility measured by changes in interest rates (absolute value of annual changes in interest rates)

X_2 is the inflation rate as measured by the Consumer Price Index (CPI)

X_3 is the Gross Domestic Product (GDP) as provided by the Kenya National Bureau of Statistics

$B_1 - \beta_3$ 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 interpretation. The objective of the study was to establish the effect of interest rate volatility on mortgage default rate in Kenya. Data was collected for all the banks. Secondary data was collected from the Central Bank of Kenya, Central Bureau of Statistics and Banks published financial statements starting 2008 – 2012.

4.2 Descriptive Statistics

Table 4.1 Mortgage Default Rate

Year	Mortgage default rate	
	Mean	Std. Dev.
2008	0.410	0.136
2009	0.56	0.189
2010	0.52	0.028
2011	0.62	0.020
2012	0.65	0.153

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 2012. In other words, the default rate has risen from 41 to 65% over a priod of 5 years. In addition, the stardard deviation depict minimal variation in default rates in different commercial banks.

Table 4.2: Descriptive statistics for Interest Rates

Year	Mean	Std. Deviation
2008	7.2933	.16166
2009	7.4800	.16643
2010	5.3200	.69764
2011	3.7800	1.18199
2012	16.1533	2.37504

From the results, the lowest interest rate value was 7.29 in 2008 while the highest was 16.15 in 2012. On the other hand 2011 and 2012 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.

Table 4.3: Descriptive statistics Inflation Rate

Year	Mean	Std. Deviation
2008	92.3625	3.61084
2009	102.0950	1.93610
2010	106.2650	1.31245
2011	121.1650	6.43061
2012	132.5283	1.19321

From the findings, it can be noted that the mean values for inflation rate have been on the rise since 2008 rising from 92.4 to 132.5. It is also evident that there has been a consistent rise in inflation rate as the stardard deviation is so small depicting minimal variability.

Table 4.4 GDP

Year	GDP (Billion)	
	Mean	**Std. Dev.**
2008	211.3	26.14
2009	237.52	16.23
2010	255.6	14.56
2011	299.9	13.58
2012	314.8	11.8

From the findings, it can be noted that the annual averages for GDP in billion rose from 211.3 in 2008 to 314.8 in 2012. It is also evident that 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.

4.2.1 Correlation Analysis

To quantify the strength of the relationship between the variables, the study used Karl Pearson's coefficient of correlation. The Pearson product-moment correlation coefficient (or Pearson correlation coefficient for short) is a measure of 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	.386**	1		
GDP	0.13	-.361**	1	
mortgage default rate	.293**	.363**	.340	1

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

Results from table 4.6 above reveal that there is a significant positive relationship between **Interest Rates** and mortgage default rate (r = .293**, P-value < 0.01). This implies that **Interest Rates** influences mortgage default rate in Kenyan real estate market.

The findings also disclosed a significant positive relationship between Inflation Rate and mortgage default rate (r = .363**, P-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 = .3401) thus, depicting that growth in GDP has no significant effect on mortgage default rate.

The results in table 4.6 above indicate that there was a significant positive relationship between Interest Rates and Inflation Rate (r = .386**, P-value < 0.01). A significant negative relationship was observed between inflation rate and GDP (r = -.361**, P-value < 0.01). This implies that a rise in inflation rate has negative effect on GDP.

4.6 Regression Analysis

The data obtained was analyzed using multiple linear regression technique.

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

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

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

X_1 is the lending interest rate volatility measured by changes in interest rates (absolute value of annual changes in interest rates)

X_2 is the inflation rate as measured by the Consumer Price Index (CPI)

X_3 is the Gross Domestic Product (GDP) as provided by the Kenya National Bureau of Statistics

$B_1 – \beta_3$ 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 Analysis of the variables

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.457	.560		.816	.416
	Interest Rates	.179	.089	.182	2.013	.046
	Inflation Rate	.298	.139	.206	2.145	.034
	GDP	.281	.104	.243	2.718	.008

	R = .459 R Square = .210 Adjusted R Square = .190 F change 10.124 Sig. 0.01
Dependent Variable: mortgage default rate	

Source: Field Data 2013

4.6.1 Regression equation

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

$Y = .457 + .179\ X_1 + 0.298\ X_2 + 0.281\ X_3 + e$

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.

4.7 Summary and Interpretation of Findings

This study examines how interest rate volatility affects 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 2012. In other words, the default rate has risen from 41 to 65% over a priod of 5 years. In addition, the stardard deviation depict minimal variation in default rates in different commercial banks.

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.

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.

Oduori (2012) also 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 o 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.

Further, the lowest interest rate value was 7.29 in 2008 while the highest was 16.15 in 2012. On the other hand 2011 and 2012 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. Kau et al (1993) also established that 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

On the other hand, the mean values for inflation rate have been on the rise since 2008 rising from 92.4 to 132.5. It is also evident that there has been a consistent rise in inflation rate as the stardard deviation is so small depicting minimal variability. This agrees with Gaitho (2010) who carried out an investigation on the causes of non-performing loans in Kenya and found out that the main causes of NPL were the national economic downturn which lead to depression for business in general; reduced buying ability of consumers; insider lending; and owner concentration; inadequate procedures of credit risk assessment and credit management; misuse of loans; and legal delays. Akahenge (2011) also carried out research on the determinants of NPL among commercial banks in Kenya and he established that poor credit analysis by banks, sources of income, interest rates charged by banks, loan repayment period, staff turnover and other behavioral aspect like morality of individual were the major causes of loan default which resulted in NPLs in banks.

Further, Kinyura (2011) carried out a research on the determinants of lending rates of commercial banks in Kenya and 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.

It is also evident that 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. The findings also disclosed a significant positive relationship between Inflation Rate and mortgage default rate (r = .363**, P-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 = .3401) thus, depicting that growth in GDP has no significant effect on mortgage default rate.

This findings agree with Ongweso (2005) who studied the relationship between interest rates and non performing loans and found out there existed a positive relationship between the level of interest and non-performing loans, whereby an increase in interest rates increased non-performing loans, a test of significance however revealed a weak relationship between the two. Tenant and Folawewo (2007) also examined the macroeconomic and market determinants of interest rate spreads in low and middle income countries. In their paper, market determinants are captured using three variables – the structure and development of the banking sector (proxied by the bank/GDP ratio and real per capita/GDP); proscribed reserve requirements (proxied by the ratio of reserves to deposits) and the impact of the market size (proxied by the annual percentage in the CPI), extent of government dependence on the domestic banking sector for financing of its deficit (proxied by public sector borrowing as a percentage of total loans) and the Treasury Bill rate. The implication of their findings is that many of the factors commonly believed to be critical determinants of interest rate spreads may not be as relevant as perceived.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The aim of the study was to examine the effect of interest rate volatility on mortgage default rate 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 priod 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.

It is also evident that there has been a consistent rise in inflation rate as the stardard 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 2012. In other words, the default rate has risen from 41 to 65% over a priod of 5

years. In addition, the stardard deviation depict minimal variation in default rates in different commercial banks

The study further concludes the lowest interest rate value was 7.29 in 2008 while the highest was 16.15 in 2012. On the other hand 2011 and 2012 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. On the other hand, the study concludes that the mean values for inflation rate have been on the rise since 2008 rising from 92.4 to 132.5. It is also evident that there has been a consistent rise in inflation rate as the stardard deviation is so small depicting minimal variability.

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 ($r = .363^{**}$, P-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 ($r = .3401$) thus, depicting that growth in GDP has no significant effect on mortgage default rate.

5.3 Policy Recommendations

Since cost of loans does influence default rate, 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. Given that the type of interest rates charged on loans (fixed and floats) 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 between different fixed credit and interest terms when they take out mortgage loans or when loans are renegotiated.

On the other hand, households should 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, no or minimal insider lending, 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.

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.

The banks were reluctant to give information their financial statements easily because of the suspicion that their information would fall in the hands of wrong persons. In addition, time and resources allocated to this study could not allow the study to be conducted as deeply as possible.

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. Finally, correlations among the variables may be causing unanticipated results despite the efforts at identifying potential multi-collinearity problems.

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 interest rate volatility 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: FINANCIAL STATEMENTS

mortgage default rate				
2008	2009	2010	2011	2012
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

Monthly data on interest rates

Month/Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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	7.60	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	8.50	6.60	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	9.80
DECEMBER	1.46	8.04	8.07	5.73	6.87	8.59	6.82	2.28	18.30	8.30

Monthly data on inflation - consumer price index(CPI)

Month/Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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

Year	GDP (Billion)
2005	142
2006	162
2007	183
2008	211
2009	237
2010	255.6
2011	299.9
2012	314.8

APPENDIX II: 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. Fina 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. Development Bank of Kenya
31. Middle East Bank
32. Equatorial Commercial Bank
33. Trans-National Bank
34. Dubai Bank
35. Fidelity Commercial Bank
36. City Finance Bank
37. Paramount Universal Bank
38. Giro Commercial Bank
39. Imperial Bank
40. Guardian Bank
41. Southern Credit Bank
42. Gulf African Bank
43. First Community Bank