THE EFFECT OF INTEREST RATES ON RESIDENTIAL REAL ESTATE PRICING IN KENYA

BY

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF BUSINESS ADMINISTRATION, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI

2017

DECLARATION

This research project is my original work and has not been presented for a degree at any other university for examination.

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D61/85887/2016

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

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ACKNOWLEDGEMENT

I thank the Almighty God for his continued grace and infinite mercy that has enabled me to reach this far. Special thanks go to my supervisor Mr. James Karanja for his professional guidance, advice, inspiring remarks as well as suggestions and criticism without which, this undertaking would not have come to fruition. My gratitude also goes, to my moderator Mr. Herick Ondigo for the great contribution and support he provided during this period.

DEDICATION

This project is dedicated to my uncle Mr. Alex Ole Nkoyo whose love for education is invaluable, it was through his continued support that I got the energy and willpower to press on with the programme to completion, to my Aunt Cecilia and Grandmother Eunice for their words of Wisdom and prayers, Also to my sister Cynthia and late mother Lasoi. Lastly to all my friends King'ori, Collins, Edison, Fuad and Zainab for their full material, moral and emotional support, and constant encouragement that always kept me going.

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LIST OF ABBREVIATIONS

ARDL- Autoregressive Distributed Lag

CBK – Central Bank of Kenya

CBR – Central Bank Rate

CPI – Consumer Price Index

GDP – Gross Domestic Product

KNBS - Kenya National Bureau of Statistics

MPT - Modern Portfolio Theory

NHCK -National Housing Corporation of Kenya

RPGT- Real Property Gains Tax

RPI – Residential Property Index

SPSS - Statistical Package for Social Sciences

ABSTRACT

Housing remains to be a critical and essential sector for nearly all economies around the world as it has connections with several other sectors. Growth in the housing sector can directly lead to employment creation, growth of GDP and a change in the consumption patterns of the economy. Despite the real estate sector being one of the major sectors in Kenya's economy, it has largely been affected by erratic interest rates. The researcher sought to show case this outcome by demonstrating how interest rates affected the residential real estate prices in the period of study. This study employed a descriptive survey to ascertain and describe the features of the variables of interest in a situation. The study population comprised of all the residential real estates in Kenya. This study employed secondary data, where data on residential real estate pricing was extracted from the Hass Property Index, while data on interest rates, money supply and GDP growth was extracted from the CBK. The study employed quarterly data for a period of 10 years from 2007 to 2016. A simple regression model was used to analyze the data. The findings established that the relationship between interest rates and the residential property index is negative and insignificant while the relationship between economic growth and the residential property index is negative and significant. The findings indicate that the correlation between the residential property index and money supply is positive and significant while the relationship between inflation and the residential property index is positive and insignificant. The study concluded that the levels of interest rates have no significant effect on residential real estate prices. The study also concluded that residential real estate prices are significantly affected by inflation, economic growth and money supply. The study recommended that the government through the central bank of Kenya should institute policies to mitigate the effects of inflation, economic growth and money supply on residential real estate prices in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Housing remains to be a critical and essential sector for nearly all economies as it has connections with several other sectors. Growth in the housing sector can directly lead to employment creation, growth of GDP and a change in the consumption patterns of the economy. The demand for houses has increased substantially amongst individuals and households due to the increased levels of income and wealth. Houses are mostly supplied by builders, property developers and the various construction companies countrywide, these is in both the public and private sectors when analyzed in the context of supply and demand for housing units, particularly due to the scarcity of land in the urban areas (Singh *et al*., 2012).

Due to the rapid economic development in the last few years, the demand for residential housing has increased significantly in most urban areas in Kenya, leading to dramatic increase in the prices of houses both in small towns and major cities, but depending on specific locations. Land and house prices are escalating and hence making it difficult for most Kenyans including the middle-class to own a house. The economic theory states that, house price changes are characterized by the demographics and economics of a given region, such like population, inflation, GDP, housing finance, and the construction cost (Ong, 2013).

The real estate industry, much like any other industry, is constantly evolving. The key drivers for this sector range from the prospect for profitability to the changing face of building space complimented by the uncertainties encircling the sector.

However, the developers are unable to keep up with the rising demand for both residential and commercial property brought about by the increased rural-urban migration in the major towns. To some extent, this inability can be blamed on the absence of proper finance mechanisms, high interest rates, unavailability of loan capital, challenges in the supply of building materials, low-income levels, escalating costs of raw materials for building and land acquisition problems. Although the demand for affordable modern housing in Kenya is insatiable, the developers in this sector continue to experience a depressed sale-to-rental ratio on the houses they construct. The real estate developers face numerous challenges which including but not limited to high interest rates, low mortgage uptakes and high risks of default. This makes it difficult for them to sell off properties and raise capital to build new developments (Kimani and Memba, 2017).

1.1.1 Interest Rates

Interest rates can be referred to as the annual amount charged, usually articulated as a percentage of the amount borrowed. Variations in the rate of interest will impinge on the total cost of borrowing, and consequently the expenditures related to the borrowed funds. High interest rates discourage expenditure while low interest rates tend to encourage expenditure. Generally, the cost of borrowing funds will highly depend on the interest rates. That is, whenever the rates of interest are high the total cost of expenditures increases, and

whenever the rates of interest are lower the total cost of expenditures decreases. This implies that a slight change in the interest rates would bring about a notable change in the investment and consumption spending, and consequently the general demand (Muthaura, 2012).

Mortgage interest rates can be either fixed or floating. Every bank can have its own rate, since there are no standard rates that cut across the board for the floating interest rates. Generally, the interest rates are determined based on the profit margins, operating expenses and cost of funds. Most banks only issue mortgage loans on a floating rate basis, and as a result, most unsettled loans on mortgage are on floating rate basis. To mitigate market risk, a premium is added over and above the floating rates depending on the tenure of the loan. Based on the expected future behavior of interest rates and the prevailing floating rates, some banks can easily determine their fixed rates, while others consider the cost of funds as well as the provisioning conditions and peg them at a level where the outflow would not be affected by the revision. In most cases, fixed rate loans are not actually 'fixed 'because the rate can be adjusted from time to time depending on the prevailing rates (Singh *et al*., 2012).

1.1.2 Residential Real Estate Pricing

House prices, are just like the prices of many other assets and can be established by discounting all the expected future cash flows. When lending institutions offer loans at a lower rate, they increase the accessibility to credit hence encouraging current and future economic activities. The rate of interest has a profound influence on the prices of real estate

properties, and as a result, most potential investors in this sector concentrate on the volatility of interest rates. As they also influence capital accessibility and demand for investment. The inaccessibility of capital influences the demand and supply for property, hence, it affects the overall property prices (Ong, 2013).

Real estate markets are diverse, with a chain of geographical and sectoral sub-markets that lack a central trading market. The pricing process is customarily subject to negotiation while the market is characterized by large transaction costs. The present value of an existing asset (apartment) should supposedly be equivalent to net present value of its future cash inflows (rents), which depend on the anticipated real interest rates, expected growth in income, taxes, and other structural factors. In a competitive market, a balance between the demand and supply should determine the price. The ultimate equilibrium price is reached at the point where replacement cost is equal to the stock of existing real estate (Hilbers *et al.*, 2001).

A growth in house prices signifies an increase in demand and hence a market growth. Several factors drive the demand in the real estate market. As the demand for residential real estate goes up, the prices also go up and as a result, most investors would desire to increase their investment in real estate to satisfy the demand and thus it can be concluded that the real estate demand has a direct proportionality to real estate investments, and real estate prices. Many families in Kenya consider a house as a major investment representing over 30% of their wealth. Thus, house pricing is of paramount importance to them. Other

parties who may be interested with the house prices include the real estate developers, banks or lending institutions and policy makers (Karoki, 2013).

1.1.3 Interest Rates and Residential Real Estate Pricing

The real estate markets can highly be impacted by the volatility in interest rates. The ability of a person to purchase a residential property can be greatly affected by the interest rate volatility. This is because, when rates of interest drop, the overall cost of buying a house on mortgage is significantly reduced, consequently increasing the demand for real estate property, thus escalating the prices. On the contrary, a raise in the interest rate automatically increases the cost of acquiring a mortgage, consequently reducing the demand for real estate, and thus lowering their prices. Low interest rates would encourage buyers to acquire more homes as part of the money that would otherwise have been used to pay interest to the lender is available to them.

Such a scenario could attract new buyers into the market, leading to numerous offers/bids on houses and an uptake in the overall prices. The rate of interest has an enormous impact on the purchasing power of an individual to the extent that, a lot of people erroneously believe that the only determining factor in the valuation of real estate is the mortgage rate. Nevertheless, the mortgage rate is simply one of the many factors related to interest rates that influence property values. Property prices can be driven in different directions by interest rates, since they affect the demand and supply of capital, the required rate of return on investments, and capital flows (Karoki, 2013).

1.1.4 Real Estate Pricing in Kenya

The housing sector in Kenya can be characterized by a lack of reasonably priced and descent housing, widespread and inappropriate houses, including squatter settlements and slums, and a low urban house ownership. The NHCK plays a primary role in the execution of policies and programs relating to housing, through the development of service and site schemes, mortgage and rental housing.

Investment in infrastructure is mainly driven by economic development. In Kenya, infrastructure and real estate receive the biggest budget allocation. Mortgage financing is mainly provided by the Kenyan financial system through its intermediation role. Despite enormous opportunities in the sector, many people still use household savings to finance their real estate investments, this clearly indicates that funding is a major limitation. Mortgage finance is long-term unlike most other types of credit which are short-term in nature. Therefore, a strong mortgage market is required to satisfy these demands for long-term funding in this sector. The Government is committed to growing the real estate sector, as clearly articulated in the 2010 finance Bill, and the Vision 2030 blueprint. The Finance Bill delineates several measures to encourage the development of the real estate market. Particularly, to enable the construction of sufficient housing to Kenya's fast-growing population.(Muriuki, 2013).

1.2 Research Problem

The real estate sector is a major sector in Kenya's economy. Nonetheless, it has largely been affected by erratic rates of interest. The researcher sought to show case this outcome

by demonstrating how interest rates affected the residential real estate prices. The construction and purchase of real estate is capital intensive, and most ordinary Kenyans can't afford, hence they borrow from banks to fund this huge expenditure. The interest rates charged by all commercial banks are determined by the real interest rate, which mainly adjusts for inflation. Interest rates are majorly driven by inflation. The CBK has an obligatory role to supervise all the commercial banks and fix the base lending rate which accommodates all the economic factors. Based on the central bank rate (CBR), commercial banks and other lending institutions can then define their own lending rates or mortgage rates some basis points from CBK's lending rate (Muriuki, 2013).

Muthee (2012) sought to ascertain the correlation between economic growth and real estate prices in Kenya. He discovered that there exists a significant connection between house prices and the GDP. Basically, this relationship can be described by the fact that, as house prices drop, people may be less likely to purchase new houses for the fear that prices may continue to drop, subsequently leading to a decline in the demand for construction, mortgage lenders and any activities directly or indirectly related to housing.

Oremo (2012) analyzed the role of the government in the determination of the cost of borrowing and how it works towards enhancing the real estate industry. He discovered that both the public and private sectors should collaborate to better the investment atmosphere considering that Kenya's annual housing demand is higher than the supply. The government can considerably influence the cost of borrowing through its various actions and policies. The trading of government securities in the financial markets has a substantial

effect on the interest rates, supply of money, and credit availability. A huge purchase of Coffers by the CBK injects new funds into the banking system, which then increase the amount of money to lend out, thus forcing the interest rates to go down.

Many scholars in the developed countries have carried out various research works to determine the effect of interest rates on residential real estate properties and found contradicting outcomes which cannot be generalized or hold in all environments. It is for this reason therefore, that the researcher desired to answer some specific questions such as: - what is the effect of interest rates on residential real estate pricing in Kenya, and what is the effect of other macroeconomic factors on the residential real estate prices.

1.3 Research Objective

To establish the effect of interest rates on residential real estate pricing in Kenya.

1.4 Value of the Study

The study findings will add to the existing body of knowledge in the field of real estate valuation/pricing and form a footing for further research by other scholars in the future. The real estate brokers and agents will also obtain relevant information relating to real estate patterns and thus advise their clients accordingly. The results of this research will remain of foremost importance to the mortgage providers as they would use it to fine tune their loan advancement decisions to the real estate investors. Financial analysts would also obtain necessary information which can help them in advising their clients on matters relating to financial decisions.

The government and its agencies may as well use the outcomes of this report as a guideline in formulation and development of policies and procedures that relate to the real estate sector. The government would also be enlightened on the various approaches that real estate firms may adopt in determining the prices of properties and advice accordingly.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers the review of various literatures by other researchers regarding the real estate industry, and particularly the connection between interest rates and house prices. This chapter will also give an insight on the various theories that affect the real estate sector and interest rates. Recent empirical studies will also be highlighted, as well as a more elaborate insight into interest rate volatility and house prices in Kenya.

2.2 Theoretical Review

Several theories endeavor to elucidate on how the cost of borrowing affects most sectors of the economy, and how they can be employed to predict the future adjustments. The theories comprise of the portfolio theory, the loanable funds theory of interest rates, and the efficient market theory. For each of these theories an assumption is made about the behavior of the various elements of the economy, and concentrate on the conduct of the other elements that also play a part in the determination of the current interest rates.

2.2.1 Portfolio Theory

Harry Markowitz (1959) pioneered the MPT, which endeavored to model the benefits of creating diversification strategies for portfolio investments. The Markowitz model being a single-period model, suggests that an investor should form a portfolio at the start of the period with the main objective being to maximize the expected returns of the portfolio at a

given level of risk. When more securities are added to a given portfolio, the anticipated returns and standard deviation will vary in very special ways, based on the manner in which the added securities relate with the other securities in the portfolio. Feldman (2003) confirms that investments in real estate companies can significantly help to lower the total portfolio risk and greatly improve on the overall asset allocation efficiency. Many scholars have revealed based on this approach that including direct real estate to the other asset classes will significantly reduce the portfolio risk (Ouma, 2015).

Bruggerman and Fisher (2008) noted that every investor will consider adding real estate investment vehicles in an existing portfolio returns if it will result to an increase in the expected returns of the portfolio while lowering or maintaining the portfolio risk. In real estate, a portfolio may consist of offices, apartments, retail and industrial buildings. Apartments have low rent growth volatility and a small risk premium on sale hence a low volatility in the expected returns. Retail buildings have a low tenant capital obligation which can be used as an excellent return/risk tradeoff. Industrial buildings also have low tenant capital obligation which can help to offset volatile market rent growth patterns. Such a portfolio can benefit from stability in place dynamics. For this study, MPT will be applied to explain whether the construction or analysis of portfolios (diversification) affects the pricing of residential real estates.

2.2.2 Loanable Funds Theory of interest rates

The Loanable funds theory builds on the classical savings and investment theory. The main agreement of the loanable funds theory is that equilibrium interest rate in an economy is

determined at the point where the demand and supply for loanable funds are equal. In this case, the interest rate is the price of the loanable funds. The theory assumes that the loanable funds market is fully integrated with perfect mobility of capital. It also assumes that there is perfect competition, which makes borrowers and buyers price takers. In this theory, interest rate is determined using a partial equilibrium model in which all factors except interest rate are held constant. This means that the interest rates are the only macroeconomic factor that determines the supply and demand of loanable funds.

The contribution of loanable funds is determined by the aggregate savings in the economy, supply of money, and aggregate dishoarding of money. The demand for loanable funds is determined by gross investment expenditure and incremental demand for money (hoarding). Demand for loanable funds is a reducing function of interest rates. Thus, the factors which determine the demand and supply for loanable funds will lead to an equilibrium interest rate (Githinji, 2015). In this study, the lonable funds theory will be used to explain whether the availability of lonable funds (the amount of money available for borrowing) affects the interest rates and consequently the investment in residential real estate and in the production of goods and services.

2.2.3 Efficient Market Theory

This theory explains the various types of markets in terms of their efficiency to reflect the available information on stock prices. The theory assumes that, all assets are priced correctly and that there are no bargains is the market. Markets are viewed informational efficient only if the following set of data is readily available. Public data (semi strong

form), private data (strong form), and historical data (weak form), as a means of getting superior returns. However, real estate is not considered as being traded in an efficient market, simply because of high transaction costs, infrequent traded assets, and then the big players in the market having specific knowledge (not available in the public domain) of a market may take advantage and earn greater than normal returns, without violating any insider trading laws.

Levine and Zervos (1998) illustrated that by lowering information costs, financial intermediaries promote a more efficient resource distribution and thus encouraging technological innovation and growth in the long-run. Thus, if costs are high, fewer transactions will be undertaken by the firms in the market resulting in less implementation or investment in positive net present value (NPV) or viable projects resulting to less employment of the factors of production (capital and labour) and lower economic growth. For this study, the efficient market theory will be employed to explore whether the prices of residential real estate properties represent the true price, and whether the real estate market is efficient.

2.3 Empirical Review

The empirical review section will explore both the international and local studies which are related to the study topic.

2.3.1 International Studies

Nandago (2015) examined the factors that determine house prices in Namibia and their effects on housing affordability. The study employed the ARDL time series model. Results established that interest rates and gross domestic product are critical in explaining the short-run disparity in house prices. Ironically, inflation and money supply, which are very much related, were found not to have any influence on the prices of house in the short run. Though, in the long run, the independent variables embraced in the ARDL Error Correction Model were jointly found to have an effect on the prices of houses in Namibia. This implies that policies aimed at influencing the prices of house in the long run can essentially aim at one or more (combination) variables incorporated in the report.

Belej and Cellmer (2014) explored the effect of the macroeconomic factors on housing prices. They discovered in their study that the rapid changes in property prices were attributed to changes in the social and economic factors that influence the property market. The study used a multiple regression models to ascertain the correlation between control variables and the market state variable. The findings of the study implied that during phases of flux, the real estate market drives the economic and social changes.

Ong, (2013) examined the correlation between the macroeconomic variables and house prices in Malaysia, Particularly, whether the escalating tendency in the housing prices was linked to the variations in GDP, inflation rate, construction cost, population RPGT and the rate of interest. The paper was exploratory/investigative in nature. The data collected was from the Ministry of finance, department of Valuation and Property Services from 2001 to

2010.the findings were that the population, GDP, and RPGT were the major contributing factors of house prices.

Nevertheless, the housing price changes in Malaysia might not automatically be determined by the three factors. The study also concluded that the housing bubbles in the Malaysian property market are growing stronger and bigger. Shi, Jou, and Tripe, (2013) examined the effects of the adjustments in the retail mortgage rates and, the CBR on the price of houses in New Zealand for a period of 10 years between 1999 and 2009. The findings of the study revealed that, the policy rate was weakly related to real fixed mortgage rates, and strongly connected to the real floating mortgage rates. The rapid escalation of housing prices in New Zealand during the 2000's was related to exterior factors which contradict the housing market policy rate. This included the flexible domestic housing demands, and a promising taxation treatment on housing investment in the long-term.

Demewez (2011) investigated the effect of the rate of interest on the changes of house prices in Sweden. This study used the distributed lag model, regressions and correlation analysis, to investigate the effects interest rates have on house prices in each period. The outcomes of the study revealed that there exists an inverse correlation between the housing price index and the interest rates (repo rates, lending rates, mortgage bond rates, governmental bond rates). Regression coefficients indicated clearly that a slight decrease in the rate of interest will results to a given corresponding increase in the housing price index. Housing price index variations of above 92% were found to be justifiable by the alterations in the rate of interest, inflation rate, supply and net household disposable

income. The result also demonstrates the lag effects on variations in the interest rates on house prices.

2.3.2 Local Studies

Kieti and K'Akumu (2017) examined the factors that affect the affordability of mortgage houses in Kenya. The study used an empirical model to uncover the fundamental factors that affect the affordability of houses in Kenya. Through a multiple regression approach, the model indicated that the affordability of mortgage housing in Kenya is determined through a set of factors, which are associated to property attributes, the households' social-economic factors, loan characteristic, and the general macroeconomic environment. Particularly, loan-to-value ratio, the interest on mortgage, dependent relatives, type of mortgage instrument, size of household, the number of income earners in a household, and the real GDP per capita are the key factors affecting housing affordability in Kenya.

Ouma (2015) studied the effects of macroeconomic variables on the prices of real estate properties in Kenya. The study employed a descriptive research design, along with regression analysis to ascertain the correlation between macroeconomic variables and real estate prices. Secondary data was used in the study that covered a period of ten years; the study concluded that real estate prices are affected by the interest rates. The study also concluded that a growth in GDP will lead to a growth in real estate investment thus increasing the supply of houses and consequently lower the prices of real estate. Lastly, the study concluded that a strong positive correlation exists between the real estate prices, level of money supply and inflation.

Mwalili (2014) investigated the effects of macroeconomic variables on the residential real estate prices in Kenya. The researcher employed descriptive research design, Pearson's correlation analysis, and the ordinary least squares regression model. The study results revealed that commercial banks' lending rates had a significant negative effect on housing price index. Unemployment was a significant predictor of residential housing prices. Unemployment rate had a significant positive effect on residential housing price index. Further findings from the study revealed that real GDP had a substantial positive outcome on the prices of residential housing in Kenya. Lastly, the findings in regard to the effect of inflation on real estate property prices indicated that inflation has a significant influence on residential housing prices.

A study by Njoki (2014) examined the correlation between interest rates and the mortgage default rate among financial institutions in Kenya. The study employed a descriptive research design, and used a population of 44 commercial banks and a single mortgage financing company registered with the CBK. Secondary data from the CBK, KBS and published financial statements of Banks between 2009 - 2013 were used in the study. The data obtained was analyzed using multiple linear regression technique. The findings of the study revealed that there exists a positive correlation between the interest rates and the mortgage default rate, meaning that a rise in the rate of interest increased the number of non-performing loans. From the findings, averages for mortgage default rate for all the banks as obtained from the financial statements reflected an upward rise over the 5-year period.

Muriuki (2013) explored the effects of the volatility in interest rates on the growth of the real estate market in Kenya. He found out that the interest rates in each bank are determined by the real rate of interest which mainly adjusts for inflation. Interest rates are mainly driven by Inflation. In this analysis, a regression model was used, and the target population was the Kenyan real estate market ranging from the small scale individual investors to the large real estate developers. Data was collected from the Hass Consulting firm and from the KNBS for the period between 2008 and 2012. The findings of the study revealed that there was a low volatility in the interest market. Hence, they concluded that the interest market volatility can easily be predicted in the short-run. However, the proof clearly shows the non-linearity of the interest rate market.

Muthaura (2012) examined the correlation between interest rates and real estate investment in Kenya. A simple user cost model was used in the analysis of the study, with the entire population of 35 Banks which were providing mortgage as at November 2010, a sample of 18 banks was drawn from the entire population of 35. The results of the study indicated that, house prices are influenced by interest rates, and that most real estate investors, retail borrowers, and similar investors are compelled to raise the house prices to accommodate the borrowing cost and to break-even. The study recommended that the government should control interest rates through its relevant agencies such as the central bank and ensure a proper supervision of banks to prevent exploitation of lenders by commercial banks and stabilize the inflation rates through the implementation of harsh monetary policies.

2.4 Determinants of House Prices

House prices are to a considerable extent determined by the demand and supply forces, just like other product prices. The standard economic theory postulates that, when the demand exceeds supply, the prices go up.(Sabal, 2005)In his study on the residential property market in Spain, he found out that there are several factors affecting house prices such as economic growth, money supply, inflation, and population growth.

2.4.1 Economic Growth

Economic growth can be referred to the increase or decrease in per capita GDP or any other measure of total income, Economic growth is often measured by the rate of change in real GDP, and mainly focuses on the amount of services and goods produced in a country over a given period of time. GDP refers to the total monetary value of all the final goods and a service produced in a given economy each year, and is considered as a primary indicator in macroeconomics employed by many scholars while gauging the health of the country's economy. It is also considered a primary indicator because of the correlation between the housing price and the macroeconomic activities (Ong, 2013).

Economic growth is a long-term enlargement of the country's prolific potential and is measured using the GDP. It is also the expansionary effect of a country's output or income due to investment measures by various stakeholders. According to Schiller (2008), economic growth is the upsurge in the output of both goods and services produced in an economy. Thus, economic growth is the expanding of the county's economy.

The economic growth is measured by the GDP which is the aggregate demand (Expenditure approach) in the economy or the sum of consumption demanded (denoted as C), government spending (denoted as G) and investment demanded (denoted as I) assuming a closed economy (i.e. GDP=C+I+G). Further, he mentioned that economic growth is measured by the economic growth rate, derived by dividing the change in real output between two periods (period one and period two) with the base period's total output (x-y/x). This means that a change in GDP for two periods divided by base GDP would give the economic growth rate of the economy (Wachira, 2012).

2.4.2 Money Supply

Money supply or money stock can be referred to as the aggregate amount of liquid assets (usually cash) available in an economy exchangeable for services and goods at any given time (Juma M. I., 2014). Money supply is the aggregate amount of money circulating in an economy at a specific time. In most cases, money supply includes liquid assets such as cash, coins, time deposits of banks, balances held in checking and savings accounts, post office deposits and other related instruments that individuals and businesses can hold as short-term investments or use to make payments. An increase in money supply brings about a high inflation uncertainty which adversely impact on the real estate market. Investments may also be affected by the excessive growth in money supply which creates an inflationary environment consequently leading to higher discount rates (Liow *et al.*, 2005).

2.4.3 Inflation

Inflation can be referred to as the continued increase in the general prices of products (services and goods) over a given period (usually one year) in an economy. Githinji, (2015). Inflation arises when there is a continued upsurge in the general price levels of goods and/or services within a specified period. Thus, it cannot be calculated by considering the increase in the price of a specific good or service, or a few products or services. It is measured as an annual percentage increase. When inflation goes up, the purchasing power of the currency in an economy is eroded and therefore, an investor can only buy a smaller proportion of a good or service (Juma, 2014).

When an economy is experiencing a high inflation rate, the prices of most goods and services will dramatically escalate. The cost of building materials will also be affected by this increase, hence making it more and more expensive to build houses. A rise in inflation front loads the real payments on a long-term fixed-rate mortgage, and consequently reducing the number of housing. In general, it can be concluded that an increase in money supply brings about inflation and increase in house prices. (Ong, 2013).

2.4.4 Population Growth

Population growth is a rise in the total number of people living in a given country, county, state or city. The size of the population, rural urban migration and mortality rates are the key determinants of the total demand for property. Borowiecki (2009) discovered that the changes in residential house price were most sensitive to population growth in the Switzerland housing market. The last determinant is employment growth. Case and Shiller

(1990) study showed that changes in employment levels were effective in predicting house prices in the US. In the long run, demographic factors have been found to extensively influence the prices of housing. Population growth leads to an increased demand for housing in an economy, state, county, city or area and thus increased house prices. There exists a positive correlation between the housing demand and household income. The income elasticity of demand for housing in a country like Kenya is likely to be greater or equal to one. Thus, the demand for housing increases proportionately with income.

2.5 Conceptual Framework

A conceptual framework describes the relationship between the independent and dependent variables. The loanable funds theory purports that the equilibrium interest rate in an economy is determined at the point where the demand and supply for loanable funds are equal hence interest rates affect all sectors of the economy including the real estate sector. Therefore, the dependent variable of the study was the residential real estate pricing while the independent variables were the interest rates, Economic growth, money supply and inflation.

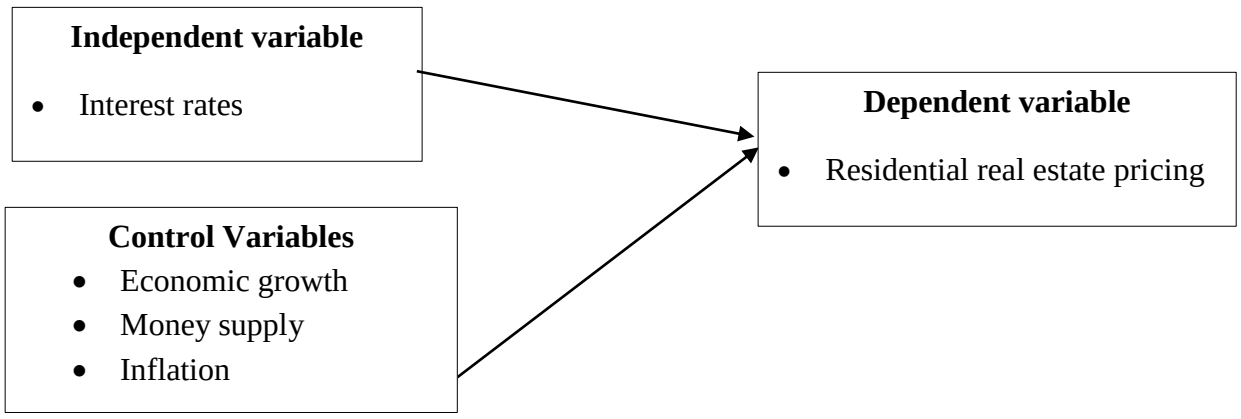

Figure 2.1 Conceptual Model

2.6 Summary of Literature Review

The theoretical literature on how interest rates affect property prices is inconclusive. The empirical literature indicates that a raise in the interest rate forces a rise in property prices to accommodate the inflated cost of borrowing. Nonetheless, the studies don't seem to include property buyers who purchase in cash and how increased inflation (which is a component of interest rate) affects their purchasing power. Generally, most studies insinuate that there has been a steady increase in the demand for property in Kenya over time. This forms the motivation of the study. It becomes important to ascertain the impact of interest rates on property prices in Kenya both in mortgage and cash.

In general, as discussed above different scholars among them Kieti and K'Akumu (2017), Ouma (2015), Nandago (2015), Mwalili (2014) and Ong, (2013) have pin pointed the various macroeconomic factors that influence house price dynamics. The major factors include Interest rates, level of money supply, GDP and inflation rates. Nevertheless, these scholars used different methods to carry out their research. The researcher intends to use an empirical analysis in the study as detailed in the next chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section explains the research methodology embraced in the study, the basis of sampling, data collection instruments, and the techniques of data analysis that were used in achieving the objectives of the study.

3.2 Research Design

This study employed a descriptive survey to ascertain and describe the features of the variables of interest in a situation (Yin, 2009).

3.3 Target Population

Population refers to the entire group of individuals, objects or events with similar features that conform to a given requirement (Mugenda & Mugenda, 2003). This study considered all the properties-standalone house/bungalows/ cottages/villas, town houses/maisionattes and apartments constituted in the Hass Property Index. This study adapted a census study of all the properties in the Hass Property Index. Efficiency was improved by a census, in that more information was obtained using the approach. The study population comprised of all the residential real estates in Kenya, hence a census study.

3.4 Data Collection

Data collection involves gathering experiential evidence to obtain new understandings concerning a given situation and answer questions that prompt undertaking of the study (Flick, 2009). This study employed secondary data, where data on residential real estate pricing was extracted from the Hass Property Index while data on interest rates, money supply and GDP growth was extracted from the CBK. The study employed quarterly data for a period of 10 years from 2007 to 2016.

3.5 Diagnostic Tests

Diagnostic test was carried out, to test the assumptions of the study model. This study also carried out tests on multicollinearity, normality and test of independence of observations (serial correlation). The study employed the Durbin Watson statistic to tests for serial correlation or autocorrelation while the variance inflation factors and tolerance levels were used to test for multicollinearity. Finally, normality was tested using measures of skewness and kurtosis.

3.6 Data Analysis

A descriptive and inferential statistics was used in data analysis to evaluate the correlation between the rate of interest and property prices in Kenya. A simple regression model analysis was used. Lionel and Khalid (1995) indicate that regression analysis is employed where a specific internal characteristic measure might have a substantial impact in a variant environment.

3.7 Tests of Significance

The F test statistics and ANOVA were used to determine the significance of the regression model. While on the other hand, the t-test statistic was used to test the significance of the regression coefficients. The significance tests were carried at 95% confidence level.

3.7.1 Analytical Model

The study employed a simple regression model:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where

Y = Residential real estate prices measured using the residential property index provided by Hassconsult.

X_1 = Interest rate measured using the quarterly interest rates

X_2 = Economic growth measured using the quarterly GDP

X_3 = Money supply measured using the quarterly amount of money supplied

X_4= Inflation measured using the quarterly consumer price index

β_o = Constant

$\beta_1 - \beta_4$ = Regression coefficients

ε = error term

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND INTERPRETATION

4.1 Introduction

This chapter entails the research results and the discussions of the results. The chapter outlines the descriptive statistics, correlations, regression results and the findings interpretations

4.2 Descriptive Statistics

4.2.1 Summary Descriptive Statistics

Table 4.1 Descriptive Statistics

	RPI	**Interest rates**	**Economic growth**	**Money supply**	**Inflation**
N	40	40	40	40	40
Mean	304.4583	15.7877	824287.60	1513156.80	125.47
Std. Deviation	74.89108	2.06813	134419.58	691402.042	29.035
Skewness	-.123	.738	.477	.341	.007
Kurtosis	-.741	-.277	-.834	-.905	-1.210
Minimum	175.30	12.87	633710.00	557650.00	78.46
Maximum	436.86	20.34	1094567.00	2761800.00	175.18

Source: Research findings

The descriptive statistics results on table 4.1 show that the mean value of the residential property index (RPI) is 304.45 and the minimum and maximum RPI is 175.3 and 436.86 respectively. The findings indicate that the average interest rate is 15.7877 and the minimum and maximum interest being 12.87 and 20.34 correspondingly.

The average GDP according to the table is 824,287.60 whereas the average amount of money supplied is 1,513,156.80 and the average inflation (CPI) is 125.47 respectively. The results also indicate that the data is normally distributed since the kurtosis and skewness values are within the recommended ranges of -1 and +1 respectively.

4.2.2 Trend Analysis

4.2.2.1 Residential Property Index

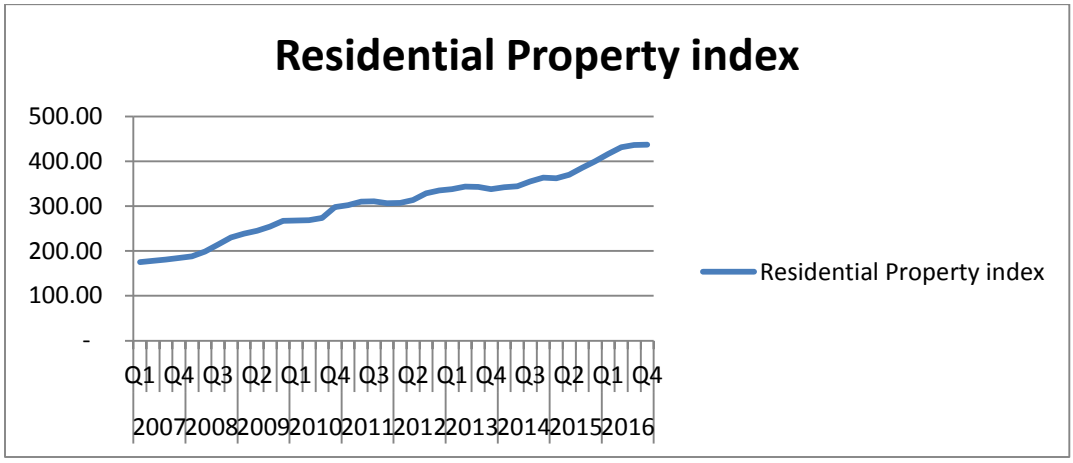

Figure 4.1 Residential Property Index

Source: Research findings

The residential property index graph indicates that the residential property prices in Kenya had been steadily increasing from 2007 to 2016.

4.2.2.2 Interest Rates

Figure 4.2 illustrates the interest rates trend. According to the figure the levels of interest rates in Kenya had been fluctuating from 2007 all through to 2016 with the highest increase being in 2012 and in quarter 1 and 2 of 2016.

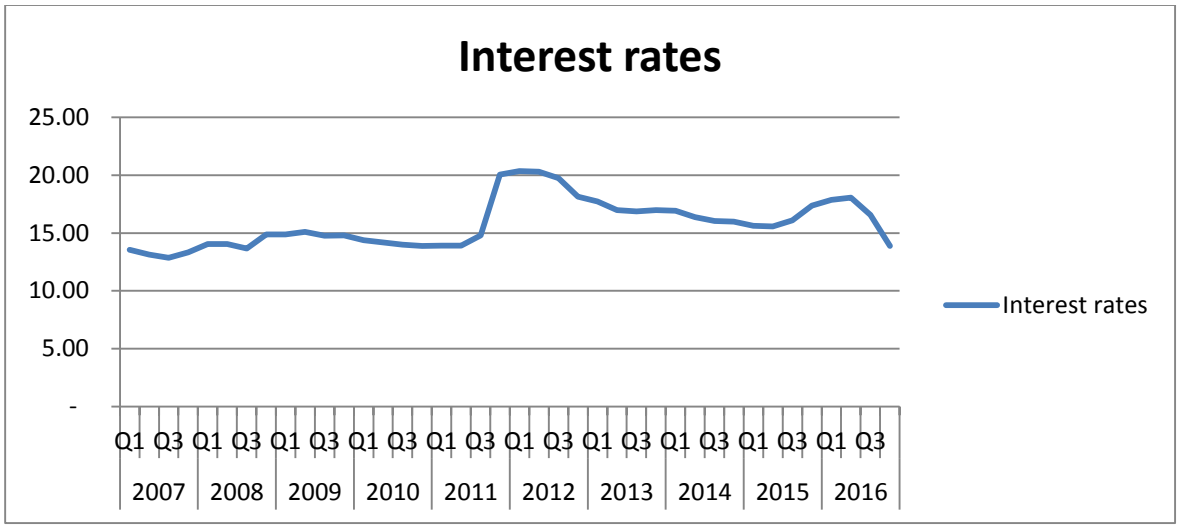

Figure 4.2 Interest Rate

Source: Research findings

4.2.2.3 Economic Growth

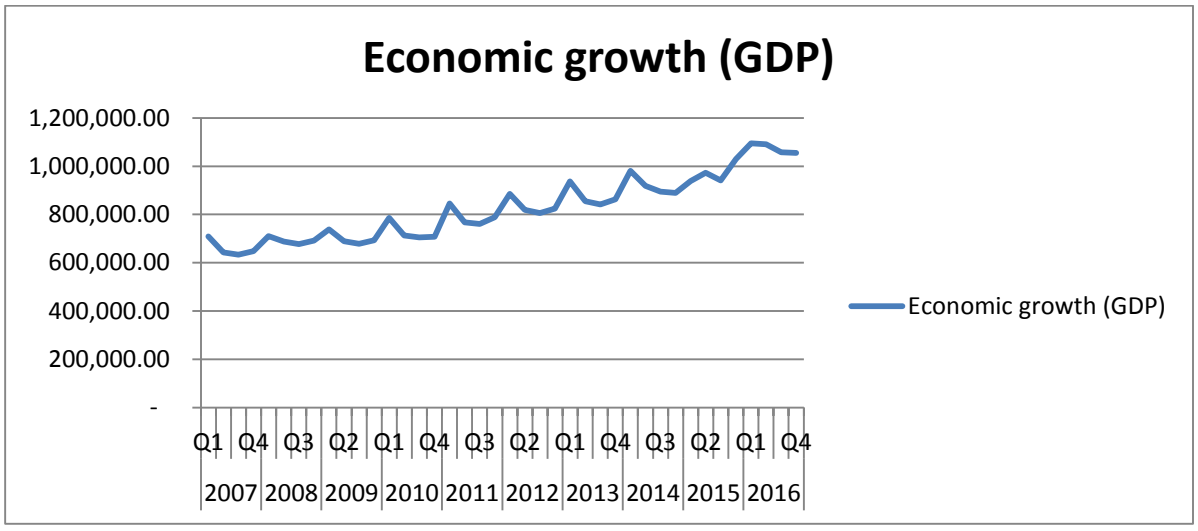

Figure 4.3 Economic Growth

Source: Research findings

Figure 4.3 illustrates that real GDP in Kenya had been fluctuating from 2007 all through to 2016 however falls and rises occurred in some quarters of some years.

4.2.2.4 Money Supply

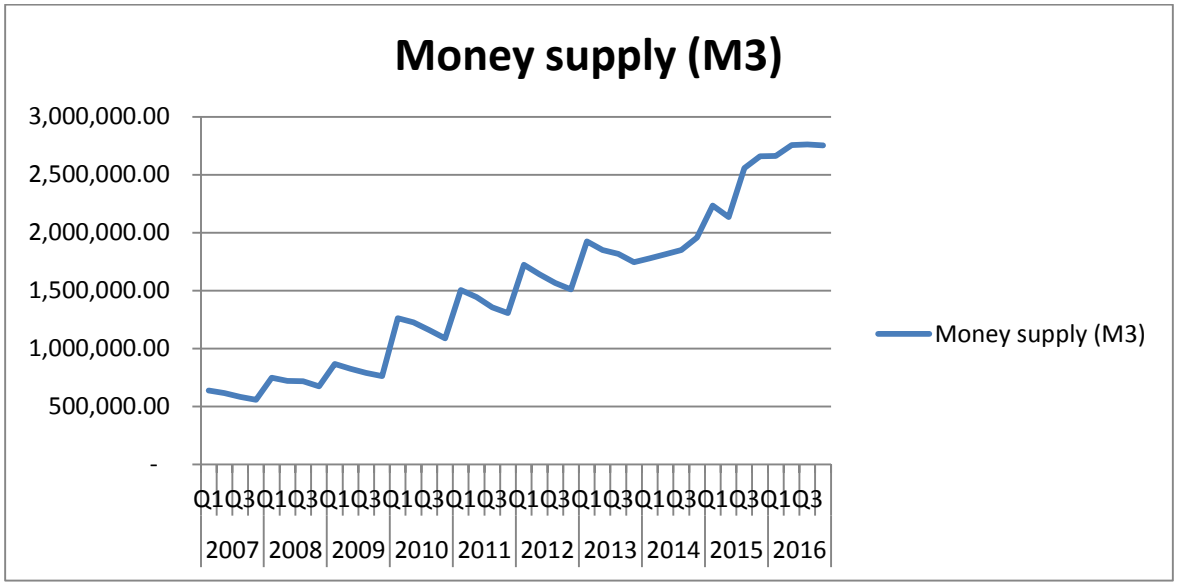

Figure 4.4 Money Supply

Source: Research findings

The trend of money supply in Kenya had been increasing steadily from 2007 all through to 2016 as indicated by figure 4.4 though declines and increases were witnessed in some of the quarters.

4.2.2.5 Inflation

Figure 4.5 on inflation as measured by the consumer price index (CPI), indicates that inflation levels had been rising from 2007 all through to 2016 in Kenya. This is an indication that the cost of living in the country has been increasing.

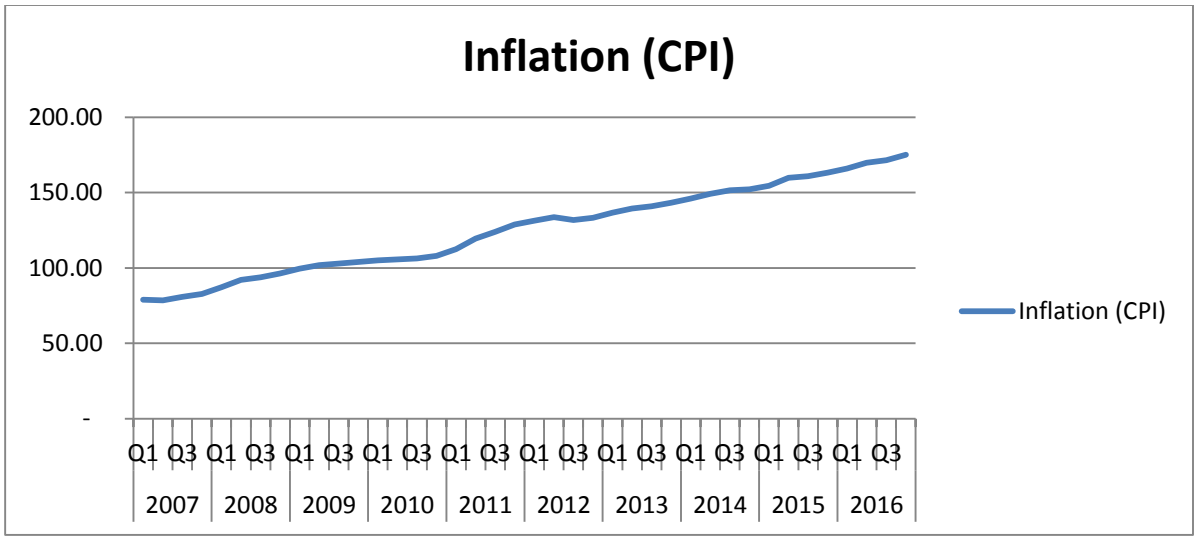

Figure 4.5 Inflation (CPI)

Source: Research findings

4.3 Correlation Analysis

Table 4.2 Correlation Matrix

	RPI	**Interest rates**	**Economic growth**	**Money supply**	**Inflation**
RPI	1				
Interest rates	.610**	1			
Economic growth	.500**	.578**	1		
Money supply	.566**	.607**	.947**	1	
Inflation	.680**	.647**	.933**	.571**	1

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

Source: Research findings

The correlation results signify that the correlations between the rates of interest, economic growth, money supply, inflation and the residential price index are strong and positive as indicated by correlation coefficients of 0.610, 0.500, 0.566, and 0.680 respectively. The

correlation coefficients are below 0.7 thus an indication that there is no multicollinearity among the variables.

4.4 Regression Analysis

4.4.1 Model Summary

Table 4.3 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.985[a]	.970	.967	.02084	1.674

a. Predictors: (Constant), Inflation, Interest rates, Economic growth, Money supply

b. Dependent Variable: RPI

Source: Research findings

The model summary results show that inflation, interest rates, economic growth, and money supply explain 97% of the variation in residential real estate property index, while 3% of the variation is accounted for by other factors not considered in the study. The Durbin Watson statistics lays within the recommended range of 1.25 and 2.5 thus an indication that there is no autocorrelation.

4.4.2 Analysis of Variance

Table 4.4 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.497	4	.124	285.905	.000[b]
	Residual	.015	35	.000		
	Total	.512	39			

a. Dependent Variable: RPI

b. Predictors: (Constant), Inflation, Interest rates, Economic growth, Money supply

Source: Research findings

The ANOVA findings on table 4.4 signify that the regression model is fit and significant as indicated by the **P** value of 0.000, which is lower than the significance value of 0.05. Therefore, the regression equation can be used to model the relationship between the variables.

4.4.3 Regression Coefficients

Table 4.5 Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	1.737	.654		2.656	.012		
Interest rates	-.076	.080	-.037	-.950	.349	.572	1.748
Economic growth	-.410	.152	-.249	-2.694	.011	.991	1.009
Money supply	.215	.074	.407	2.908	.006	.431	2.320
Inflation	.923	.144	.841	6.425	.000	.501	1.996

a. Dependent Variable: RPI

Source: Research findings

Based on the results on table 4.5 the following regression equation was derived

$$Y = 1.737 - 0.076X_1 - 0.410X_2 + 0.215X_3 + 0.923X_4 + \varepsilon$$

The coefficient results on table 4.5 indicate that the relationship between interest rates and the residential property index is negative and insignificant while the relationship between economic growth and the residential property index is negative and significant. The findings show that the correlation between money supply and the residential property index is positive and significant while the relationship between inflation and the residential property index is positive and insignificant. The variance inflation factors are 1.748, 1.009, 2.320 and 1.996 they are less than 10 hence an indication that there is multicollinearity.

4.5 Interpretation of the Findings

The study results found that the interest rates have a negative but insignificant effect on residential property index. This finding therefore shows that the correlation between the residential real estate prices in Kenya and interest rates is negative and insignificant. Muthaura (2012) however found that house prices are influenced by interest rates, and that most real estate investors, retail borrowers, and similar investors are compelled to raise the house prices to accommodate the borrowing cost and to break-even. Njoki (2014) also revealed that there exists a positive correlation between the interest rates and the mortgage default rate, meaning that a rise in the rate of interest increased the number of non-performing loans.

The research findings revealed that the economic growth has a negative and significant effect on residential property index. This finding therefore indicates that the correlation between the residential real estate prices in Kenya and economic growth is negative and significant. Kieti and K'Akumu (2017) the real GDP per capita are the key factors affecting housing affordability in Kenya. Ouma (2015) concluded that a growth in GDP will lead to a growth in real estate investment thus increasing the supply of houses and consequently lower the prices of real estate.

The findings of the research established that money supply has a positive and significant effect on residential property index. This finding shows that the correlation between the residential real estate prices in Kenya and money supply is positive and significant. Belej and Cellmer (2014) discovered in their study that the rapid changes in property prices were attributed to changes in the social and economic factors that influence the property market. Nandago (2015) however found that inflation and money supply, which are very much related, were found not to have any influence on house prices in the short run.

The findings of the research also established that the inflation has a positive and significant effect on residential property index. This finding shows that the correlation between the residential real estate prices in Kenya and inflation is positive and significant. Mwalili (2014) study on the effect of inflation on real estate property prices indicated that inflation has a considerable influence on residential housing prices.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter covers the summary of findings, study conclusions, and recommendations. In addition, the chapter also presents the limitations of the study and the suggestions for further research.

5.2 Summary

This study specifically sought to explore the effects of interest rates on residential real estate pricing in Kenya. The study adopted the portfolio theory, the loanable funds theory of interest rates, and the efficient market theory. The dependent variable of the study was the residential real estate pricing while the independent variables were the interest rates, economic growth, money supply and inflation. This study employed a descriptive survey and employed quarterly secondary data for a period of 10 years from 2007 to 2016. A simple regression model analysis was used to analyze data.

The descriptive results found that the mean value of the residential property index (RPI) was 304.45 and that the average interest rate is 15.7877 correspondingly. The average GDP according to the results was 824,287.60 and the average amount of money supplied is 1,513,156.80 while the average inflation (CPI) is 125.47 respectively. Trend analysis results revealed that residential property prices in Kenya had been steadily increasing from 2007 to 2016. The results also found that the levels of interest rates in Kenya had been

fluctuating from 2007 all through to 2016 and that real GDP in Kenya had been fluctuating from 2007 all through to 2016 however falls and rises occurred in some quarters of some years. The trend of money supply in Kenya had been increasing steadily from 2007 all through to 2016 while inflation levels had been rising from 2007 all through to 2016 in Kenya.

The results of correlation analysis found that the relationships between the rates of interest, economic growth, money supply, inflation and the residential price index are strong and positive. The model summary results show that inflation, interest rates, economic growth, money supply explain 97% of the variation in residential real estate property index. The ANOVA findings established that the regression model was fit and significant. The coefficient findings established that the relationship between interest rates and the residential property index is negative and insignificant while the relationship between economic growth and the residential property index is negative and significant. The findings show that the relationship between money supply and residential property index is positive and significant while the relationship between inflation and the residential property index is positive and insignificant.

5.3 Conclusions

The findings established that interest rates had a negative but insignificant effect on residential property index. The study therefore concludes that the correlation between the residential real estate prices in Kenya and interest rates is negative and insignificant. The study results revealed that economic growth has a negative and significant effect on

residential property index. The study therefore concludes that the relationship between the residential real estate prices in Kenya and economic growth is negative and significant.

The research findings established that the money supply has a positive and significant effect on residential property index. The study therefore concludes that the relationship between the residential real estate prices in Kenya and money supply is positive and significant. The findings of the research established that inflation has a positive and significant effect on residential property index. The study therefore concludes that the relationship between the residential real estate prices in Kenya and inflation is positive and significant.

5.4 Recommendations

The study based on the study findings concluded that the relationship between the residential real estate prices in Kenya and interest rates is negative and insignificant. The study recommended that the government through the central bank should ensure that the interest rates are stable since they may affect other macroeconomic variables, which may have significant effect on residential real estate prices in Kenya.

The study concluded that the correlation between the residential real estate prices in Kenya and economic growth is negative and significant. The study therefore recommends that the government and the central bank should make strategic policies that will facilitate economy growth and consequently boost housing in Kenya.

The research based on the results concluded that the relationship between the residential real estate prices in Kenya and money supply is positive and significant. The study therefore recommends that the central bank of Kenya should supply an optimal quantity of money to ensure the growth of residential real estates in Kenya.

Finally, the study concluded that the correlation between the residential real estate prices in Kenya and inflation is positive and significant. The research recommends that the Central bank and the government of Kenya should come up with effective monetary policies to mitigate the effect of inflation on residential real estate prices in Kenya.

5.5 Limitations of the Study

The main aim of this study was to assess the effect of interest rates on residential real estate prices in Kenya. As such, money supply, economic growth and inflation were incorporated as the control variables. However, the effect of other macroeconomic variables like exchange rates, foreign direct investments, unemployment, industrial production were not explored and did not form part of the study and part of the study conclusions and recommendations. Additionally, the study findings, conclusions and recommendations were based on quarterly secondary data from 2007 to 2016.

5.6 Suggestion for Further Research

The focus of this study was residential real estate prices in Kenya and how it is influenced by the rates of interest in Kenya. Additional, the study explored the effect of money supply, economic growth and inflation to assess their relationships. The study therefore

recommends a study where the effects of exchange rates, foreign direct investments, unemployment, and industrial production on residential real estate prices in Kenya will be determined. The study also recommends an additional study using monthly data and a longer period.

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APPENDICES

Appendix 1: Data for GDP per quarter

Year	Quarter	GDP (Ksh Mill)
2007	Q1	709,240.00
	Q2	643,248.00
	Q3	633,710.00
	Q4	647,553.00
2008	Q1	710,887.00
	Q2	687,316.00
	Q3	677,124.00
	Q4	691,916.00
2009	Q1	737,906.34
	Q2	688,912.00
	Q3	678,697.00
	Q4	693,523.00
2010	Q1	786,481.00
	Q2	713,363.99
	Q3	705,260.19
	Q4	707,158.87
2011	Q1	845,860.78
	Q2	767,418.00
	Q3	761,159.00
	Q4	789,245.00
2012	Q1	880,802.00
	Q2	853,430.00
	Q3	847,709.00
	Q4	862,398.00
2013	Q1	934,377.00
	Q2	917,617.00

	Q3	902,369.00
	Q4	892,495.00
2014	Q1	982,831.00
	Q2	972,665.00
	Q3	944,042.00
	Q4	942,493.00
2015	Q1	1,039,409.00
	Q2	1,026,857.00
	Q3	1,001,186.00
	Q4	994,079.00
2016	Q1	1,094,619.00
	Q2	1,091,052.00
	Q3	1,058,371.00
	Q4	1,055,045.00

Appendix 2: Data on Interest Rate

Year	Quarter	Average Interest rate
2007	Q1	8.00
	Q2	8.50
	Q3	8.75
	Q4	8.75
2008	Q1	8.75
	Q2	9.00
	Q3	9.00
	Q4	8.75
2009	Q1	8.38
	Q2	8.00
	Q3	7.75
	Q4	7.00
2010	Q1	7.00
	Q2	6.75
	Q3	6.38
	Q4	6.00
2011	Q1	5.88
	Q2	6.25
	Q3	6.63
	Q4	15.17
2012	Q1	18.00
	Q2	18.00
	Q3	14.75
	Q4	11.00
2013	Q1	9.50
	Q2	8.50
	Q3	8.50
	Q4	8.50

2014	Q1	8.50
	Q2	8.50
	Q3	8.50
	Q4	8.50
2015	Q1	11.50
	Q2	11.50
	Q3	9.00
	Q4	11.50
2016	Q1	**11.50**
	Q2	11.50
	Q3	10.00
	Q4	10.00

Appendix 3: Inflation

Year	Quarter	CPI
2007	Q1	78.90
	Q2	78.46
	Q3	80.90
	Q4	82.68
2008	Q1	87.18
	Q2	92.14
	Q3	93.75
	Q4	96.38
2009	Q1	99.50
	Q2	101.91
	Q3	102.90
	Q4	104.07
2010	Q1	105.01
	Q2	105.65
	Q3	106.32
	Q4	108.07
2011	Q1	112.41
	Q2	119.56
	Q3	123.88
	Q4	128.81
2012	Q1	131.36
	Q2	133.63
	Q3	131.78
	Q4	133.35
2013	Q1	136.72
	Q2	139.46
	Q3	140.99
	Q4	143.25

2014	Q1	145.99
	Q2	149.27
	Q3	151.62
	Q4	152.09
2015	Q1	154.48
	Q2	159.71
	Q3	160.93
	Q4	163.27
2016	Q1	165.45
	Q2	168.27
	Q3	171.12
	Q4	173.89

Appendix 4: Property Index

Year	Quarter	Property Index
2007	Q1	103.82
	Q2	104.23
	Q3	106.38
	Q4	111.76
2008	Q1	116.06
	Q2	118.10
	Q3	123.80
	Q4	129.11
2009	Q1	132.16
	Q2	130.29
	Q3	127.51
	Q4	128.04
2010	Q1	128.44
	Q2	130.24
	Q3	130.74
	Q4	133.34
2011	Q1	137.24
	Q2	141.64
	Q3	140.64
	Q4	139.64
2012	Q1	140.34
	Q2	141.64
	Q3	142.94
	Q4	148.04
2013	Q1	149.74
	Q2	150.24
	Q3	152.54
	Q4	151.04

2014	Q1	150.04
	Q2	151.94
	Q3	152.54
	Q4	155.64
2015	Q1	158.04
	Q2	157.64
	Q3	159.84
	Q4	164.04
2016	Q1	167.64
	Q2	171.84
	Q3	175.44
	Q4	176.64

Appendix 5: Money Supply

Year	Quarter	Money supply (M3)
2007	Q1	624,288.69
	Q2	649,189.32
	Q3	564,605.74
	Q4	591,195.90
2008	Q1	726,331.39
	Q2	757,128.71
	Q3	690,580.46
	Q4	723,174.43
2009	Q1	836,937.19
	Q2	883,107.75
	Q3	770,784.32
	Q4	800,321.15
2010	Q1	1,055,491.29
	Q2	1,091,455.40
	Q3	938,002.60
	Q4	1,000,392.41
2011	Q1	1,211,263.46
	Q2	1,243,904.59
	Q3	1,129,631.56
	Q4	1,164,448.79
2012	Q1	1,386,144.40
	Q2	1,456,090.13
	Q3	1,255,046.50
	Q4	1,314,226.51
2013	Q1	1,582,248.76
	Q2	1,649,167.12
	Q3	1,468,297.84
	Q4	1,541,419.93

2014	Q1	1,876,820.34
	Q2	1,949,985.60
	Q3	1,730,680.13
	Q4	1,815,431.03
2015	Q1	2,145,558.62
	Q2	2,193,983.91
	Q3	2,022,103.78
	Q4	2,108,592.59
2016	Q1	2,145,558.00
	Q2	2,202,200.50
	Q3	2,231,846.00
	Q4	2,305,862.00