THE EFFECT OF INTEREST RATES VOLATILITY ON THE GROWTH OF REAL ESTATE MARKET IN KENYA

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DECLARATION

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

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DEDICATION

To my family who have been infinitely supportive

ABSTRACT

The purpose of the study was to portray the effect of interest rates volatility on the growth of real estate market in Kenya. The real estate sector being one of the major sectors of the economy in Kenya has been largely affected by fluctuating interest rates. The study sort to show case this effect by showing how growth of real estate market is affected by the interest rates volatility. Real estate is a large investment which requires huge capital that most ordinary Kenyans cannot raise, therefore they turn to banks to finance this cost of construction or purchase. The cost of borrowing in all banks is driven by the real interest rate which is fuelled or largely accommodates inflation. Inflation is the key driver of interest rates.

The research problem was analysed through the use of the regression model. The target population of this study was the real estate market in the country ranging from the large real estate developers to the small scale individual investors. Data for the purpose of the study was collected from KNBS and Hass Consulting firm from 2008-2012. Study findings indicated that the interest market has experienced low volatility. Thus, volatility in the interest market is predictable, at least in the short run. The evidence strongly indicates that the interest rate market is nonlinear. The following recommendation was made, that the investors should consider investing in the real estate market despite the erratic interest rates.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CBK	Central Bank of Kenya
CBR	Central Bank Rate
KNBS	Kenya National Bureau of Statistics
RROR	Required Rates of Return
SACCO	Savings and Credit Co-operatives
SMEs	Small and Micro Enterprises
SPSS	Statistical Package for Social Sciences

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The commercial real estate market worldwide is increasingly dominated by institutional investors. This presents a challenge to private real estate investments because individual properties are not bought and sold on a regular basis like stocks and bonds (Kohnstamm,1995). Unlike the developed countries that use stocks and bonds, financing of real estate in Kenya is predominantly through mortgage financing.

Interest rate targets are a vital tool of monetary policy and are taken into account when dealing with variables like investment, inflation, and unemployment. The central banks of countries generally tend to reduce interest rates when they wish to increase investment and consumption in the country's economy. However, a low interest rate as a macro-economic policy can be risky and may lead to the creation of an economic bubble, in which large amounts of investments are poured into the real-estate market and stock market.

This happened in Japan in the late 1980s and early 1990s, resulting in the large unpaid debts to the Japanese banks and the bankruptcy of these banks and causing stagflation in the Japanese economy with exports becoming the last pillar for the growth of the Japanese economy throughout the rest of 1990s and early 2000s. The same scenario resulted from the United States' lowering of interest rate since late 1990s to the year 2008, (2007–2012 global financial crisis) substantially by the decision of the Federal Reserve System.

1.1.1 Interest Rate Volatility

The interest rate is the percent charged, or paid, for the use of money. It is charged when the money is being borrowed, and paid when it is being loaned. The interest rate that the lender charges is a percent of the total amount loaned (Kimberly Amadeo, 2012). An interest rate is the rate at which interest is paid by borrowers for the use of money that they borrow from a lender. Specifically, the interest rate (I/m) is a percent of principal (P) paid a certain amount of times (m) per period (usually quoted per annum).

The interest rates that banks charge make loans more expensive. When interest rates are high, that means fewer people and businesses can afford to borrow. This lowers the amount of credit available to fund purchases, slowing consumer demand. At the same time, it encourages more people to save (if they can) because they receive more on their savings rate. Higher interest rates also reduce the capital required to expand businesses, strangling supply. This reduction in liquidity usually slows the economy down (Kimberly Amadeo, 2012)

Low interest rates have the opposite effect on the economy. Low mortgage interest rates have the same effect as lower housing prices, stimulating demand for real estate (Kimberly Amadeo, 2012). Mortgage financing refers to a loan secured by collateral of some specified real estate property that the borrower is obliged to pay back with predetermined set of installments (Bienert&Brunauer, 2006). The loan is usually for the purchase or construction of housing estates by individuals or companies.

Interest rates, especially the rates on interbank exchanges and Treasury bills, have as profound an effect on the value of income producing real estate as on any investment

vehicle. Because the influence of interest rates on an individual's ability to purchase residential properties (by increasing or decreasing the cost of mortgage capital) is so profound, many people incorrectly assume that the only deciding factor in real estate valuation is the mortgage rate. However, mortgage rates are only one interest-related factor influencing property values. Because interest rates also affect capital flows, the supply and demand for capital and investors' required rates of return on investment, interest rates will drive property prices in a variety of ways.

Interest rates can significantly affect the cost of financing and mortgage rates, which in turn affects property-level costs and thus influences values. However, supply and demand for capital and competing investments have the greatest impact on required rates of return (RROR) and investment values.

As interbank exchange rates decrease, the cost of funds is reduced and funds flow into the system; conversely, when rates rise, the availability of funds decreases. As for real estate, the changes in interbank lending rates either add or reduce the amount of capital available for investment. The amount of capital and the cost of capital affect demand, but also supply, capital available for real estate purchases and development. For example, when capital availability is tight, providers of capital tend to lend less as a percentage of intrinsic value, or not as far up the capital stack. This means that loans are done at lower loan to value ratios, thus reducing leveraged cash flows and property values.

Most retail investors, especially homeowners, focus on changing mortgage rates because they have a direct influence on real estate prices. However, interest rates also affect the availability of capital and the demand for investment. These capital flows influence the

supply and demand for property and, as a result, they affect property prices. In addition, interest rates also affect returns on substitute investments, and prices change to stay in line with the inherent risk in real estate investments. These changes in required rates of return for real estate also vary during periods of destabilization in the credit markets. As investors foresee increased variability in future rates or increase in risk, risk premiums widen, putting increased downward pressure on property prices.

High interest rates in Kenya are hurting real estate investment. Interest is a cost to the developer of real estate as it is to the end buyer. Since October 2011 the Central Bank of Kenya (CBK) has increase the Central Bank Rate (CBR) from 7% to 18% in an effort to tame runaway inflation and stabilize the weakening shilling. Consequently commercial banks have increased their lending rates from low figures of 11% to about 25%.

While the intervention by the CBK brought almost immediate relief to the economy, the effects of high interest rates on real estate are yet to be felt. Real estate market is an imperfect market. Any changes in real estate market are felt several months later. This can be explained by the process and time it takes to deliver real estate.

High interest rates in Kenya mean that ongoing projects will cost more when finally delivered. This will be due to higher costs of material, labour and most importantly the cost of construction money. Halting or delaying work in progress would only escalate costs further. Developers will therefore want to pass the increased costs to buyers in the form of higher prices. Should they fail to do so, they will have to do with drastically reduced profits or suffer loses. New investors will shy away from real estate investment resulting in low investment.

The Monetary Policy Committee of the CBK in February 2012 decided to maintain the CBR at 18%. This implies that commercial bank lending rates would remain high for the succeeding months. For existing customers, commercial banks have agreed to restructure their loans to ease their increased burden due to the high interest rates. This would be by lengthening the repayment periods and subsidizing the higher liability rather than increasing monthly repayments.

Lower interest rates allow more people to be able qualify to purchase a home, thus more people can afford to purchase. At the same time, because more people are able to purchase homes it reduces the amount of homes on the market (reduces the supply) which in turn pushes up the cost. Conversely, when interest rates are high fewer buyers are able to qualify for a loan which increases supply. Over supply tends to push prices lower.

One of the methods of measuring interest rate risk is Rate Sensitive Assets/Rate Sensitive Liabilities (RSA/RSL). It is commonly used in banks as one of their roles is to lend. For instance as the name implies, we simply examine a ratio of the bank assets that mature or reprice within a year to the bank liabilities that mature or reprice within a year. A balanced position would result if the amount of repricing assets were exactly offset by the repricing liabilities (ratio = 1.0). Ratios less than 1.0 indicate a bank that is liability sensitive (liabilities reprice quicker than assets), while a ratio greater than 1.0 indicates that the bank's assets reprice faster than liabilities (asset sensitive) (Echo Partners, 2013).

Risk is defined by compliance within established interest rate risk parameters. Banks rated as having little or no interest rate risk will tend to have net interest income results that will not increase as interest rates change. On the other hand, these banks' results will

not decrease due to interest rate changes either. Similarly, some banks with relatively poor interest rate risk indicators will increase earnings rapidly as rates change. But simply because favorable results are experienced does not mean that the banks involved did not accept increased risk levels. Others may experience significant interest rate income declines as rates vary. It is this variability in net interest income and earnings that we are measuring (Echo Partners, 2013).

1.1.2 Growth of Real Estate

Real estate is property consisting of land and the buildings on it, along with its natural resources such as crops, minerals, or water; immovable property of this nature; an interest vested in this, an item of real property; buildings or housing in general. Real estate is sometimes inaccurately spoken of as a profession, but it is essentially a business. The principal divisions of the real estate business are investment, operation and agency (Kimmons, 2010). These differ from one another according to the aims of the persons engaging in them and the methods by which those persons expect to make their gains. Real estate is often used to refer to things that are not movable such as land and improvements permanently attached to the land (Brueggeman, 1997).

Research findings indicated that real estate accounts for a large share of wealth; about 33% and Gloss Domestic Product (GDP) of about 11% in the United States of America. Further, stated that real estate is multifaceted. It is local and it is national. Prices may be high in summer and lower in winter. What sellers ask for may be higher in winter and lower in summer. It can be perception. It can also be supply versus demand. Real estate is a business, an emotion, a science and it is random. There are usually hundreds of forces

at work, many unseen, culminating in a selling price for a house or a piece of land (Antonio, 2006).

Real estate market is one that is characterized by almost predictable cycles of booms and busts (Smith, 2010). The former are the periods when the prices in market soar and almost inevitably, they are followed by other periods when the prices plummet. There are people who make a living out of these cycles. These are people whose study of the real estate property markets has brought them to a point where they can reliably tell when they are seeing a bust (when prices are very low), purchase property at that point and then sell it during the subsequent and virtually inevitable boom, making a big profit (Smith, 2010).

Due to conflict, political instability and low investment the African property market has been quite stagnant over the years. But recently Africa's property market has experienced significant growth. Africa's economy at GDP growth rate of 5% per annum is expanding exponentially. This expansion is creating a middle class which has led to the urban centres coming up. It also creates a need for modern retail formats and big shopping malls. The African property market has been growing since the turn of the millennium albeit slowly due to lack of big investments (Harry Kimotho, 2013).

Since the worldwide global the African real estate market has been getting interest from International investors. The property market in South Africa suffered a minor slump as real estate there can be funded wholly by debt. Most of the other African countries developments are not built on credit basis and thus were not affected by the global crisis. Markets like Kenya, Nigeria, Uganda and Zambia already have strong bases on which to

build on; high GDP growth and demand for high end real estate is a key drive in these economies. There has been also an increased efficiency in financing as the local banks are heavily chipping in real estate and Infrastructure (Harry Kimotho, 2013).

Mara Capital Group is financing construction of what will become the largest retail chain on the African continent in the port city of Dar-es-salaam. Stanlib is set to launch the Stanlib Africa Direct Property Development fund in May or June 2013. The fund seeks to capitalize on Africa's growing real estate and would focus primarily on developments in Nigeria and Kenya. The chief investment officer of Stanlib Direct Property Investments, Amelia Beattie cited the undersupply of quality retail properties in the region. It would also look into South Africa retailers. Actis, another major player in the Africa's property market invests in institutional quality retail and office developments in high growth markets such as Ghana, Kenya, Nigeria, Tanzania and Zambia (Harry Kimotho, 2013).

1.1.3 Effect of Interest Rates on Growth of Real Estate

Theoretical studies shows that down-payment constraints, as reflected in the maximum available loan-to-value ratio, also help determine home prices using the home price-to-rent approach to model home prices. The lack of good data on mortgage availability and on regional home stocks raises concerns that estimates of home price and consumption models may suffer from omitted variable bias (Kim, 2007).

The Post-Keynesian theory of debt deflation takes a demand-side view, arguing that real estate property owners not only feel richer, but borrow against the increased value of their property, or borrow money to speculate in real estate property, buying property with borrowed money in the expectation that it will rise in value. Studies point out the

importance of mortgage credit for house prices fluctuations in 17 countries. The analysis finds that fundamentals relating to mortgage finance, including bank credit and the real interest rate, explain approximately one-third of the long-run variation in house prices (Tsatsaronis and Zhu, 2004).

There is a long-run relationship linking house prices, bank credit and GDP in Hong Kong . For house prices and credit in the short run, they conclude that the relationship is one-way; a change in house prices causes changes in bank credit (Gerlach and Peng, 2005). An example of a national-level empirical study using the U.S national data that points to mortgage credit as the transmission mechanism by which interest rates affect the demand for houses. The results show a significant negative relationship between house prices and the mortgage interest rate in the long run; however, when income and new home sales are included, the relationship is not significant in the short run (McGibany and Nourzad, 2004). Using inflation-adjusted U.S. national data, house price growth responds immediately to a change in mortgage credit. In addition, mortgage credit responds contemporaneously to the change in house prices, suggesting that the relationship is reinforcing in the short run (Laura Berlinghieri, 2008).

The existing literature can be summarized with a few key points. First, empirical studies typically include income, the interest rate and a supply-related measure as determinants of house price dynamics. However, these fundamentals are unable to explain all movements in house prices. International studies typically add bank loans to the list of determinants. More specifically, evidence from studies of Hong Kong and Ireland indicate that house prices and credit are linked in the long run. In addition, these country-specific studies provide some evidence of a short-run relationship between house price

changes and credit growth, although the direction of the relationship is not necessarily clear. This research will cover Nairobi and will identify the effect of interest rates on real estate market.

1.1.4 Real Estate in Kenya

Nairobi has the highest growth in real estate prices, not just in Africa but the whole world. Properties in the Nairobi and the coastal towns of Mombasa in the East African country showed an increase by a quarter in just one year. Cape Town another African city also appeared on the list with a 4.1 per cent growth rate. Investors are no longer shying away from the African real estate market, and are seeking opportunity for to invest where there will be sheltered from the rest of the world's Economic troubles (Knight Frank and Citi Private Wealth, 2010).

In Kenya, the housing sector has been characterized by inadequacy of affordable and descent housing, low level of urban home ownership, extensive and inappropriate dwelling units, including slums and squatter settlements. The national housing corporation (NHC) continued to play a leading role in the implementation of housing policies and programmes through site and service schemes, rental and mortgage housing developments. In 2008, three housing projects were completed at a total cost of Ksh 194.8 million. These consisted of 16 rental flats in Woodley infill (Nairobi), 24 rental flats in Sadi infill (Nairobi) and 38 mortgage maisonettes in Kiambu (Phase III). Other six housing projects under construction as at 31st December 2008 cost a total of Ksh 1,340.3 million upon completion (Republic of Kenya, 2009).

The Kenyan government for instance is relying on private developers to invest in infrastructure development. The Kenyan Government is set to release a $1 Billion dollar sovereign bond in 2013 for infrastructure projects. Sub-Saharan Africa is rapidly urbanizing and there high demand to provide infrastructure for the urban set up (Harry Kimotho, 2013). Markets like Kenya, Nigeria, Uganda and Zambia already have strong bases on which to build on; high GDP growth and demand for high end real estate is a key drive in these economies. There has been also an increased efficiency in financing as the local banks are heavily chipping in real estate and infrastructure (Harry Kimotho, 2013). Economic development is the key factor driving investment in infrastructure. An area which is receiving big investment has been real estate and infrastructure.

The Kenyan financial system through its intermediation role remains the key pillar in providing mortgage financing. Although there is evidently enormous opportunity in the sector, lending to the building and construction and real estate sector stands at 12.2% (Ksh 92.5 billion as at end of 2009) of the total credit by banks and mortgage finance companies. The bulk of financing, it does appear, is through household savings. This is a clear indication that financing is one of the major constraints. While most deposits are of short term nature, mortgage finance is long-term. The traditional mismatch constraint therefore comes into play. This requires a well developed mortgage market to address long term funding requirements of the sector (NjugunaNdung'u, 2010).

The Government's commitment to growth of real estate sector is in our blueprint for Vision 2030 and is also well articulated in the Finance Bill, 2010. The Finance Bill outlines a number of measures to spur growth in the property market. In particular, in

order to facilitate provision of adequate housing to Kenya's growing population (NjugunaNdung'u, 2010),

The Finance Bill, 2010 contains proposals to amend the Banking Act:

i. To allow mortgage finance companies to operate current accounts; and
ii. To allow banks to advance up to 40% of their total deposit liabilities up from 25% for purchase, improvement or alterations of land.

1.2 Problem Statement

Many investors are watching rising real estate values with a sense of urgency to purchase while the deals are still good. However, one would argue that while increasing prices are definitely a motivating factor, rising interest rates are just as. Interest rates are definitely less predictable than rising values and can move in either direction much quicker as well. As we all witnessed just this last month, any minor shifts in policy or market demand can have a tremendous affect on mortgage interest rates and can affect future returns on an investment on a moments notice.

The real estate sector being one of the major sectors of the economy in Kenya has been largely affected by fluctuating interest rates. The study seeks to show case this effect by showing how real estate growth is affected by the cost of borrowing. Real estate is a large investment which requires huge capital that most ordinary Kenyans cannot raise, therefore they turn to banks to finance this cost of construction or purchase. The cost of borrowing in all banks is driven by the real interest rate which is fuelled or largely accommodates inflation. Inflation is the key driver of interest rates. The banks are highly supervised and are under the obligatory role of the Central bank of Kenya which

determines the base lending rate accommodating all factors in the economy, based on this the bank can then come up with their own mortgage rates or borrowing rates a few basis points from the Central Bank lending rate.

In recent years a number of countries experienced a rapid increase in housing market activity, which coincided with a period of low real and nominal interest rates. The link between the two is intuitive: low interest rates make credit cheaper and increase the demand for housing. Some scholars argue that expansionary monetary policy has been significantly responsible for this low level of interest rates and the subsequent house price boom (Hume and Sentance (2009) and Taylor (2009)).

In more developed mortgage markets, consumers have easier access to credit and tend to be more leveraged. In the presence of financial frictions, the impact of changes ininterest rates on consumers and therefore the housing market should become stronger whenleverage is higher. Diamond and Rajan (2009) argue that excessive financialinnovation has led to a misallocation of capital to the real estate sector through securitization, exacerbating the effect of interest rate movements on housing activity.

Some previous studies have looked at whether the structure of the mortgage market plays a role in the propagation of monetary policy shocks. (Calza et al, 2009) and (Assenmacher-Wesche and Gerlach, 2010) shows that higher mortgage market development amplifies the effects of monetary policy shocks on housing variables.

In addition, the success of the Kenya Government infrastructure bond as well as other corporate bonds that have followed, demonstrates enormous potential of the bond market. In 2009 alone the Government raised a total of Ksh 54.7 billion through bonds issues, and

the infrastructure bonds were oversubscribed every time. This is a clear testimony of the market's ability to provide cheaper source of funding for long-term projects such as mortgages. To further deepen the bond market, the Central Bank has implemented a number of measures, including introduction of benchmark bonds and re-opening of these benchmark bonds to create liquidity and facilitate trading. We can then use this infrastructure bond platform to develop housing bonds (NjugunaNdung'u, 2010).

The other source of construction money discovered is SACCO loans (credit unions). For instance, take Teachers SACCOs. Their loans are very friendly compared to the major banks. These SACCOs, unlike commercial banks are willing to use plots as collateral for a loan. Commercial banks normally do not use plots as collateral except for developing the plot. The study helped to close the gaps identified such as, the options to Mortgage loans an investor has, the mitigation measures to control such interest rates in real estate. This study filled the gap where we look at the effect of interest rates on growth of real estate market. The research answered the question, what is the effect of interest rates on real estate market growth?

1.3 Objectives of the study

The objective of this study was to establish the effect of interest rates on growth of real estate market in Kenya.

1.4 **Value of the Study**

This research is much interest to real estate investors as it informs them on the impact that interest rates has on the real estate market. The study also, sheds light on how to control interest rates, i.e. through monetary policy. Mortgages are prohibitively expensive

and only the big developers are applying for them. Kenya real estate is wide open for all investors and majority of Kenyans like all people around the world dream of owning their own homes. The Jua Kali lending avenues are enormous. Further, majority of people construct their homes gradually, moving in after roofing before fully finishing the interiors.

In a bid to tackle the housing crisis in Kenya the government has been wooing the private sector to bridge the gap between supply and demand. But with a target of creating 300,000 residential homes every year throughout the country and a shortfall of 150,000 unconstructed units per annum, the demand for Kenyans to own their homes is not about to be quenched. According to this study, demand in the residential, office and retail market continues to increase, courtesy of a growing middle class with disposable income and a desire to own property of their own, or conduct trade and consultancy business. Demand for residential town houses and stand alone properties on large acreages within the preferred suburbs continue to grow. Hence there is a need to take control of the interest rates in order to grow the real estate market which is in line with vision 2030.

Finally, the study may help the financial analysts with information that would be useful in advising their clients in financial decisions. It also provokes other researchers to carry out additional research on the effects of interest rates on real estate market in Kenya. The real estate agents and real estate brokers can also benefit from this study. They can get information concerning real estate purchase patterns. They in turn may enable them advice their clients (both sellers and buyers) on the real estate price patterns. The buyers and sellers can also benefit directly. They can make informed choices in the real estate property investment as they know what factors to consider and the weight of each in their

choices of where to invest, when to invest and how much to invest. The results of this study is also beneficial to other scholars and learners who would be seeking information as they use the results obtained in furtherance of their studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on the Effect of Interest Rates on Real Estate Market. It highlights the trends in this study relating to the research topic. It includes research areas, methodology, theoretical approaches and findings. It shows sources of where the information is coming from such as countries or other areas. The review also outlines some of the gaps identified, it deals with the historic and current state of research in the field.

2.2 Theoretical Review

In the study, there are several theories that attempt to explain how interest rates affect economies and how they can be used to forecast future changes. These theories include classical, liquidity reference and loanable funds theories. Each of these theories makes assumptions regarding the behavior of aspects of the economy and focuses on the behaviors of other aspects as determinants of the prevailing interest rates.

2.2.1 Classical Theory

The classical theory of interest rates applies the classical theory of economics to determining interest rates. Classical theory of interest rates compares the supply of savings with the demand for borrowing. Using supply and demand curves the equilibrium rate is calculated by determining the curves intersection point. Thus if savings are greater than investments the interest rate drops until they reach equilibrium and vice versa, if

savings are less than investment the interest rate increases until the reward for savings encourages increased savings rates causing the market to again reach equilibrium. However the classical theory of interest rates fails to account for factors besides supply and demand that may affect interest rates such as the creation of funds, the importance of income and wealth and changes in the primary borrowers in an economy. Modern economic theory has stressed the key role that real interest rates play in economic behavior: real interest rates affect investment, which, in turn, affects the aggregate level of economic activity. Monetary policy is given a central role in controlling the level of economic activity through its role in controlling interest rates. Monetary authorities are hypothesized to change nominal interest rates in response to a change in expectations concerning inflation so that the real interest rate adjusts in the desired way (Joseph E. Stiglitz, 1995).

2.2.2 Liquidity Preference Theory

Liquidity preference theory asserts that economic units have a preference for liquidity over investing. Applying this theory explains the premium offered in forward rates in comparison to expected future spot rates. This premium is used as payment for the use of scarce liquid resources. The preference for liquidity can be accounted for by the fact that economic units need to hold certain levels of liquid assets for purchase of goods and services and the fact that these near term future expenditures can be difficult to predict. Liquidity theory is limited by its short-term nature, the assumptions that income remains stable, and, like classical theory, only supply and demand for money are considered.

2.2.3 Loanable Funds Theory

Loanable funds theory assumes that interest rates are determined by supply of loanable funds and demand for credit. In loanable funds theory the demand of loanable funds originates from domestic business, consumers, governments and foreign borrowers. While the supply is generated by domestic savings, dispersion of money balances, money creation in the banking system and foreign lending. With these factors determining long-term interest rates, short term interest rates are decided by financial and monetary conditions in the economy. The many factors considered in loanable funds theory mean that equilibrium will be reached only when each of the factors is in equilibrium. Previous researchers conducted many studies that were useful for households, policy makers, home buyers and sellers. Mortgage rate is one of the key components of housing affordability index, and the rise in mortgage rate decreases the index and vice versa (Mc Gibany and Nourzad, 2004). Households are very sensitive to changes in interest rates, in the countries with variable mortgage rates like Sweden, because of their greater indebtedness in the past two decades (Debelle, 2004). Similarly, interest rates, income and expected prices are determinants of house price (Vries and Boelhouwer, 2005).

Specifically, banks may be insensitive to changes in monetary stance owing to risk aversion. There are strong policy implications; it is argued, for instance, that in East Asia raising interest rates exacerbated economic decline and, rather than contributing to exchange-rate stability, may have induced capital flight as default risk increased, lowering risk-adjusted expected returns. A link between low interest rates and house price bubbles is especially tenuous. Standard theory says that low interest rates should increase house values (or the the value of any long-lived asset, for that matter).

Consequently, the observation that house prices rise when interests rates fall is not by itself evidence that low interest rates cause bubbles. To make this case, one would have to argue house prices tend to overreact to interest rate reductions, i.e., that appreciations are larger than warranted by fundamentals.

2.3 Determinants of Growth of Real Estate Market

Real estate represents a significant portion of most people's wealth, and this is especially true for many homeowners in the developing countries. The size and scale of the real estate market make it an attractive and lucrative sector for many investors. This study will look at some of the main factors that affect the real estate market and the variety of investments available.

2.3.1 Lending Interest Rates

Interest rates also have a major impact on the real estate markets. Changes in interest rates can greatly influence a person's ability to purchase a residential property. That is because as the interest rates fall, the cost to obtain a mortgage to buy a home decreases, which creates a higher demand for real estate, which pushes prices up. Conversely, as interest rates rise, the cost to obtain a mortgage increases, thus lowering demand and prices of real estate. However, when looking at the impact of interest rates on an equity investment such as a real estate investment trust (REIT), rather than on residential real estate, the relationship can be thought of as similar to a bond's relationship with interest rates. When interest rates decline, the value of a bond goes up because its coupon rate becomes more desirable, and when interest rates increase, the value of bonds decrease. Similarly, when the interest rate decreases in the market, REITs' high yields become

more attractive and their value goes up. When interest rates increase, the yield on an REIT becomes less attractive and it pushes their value down (Joseph Nguyen, 2011).

The interest rates are expected to reduce as pressure is put on the Central Bank and other banks here in Kenya, investors, developers, bank customers and other stakeholders. There is a lot of competition that banks are facing from SME financiers and money-lending is becoming a popular business outlet at lower interest rates than the mainstream banks have been offering. Co-operative Saccos are giving banks a run for their money and Chama Accounts are opening everywhere in the country. With this kind of healthy competition, interest rates cannot remain high much longer (Daniel Ojijo, 2013).

2.3.2 Population

One of the methods used by these professional real estate investors is a thorough analysis of current and future population trends. Tracking the trends in population growth and population movement can provide an accurate prediction of which neighborhoods are likely to succeed and which ones are doomed to at least short term failure. Over the past several years it has been those markets with the strongest and fastest population growth that have been the hottest markets in the country. This trend has held true both in residential and in commercial real estate and those investors who took advantage of this fact were able to realize excellent profits through the buying and selling of residential and commercial properties. It is easy to see how population movement and population growth impact the housing market, since a higher population density increases the demand for local real estate. In turn companies looking to open new facilities or new branches often

look to areas with high population growth, causing a spike in commercial real estate prices as well.

Demographics are the data that describes the composition of a population, such as age, race, gender, income, migration patterns and population growth. These statistics are an often overlooked but significant factor that affects how real estate is priced and what types of properties are in demand. Major shifts in the demographics of a nation can have a large impact on real estate trends for several decades. For example, the baby boomers who were born between 1945 and 1964 are an example of a demographic trend with the potential to significantly influence the real estate market. The transition of these baby boomers to retirement is one of the more interesting generational trends in the last century, and the retirement of these baby boomers, which began back in 2010, is bound to be noticed in the market for decades to come. (Joseph Nguyen, 2011).

2.3.3 Inflation

Inflation also affects the interest rates, for instance, when inflation increases, interest rates increase and vice versa. Recent reports indicate that the rate of inflation has also started to reduce. According to the Finance Minister Uhuru Kenyatta, in year 2012, Kenya planned to cut inflation to five percent by 2014/15 through austerity measures to reduce its budget deficit, accompanied by a tight monetary stance. Statistics show that year-on-year inflation rose for 13 straight months to peak at 19.72 percent last November, before easing to 18.93 percent in December after the central bank raised rates aggressively and rainfall pointed to an improvement in harvests.

The shilling fell against the dollar for most of last year mainly due to a widening trade gap, amplified by global increases in fuel prices and a drought that ravaged the Horn of Africa, feeding through to higher inflation rates in the region. The government aims to lower its budget deficit to 5.1 percent by 2014/15 from this fiscal year's 6.1 percent. The decrease in cost of fuel should see the cost of inflation also come down considerably (Daniel Ojijo, 2013).

2.3.4 The Economy GDP

Another key factor that affects the value of real estate is the overall health of the economy. This is generally measured by economic indicators such as the Gross Domestic Production, employment data, manufacturing activity, the prices of goods, etc. Broadly speaking, when the economy is sluggish, so is real estate. However, the cyclicality of the economy can have varying effects on different types of real estate. For example, if an REIT has a larger percentage of its investments in hotels, they would typically be more affected by an economic downturn than an REIT that had invested in office buildings. Hotels are a form of property that is very sensitive to economic activity due to the type of lease structure inherent in the business. Renting a hotel room can be thought of as a form of short-term lease that can be easily avoided by hotel customers should the economy be doing poorly. On the other hand, office tenants generally have longer-term leases that can't be changed in the middle of an economic downturn. Thus, although you should be aware of the part of the cycle the economy is in, you should also be cognizant of the real estate property's sensitivity to the economic cycle (Joseph Nguyen, 2011).

2.4 Summary of Literature Reviews

All of the described theories have shortcomings in some aspect. These limitations are based on the theories' various assumptions which are necessary to understand the diverse aspects of economic influence and change. The most inclusive of these theories is the loanable funds theory and as such it is the choice of financial practitioners. The loanable funds theory includes many of the various factors that influence our markets. Because of the variety of influences included in the theory, any failure can be attributed to imbalances in the equilibrium of savings and investment, money supply and demand, the supply of loanable funds, or net foreign demand and exports.

Increased spending on infrastructure by the government and stable legal provisions. Within Nairobi and the coastal resort towns, including other areas like the Kenya's Rift Valley and its western frontier, good roads, access to financial services, utilities, and effective means of communication, are largely influencing improved growth of real estate within these areas. Effects of the forces of demand and supply. Recent report by the Kenya National Bureau of Statistics, shows that demand for real estate in the urban areas in the last ten years, exceeded supply by more than five times. This is quite an issue because more citizens, members of staff various diplomatic missions and UN agencies, foreign companies and multinationals increasingly look for top-notch homes from where they can easily access public amenities.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methods and procedures used in this research. The chapter covers the research design, population, sampling method, data collection methods and data analysis technique.

3.2 Research Design

This refers to the nature and outlook of the type of research applied. The overall objective is to find out the impact of interest rates on Real Estate Market. A descriptive research design was used to obtain information concerning the current status of the problem. It describes what exists in a situation (Key, 1997). Quantitative techniques were used since the study focused on statistical and quantitative assessment of growth of the real estate market as proxied by the investments in real estate sector.

3.3 Population

The population of was the real estate industry or market in the country ranging from the large real estate developers of the small-scale, individual investors.

3.4 Data Collection Methods

The nature of data collected is numerical since it comprises of quantitative data. The source of data was the real estate report from KNBS and Hass Consulting firm. The data collected consist of quarterly report of the real estate investment in Kenya Shillings,

financial institutions weighted average lending interest rates as adapted by CBK, GDP and inflation rates.

3.5 Data Analysis Technique

Data analysis consisted of quantitative measures. This was done using descriptive statistics i.e. mean, standard deviation, minimum and maximum values. This was used to show the distribution in the data so collected. To accomplish this, Statistical Package for Social Sciences (SPSS) was used.

Multiple linear regression model was used in measuring each variable and this model helped in bringing out the effects of interest rates volatility on real estate growth. The regression model was of the form:

$$\mathbf{Ln\ (y) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e}$$

Where,

y= Dependent variable (Growth of Real Estate as measured by natural logarithm of the quarterly investments in real estate)

α= regression constant,

$\beta_1 - \beta_3$ = Regression coefficients (change in y for every unit change in X)

X_1 = Annual Average Interest Rate Volatility

X_2 = Inflation

X_3 = natural logarithm of GDP

e = Error term

3.6 Measurement of Variables

3.6.1 Interest Rates Volatility

An interest rate is the rate at which interest is paid by borrowers for the use of money that they borrow from a lender. This includes lending interest rate for general loans and mortgages. The volatility of interest rate will be represented by the monthly realized volatility. The below formula will be used to calculate the realized volatility.

Vol Formula:

$$Vol = 100.\sqrt{(12/n\sum R_t^2)}$$

Where:

Vol = Realized volatility

12 = a constant representing the months in a year

t = a counter representing each month

n = number of months in the measurement time frame

Rt = continuously compounded monthly change in interest rates as calculated by the formula:

$$R_t = Ln\frac{P_t}{P_{t-1}}$$

Where:

Ln = natural logarithm

Pt = interest rate of month t

Pt–1 = interest rate of the immediately preceding month t (Alexander, 1998)

3.6.2 Inflation

This is a general increase in prices of commodities. Measured using a price index usually the consumer price index (CPI) based on a representative basket of goods and services.

The Consumer Price Index, for example, uses data collected by surveying households to determine what proportion of the typical consumer's overall spending is spent on specific goods and services, and weights the average prices of those items accordingly. Those weighted average prices are combined to calculate the overall price. The quarterly inflation is expressed in relation to the base year price.

Annual percentage rate of inflation = $CPI_2 – CPI_1 / CPI_1 * 100$

3.6.3 GDP

Measures the size of an economy adjusted for price changes and inflation. It measures in constant prices the output of final goods and services and incomes within an economy. Calculated as prices in the base year multiply by quantities in the current year.

CHAPTER FOUR

DATA FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the data findings on effect of interest rate volatility on the growth of real estate market by analyzing how volatility impacts on investment in real estate industry. This relationship was moderated by macroeconomic aggregates; GDP and inflation rate. The quarterly data was collected from the CBK and Kenya National Bureau of Statistics (KNBS) reports between 2008 and 2012 and analyzed using Excel and SPSS (version 17).

4.2 Descriptive Analysis

Interest rate was looked at by establishing the variability of the average lending rate. The summary statistics presented inn Table 4.1 from the appended data (Appendix I), shows that the average quarterly investment in real estate was Ksh19.6 billion with maximum and minimum values of Ksh23.6 and Ksh16.3 billion respectively. Within the same period, the maximum interest rate was 20% and minimum value was 14% with an average of 15%.

Table 4.1: Descriptive Data

Statistics	Real Estate (Mn)	Interest Rate	GDP (Mn)	Inflation Rate
Mean	19,587	15	368,849	11
Standard Deviation	2,161	2	29,976	5
Minimum	16,304	14	322,884	3
Maximum	23,577	20	424,886	19

The findings presented in Figure 4.1 show that the interest rate was almost constant at 15% between 2009 and second quarter of 2011. There was high variability in interest rates within the last quarter of 2011 (September and December) before maintaining an all time high of 20% then dropping in the last quarter of 2012. This could owe to the monetary policy adopted by CBK following the Kenya shilling depreciation of 2011.

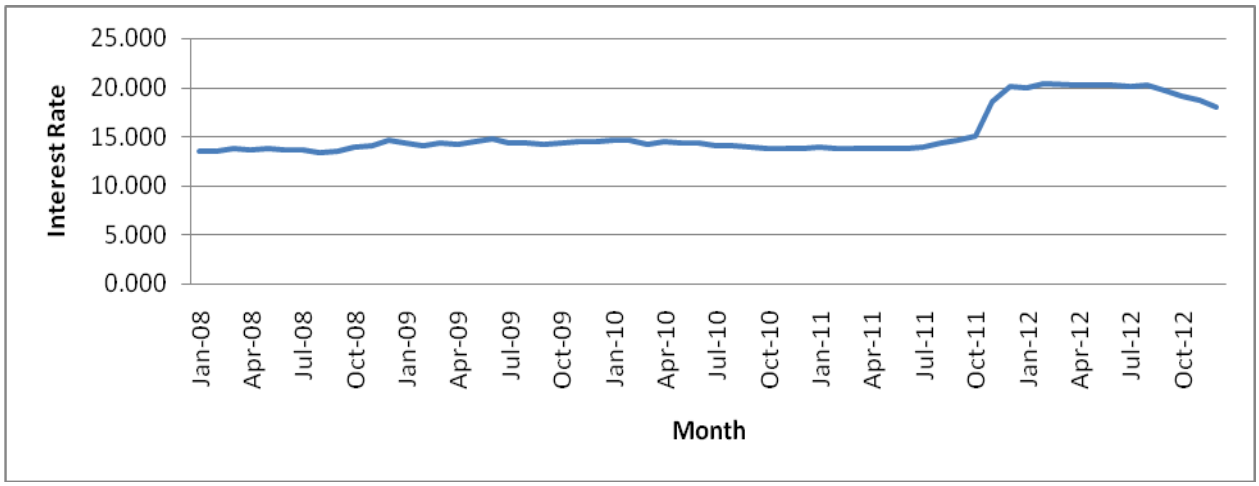

Figure 4.1: Interest Rate

4.2.1 Interest Rate Volatility and Real Estate

The relationship between intrest rate and growth of real estate market was compared by looking at the trend in interest rates (in percentage) and investments in real estate (in Ksh. Bilion). Figure 4.2 shows that while interest rate was near constant between 2008 and

2011, investment in real estate was predictably erratic with the third quarter of every year experiancing low investment while high investment was in the second quarter. This tradend did not change in 2012 despite the increase in and volatility intterest rate.

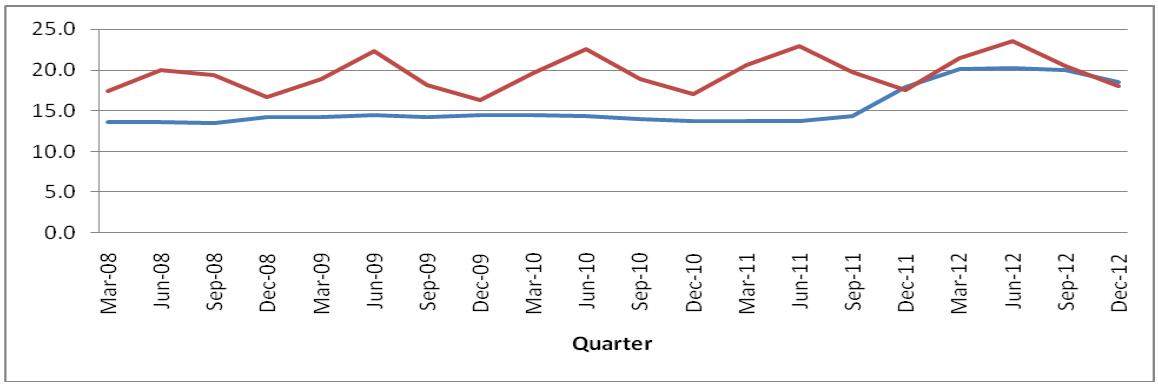

Figure 4.2: Interest Rate and Real Estate

4.2.2 Correlation Analysis

The study used correlation to establish the relationship between interest rate and growth in real estate market. Pearson Correlation analysis was used to achieve this end at 95% ($\alpha = 0.05$) confidence level.

Table 4.2 shows that at 95% confidence level, there were: very good, significant and negative correlation between interest rate volatility and growth in real estate ($R = -0.780$; $p = .02$) in 2008, ($R = -0.873$; $p = .027$) in 2011 and ($R = -0.948$; $p = .032$); very good, significant and positive correlation between interest rate volatility and growth in real estate ($R = 0.923$; $p = .047$) in 2009 and ($R = 0.698$; $p = .002$) in 2010.

Table 4.2: Correlation - Interest Rate Volatility and Real Estate Investment

Test		LN(Real Estate)				
		2008	**2009**	**2010**	**2011**	**2012**
Interest Rate Volatility	Pearson Correlation	-.780	.923	.698	-.873	-.948
	Sig. (2-tailed)	.020	.047	.002	.027	.032
	N	4	4	4	4	4

4.3 Regression Analysis

In determining the relationship between dependent (real estate growth) and independent (interest rate volatility), the study used multiple regression analysis:

Ln (Real Estate) = $\beta_0 + \beta_1$* Interest Volatility + β_2*GDP + β_3*Inflation + ε

Where β_0 is regression constant for the y-intercept, β_1 to β_3 are regression coefficients and ε is error term. In fully determining this relationship, the regression model was moderated by incorporating intervening variables – GDP and inflation rate.

In order to determine the goodness of fit of the regression equation, the study used correlation coefficient between the overall independent variables and growth in real estate. Coefficient of determination established the strength of the relationship between the two variables. From the determination coefficients in Table 4.3, it can be noted that there is a very good linear relationship between dependent and independent variables given a Pearson correlation value of 0.807. Determination coefficient value of 0.651 and 0.576 when adjusted shows that the independent variables could account for 57.6% of the variability in the growth of real estate market.

The study also used Durbin Watson (DW) test to check that the residuals of the models were not auto correlated since independence of the residuals is one of the basic hypotheses of regression analysis. Being that the DW test statistic was close to the prescribed value of 2.0 (1.793) for residual independence, it can be concluded that there was no autocorrelation

Table 4.3: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.807[a]	.651	.576	.11363	1.793

a. Predictors: (Constant), Inflation, LN(GDP), Interest rate Volatility
b. Dependent Variable: LN(Real Estate)

Analysis of Variance (ANOVA) was used to make simultaneous comparisons between two or more means; thus, testing whether a significant relation exists between variables (dependent and independent variables). This helps in bringing out the significance of the regression model. The ANOVA results presented in Table 4.4 shows that the regression model has a margin of error of 0.043. This indicates that the model has a probability of 4.3% of giving false prediction which points to the significance of the regression model.

Table 4.4: Analaysis of Variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.021	3	.007	.554	.043b
Residual	.207	16	.013		
Total	.228	19			

a. Predictors: (Constant), Inflation, LN(GDP), Interest rate Volatility
b. Dependent Variable: LN(Real Estate)

From the finding in Table 4.5, multiple linear regression equation was:

Real Estate = 17.896 - 0.073*Interest Rate Volatility + 0.217*GDP Growth +
0.004*Inflation Rate

The results shows that when interest rate volatility, GDP growth and inflation rate are zero, growth of real estate market would be 17.896. This means that the investors would invest approximately Ksh59 million in the real estate.

It was further established that a unit increase in interest rate volatility while holding other factors, inflation rate and GDP growth, contestant will lead to a 0.073 (p = .017) decrease in real estate growth. Holding other factors, interest rate volatility and inflation rate, constant, a unit increase in GDP will lead to a 0.217 (p = .037) increase in the growth of real estate market. A unit increase inflation rate while holding GDP and interest rate constant will lead to a 0.004 (p = .049) increase in the growth of real estate market.

Table 4.5: Model Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**	**Collinearity Statistics**	
	B	**Std. Error**	**Beta**			**Tolerance**	**VIF**
(Constant)	17.896	9.967		1.796	.191		
Interest Rate Volatility	-.073	.057	-.372	-1.284	.017	.676	1.480
LN(GDP)	.217	.374	.159	.580	.037	.752	1.330
Inflation	.004	.006	.192	.697	.049	.750	1.333

a. Dependent Variable: LN(Real Estate)

Multicollinearity diagnostics was used to determine whether the independent variables had relationships among themselves; that is, if two or more predictor (independent) variables in the multiple regression model are highly correlated. The study used tolerance

and variance inflation factor (VIF) values for the predictors as a check for multicollinearity. Tolerance indicates the percent of variance in the independent variable that cannot be accounted for by the other independent variable while VIF is the inverse of tolerance. Table 4.5 shows that tolerance values ranged between 0.676 and 0.752 while VIF values ranged between 1.33 and 1.480. Since tolerance values were above 0.1 and VIF below 10, then were was no multicollinearity in the model.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the results of the study and the main conclusions drawn from the analysis of the data in Chapter Four. The chapter is organized as follows. Section 5.2 presents the summary of the findings of the study while section 5.3 is the conclusion. Section 5.4 discusses the policy implications arising from the results of this study. Lastly, section 5.5 presents the recommendations for further research.

5.2 Summary of the Findings of the Study

The general objective of this study was to analyze interest rate volatility and real estate market in Kenya for the period starting January 2008 to December 2012. Firstly, the results from the data analysis strongly suggest that the interest market has experienced low volatility. Thus, volatility in the interest market is predictable, at least in the short run. The evidence strongly indicates that the interest rate market is nonlinear.

Secondly, there are seasonal patterns in investment in the real estate market. Growth in the real estate market display seasonal patterns with low investment around fourth and last quarter of every year. High investment is experienced in the second quarter of every year. Seasonality may reflect the economy-wide events such as reading of the government budget and the tourism season, the institutional arrangements within the

market as well as the December holidays where people concentrate on being merry and less about investments.

Third, the results show that the term structure of the risk premiums rises with the investment horizon. Thus, as the investment horizon rises from one month to twelve month, the risk premiums demanded also increase to reflect the increasing exposure to risk at longer maturities. This suggests that the yield curve is upward sloping. When short-term risk premiums are rising, longer-term risk premiums are also rising. Therefore, the yield curve typically shifts upward or downward each week or month instead of twisting or rotating about some point along the yield curve.

5.3 Conclusions

Demand real estate in Kenya grows exponentially despite the volatile interest rate, by close to two per cent in the last four months of 2012, despite tightening liquidity through CBK's monetary policies. Real estate has defied economic fundamentals such as higher interest rates, spiraling inflation (which nearly hit 20 per cent in 2011, but is now on a retreat), and a weak shilling. Within the same year prices for everything increase erratically, ranging from land, construction materials, to interest rates.

The increase in growth of real estate market despite the high interest rate could owe to the price inelastic demand for housing owing to economic disparity in the country. While low income earners, who are majority, are pushed away to less glossy and crowded homes where survival supersedes luxury, the upper middle income purchase of housing units is on the upward spiral. The underlying reason is that Kenya is a hub for multinationals and international organizations like the United Nations whose staff often take up executive

apartments and stand-alone units, and have helped to push up not just demand, but prices too. Additionally, Kenya's middle class is among the fastest growing in Africa, buoyed by a rebound in earnings from a growing economy.

5.4 Recommendations

The study recommends that investors should consider investing in real estate market despite the erratic interest rate. This owes to the virility of the real estate industry in Kenya as it has withstood market turbulence and changes in the macroeconomic environment. This is also helped by the increased demand of housing in the country which stood at annual deficit of 120,000 housing unit. A burgeoning middle-income population presents the biggest market for real estate investors in East Africa's biggest economy. Besides this, 60 per cent of households are 'inadequately housed' most of them located in slums.

Real estate market is bullish about the future owing to increase in urbanization in the entire continent with Kenya's urbanization growing at 10%. According to Kariuki (2013), Africa's population is growing at 2.4 per cent a year and it is estimated that, by 2030, half of the continent's people will be living in cities. The Kenya's workforce will reach double by 2040 and this is expected to push up the demand for urban housing (ibid).

5.5 Limitations of the Study

The researcher encountered various limitations that may have affected the findings of this study. For instance, the study relied on secondary data sources. Secondary data can, however, be unreliable as they are intended for other purposes. This could include

convincing external stakeholders that the business performs well. To curb this, the study sought reports from KNBS and CBK.

The sample for this study might have been small and could have the drop-back of not being representative of the population reality. To mitigate this, the researcher carried the study on all the real estate investors. Further, other factors might have effect on the real estate investments like regulation, foreign exchange and political environment which might moderate the relationship between interest rate and real estate growth. In cognizance of this, the study tested the significance of the established relationship to mitigate this. In addition, information on real estate investment is sensitive and access to such information proves a challenge. Gichuhi (2012) states that Kenya's real estate sector has scored poorly in a global property markets transparency rankings over unreliable data despite emerging fourth best in Africa.

5.6 Suggestions for Further Research

Further studies can be done by incorporating other variables, though qualitative, that affects the performance. These could include: housing demand, government regulations and incentives, speculations, political environment among others. This would help complete the study's findings. Further, another study can be done on the effect of foreign exchange volatility or foreign direct investment on the growth of real estate market. This would be in line with Kamau (2013) assertion that Kenya's real estate market is the most lucrative in Africa and attracts investors from China, India, London, Italy and South Africa. These foreign investors source cheaper financing from outside Kenya and benefit big, given that house prices will keep rising due to high demand and inadequate supply.

Follow up studies can also be done in future to determine this relationship; between interest rate volatility and real estate growth. This owes to changes in macroeconomic fundamentals occasioned by constitution of Kenya 2010. This ranges from establishment of Lands Commission and County governments. Implementation of county governments might create positive growth in the property sector both commercial and residential and appetite for mortgage growth in future as developers begin implementation of projects. On the other hand, the established counties might delay approvals as new counties settle down, most of the existing local government authorities are destabilized therefore delaying new projects implementation (Kariuki, 2013). Additionally, Tax on Rental properties may reduce the attractiveness of the buy-to-rent or build-to-rent properties quite significantly for some, as the taxes will reduce the income due to investors.

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APPENDICES

Appendix I: Descriptive data

Year	Quarter	Real Estate (Mn)	Interest Rate Volatility	GDP (Mn)	Inflation
2008	Quarter 1	17,439	13.639	322,884	10.5
2008	Quarter 2	19,960	13.710	326,704	17.4
2008	Quarter 3	19,436	13.538	357,640	15.9
2008	Quarter 4	16,668	14.244	350,036	16.6
2009	Quarter 1	18,875	14.233	342,820	14.1
2009	Quarter 2	22,318	14.475	332,800	10.6
2009	Quarter 3	18,178	14.314	364,423	9.8
2009	Quarter 4	16,304	14.466	354,344	8.0
2010	Quarter 1	19,630	14.474	347,736	5.5
2010	Quarter 2	22,532	14.423	352,973	3.7
2010	Quarter 3	18,889	14.042	390,817	3.3
2010	Quarter 4	17,038	13.796	383,776	3.8
2011	Quarter 1	20,666	13.842	364,581	7.0
2011	Quarter 2	22,925	13.782	365,496	13.2
2011	Quarter 3	19,725	14.343	406,451	16.5
2011	Quarter 4	17,571	17.920	403,383	19.2
2012	Quarter 1	21,450	20.183	379,518	16.9
2012	Quarter 2	23,577	20.280	381,753	11.8

2012	Quarter 3	20,509	20.015	424,886	6.4
2012	Quarter 4	18,046	18.602	423,959	3.5

Appendix II: Correlation Analysis

Year = 2008

		LN(Real Estate)	Interest rate Volatility	LN(GDP)	Inflation
LN(Real Estate)	Pearson Correlation	1	-.780*	-.050	.409
	Sig. (2-tailed)		.020	.950	.591
	N	4	4	4	4
Interest rate Volatility	Pearson Correlation	-.780*	1	.593	.180
	Sig. (2-tailed)	.020		.407	.820
	N	4	4	4	4
LN(GDP)	Pearson Correlation	-.050	.593	1	.480
	Sig. (2-tailed)	.950	.407		.520
	N	4	4	4	4
Inflation	Pearson Correlation	.409	.180	.480	1
	Sig. (2-tailed)	.591	.820	.520	
	N	4	4	4	4

*. Correlation is significant at the 0.05 level (2-tailed).

Year = 2009.00

		LN(Real Estate)	Interest rate Volatility	LN(GDP)	Inflation
LN(Real Estate)	Pearson Correlation	1	.923*	-.769	.410
	Sig. (2-tailed)		.047	.231	.590
	N	4	4	4	4
Interest rate Volatility	Pearson Correlation	.923*	1	-.940	.340
	Sig. (2-tailed)	.047		.060	.660
	N	4	4	4	4
LN(GDP)	Pearson Correlation	-.769	-.940	1	-.459
	Sig. (2-tailed)	.231	.060		.541
	N	4	4	4	4
Inflation	Pearson Correlation	.410	.340	-.459	1
	Sig. (2-tailed)	.590	.660	.541	
	N	4	4	4	4

*. Correlation is significant at the 0.05 level (2-tailed).

Year = 2010.00

		LN(Real Estate)	Interest rate Volatility	LN(GDP)	Inflation
LN(Real Estate)	Pearson Correlation	1	.698**	-.682	.049
	Sig. (2-tailed)		.002	.318	.951
	N	4	4	4	4
Interest rate Volatility	Pearson Correlation	.698**	1	-.620	.807
	Sig. (2-tailed)	.002		.380	.193
	N	4	4	4	4
LN(GDP)	Pearson Correlation	-.682	-.620	1	-.720
	Sig. (2-tailed)	.318	.380		.280
	N	4	4	4	4
Inflation	Pearson Correlation	.049	.807	-.720	1
	Sig. (2-tailed)	.951	.193	.280	
	N	4	4	4	4

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

Year = 2011.00

		LN(Real Estate)	Interest rate Volatility	LN(GDP)	Inflation
LN(Real Estate)	Pearson Correlation	1	-.873	-.787	-.603
	Sig. (2-tailed)		.027	.213	.397
	N	4	4	4	4
Interest rate Volatility	Pearson Correlation	-.873	1	.618	.705
	Sig. (2-tailed)	.027		.382	.295
	N	4	4	4	4
LN(GDP)	Pearson Correlation	-.787	.618	1	.848
	Sig. (2-tailed)	.213	.382		.152
	N	4	4	4	4
Inflation	Pearson Correlation	-.603	.705	.848	1
	Sig. (2-tailed)	.397	.295	.152	
	N	4	4	4	4

Year = 2012.00

		LN(Real Estate)	Interest rate Volatility	LN(GDP)	Inflation
LN(Real Estate)	Pearson Correlation	1	-.948*	-.791	.714
	Sig. (2-tailed)		.032	.209	.286
	N	4	4	4	4
Interest rate Volatility	Pearson Correlation	-.948*	1	.554	-.485
	Sig. (2-tailed)	.032		.446	.515
	N	4	4	4	4
LN(GDP)	Pearson Correlation	-.791	.554	1	-.925
	Sig. (2-tailed)	.209	.446		.075
	N	4	4	4	4
Inflation	Pearson Correlation	.714	-.485	-.925	1
	Sig. (2-tailed)	.286	.515	.075	
	N	4	4	4	4

*. Correlation is significant at the 0.05 level (2-tailed).