

**THE EFFECT OF MACROECONOMIC FACTORS ON
RESIDENTIAL REAL ESTATE INVESTMENT IN KENYA**

BY

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

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I

DEDICATION

This

ABSTRACT

The real estate industry is characterized by huge investments and it's vital in boosting economic growth. In both developing and developed nations, real estate investments have been increasing dramatically, over the last decade in both nominal and real terms. However, the industry is faced with the liquidity problem especially when an investor needs money to invest in other sectors of the economy and it's a non-transparent market as well. The study aimed at assessing the effect of macroeconomic factors on residential real estate investment in Nairobi County. The study explored the Q theory of housing investment, the standard Gordon growth model, the modern portfolio theory and the arbitrage pricing theory. To achieve this objective, the study used a descriptive research design and used quarterly secondary data, which was covering 10 years from January 2007 to December 2016. Data analysis was through descriptive and inferential statistics. Descriptive statistics comprised of the measures of central tendency among them the arithmetic mean, variance and standard deviation. Correlation and pooled regression analysis made up the inferential statistics and used in establishing existing correlation linking the research variables. The results established direct correlation linking the consumer price index, money supply and the residential real estate index. The results show that there is a weak positive correlation between CPI, GDP and exchange rates and the residential real estate index but a strong correlation between the money supply, exchange rate and residential real estate index. The results further indicate direct but insignificant association linking interest rates, exchange rates and the residential real estate index. The study concluded that residential real estate investment in Kenya is significantly influenced by inflation, economic growth and the amount of currency supplied. The study recommends that the government and other policy institutions should ensure that inflation levels, economic growth rates and money supply should be properly managed so that they do not interfere with investments in the real estate sector since housing is important in any economy.

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LIST OF ABBREVIATIONS

APT	-	Arbitrage Pricing Theory
CPI	-	Consumer Price Index
DCF	-	Discounted Cash flows
GDP	-	Gross Domestic Product
GGM	-	Gordon growth model
HPI	-	House Price Index
M&A	-	Mergers and Acquisitions
M3	-	Broad Money Supply
MPT	-	Modern Portfolio Theory
NPV	-	Net Present Value
REITs	-	Real Estate Investment Trusts
VAR	-	Vector Auto Regressive Model

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

This real estate sector is vital to the growth of a country's GDP through promoting various factors of production and its monetary role (Galati, Teppa&Alessie, 2011). The real estate is recognized around the globe to be the driving force towards improving socio-economic conditions of the population. The sector boosts economy through job creation and plays a role in poverty eradication through providing better housing to the population especially those from low income end (Kibiru, Pokhariyal&Obwocha, 2014). The real estate sector continues to outperform other asset classes supported by high demand from both individuals looking to purchase real estate, as well as increased institutional investor demand (Kainulainen, 2015).

Residential real estate has also attracted a lot of attention due to its strong economic performance which can be attributed to increasing housing demand and additional diversification benefits offered to investors, making real estate investment extremely lucrative (Safia, 2015). Recently the property prices have been fluctuating immensely especially upwards affecting the whole economy through prices of commodities especially when the economy is going through economic slump. However, residential houses are also complex and fluctuations in house prices is caused by numerous aspects (Watson, 2013). As such, despite increased macroeconomic risk in the world economy, residential real estate investors are taking on increased debt in their real estate investments to ensure reasonable returns (Sorina, 2014).

On a theoretical perspective, the economic growth theory supports that real estate investment could provide an incentive to the individuals who are busy to run the day to day activities of a business and expect to earn huge profits from their investments (Safia, 2015). The portfolio theory the diversification is attractive to the risk-averse individuals who are afraid of losing all their assets when some of their investments collapse. This however is not a guarantee as the factors which cause the collapse of business in the economy are the same factors which affect the performance of real estate businesses (Kainulainen, 2015). The capital assets model suggests that a single asset price is affected by the same factors affecting other assets in the economy. The arbitrage pricing theory supports that the returns of an asset in a portfolio can be determined by the using a linear regression model (Battinelli& Reid, 2013).

The real estate sector in Kenya has grown at a high rate in recent years due to believe that investment in real estate is worthwhile because prices and rental incomes keep on increasing (Obong'o, Nyakundi & Mogwambo, 2016). The industry contributes about 3 percent of the national GDP and it has been on the rise to over 35% over past ten **years** due to good macroeconomic factors (Kioko, 2014). The demand for housing exceeds its supply by a very huge margin which has been caused by high influx of people to the urban centers in search of greener pastures Residential property market has been characterized by a boom in the last decade (Akumu, 2014).

1.1.1 Macroeconomic Factors

Macro-economic factors are the factors, which affects the economy as a whole nationally and are not pinned to a particular area, region or individual as is the case of the

microeconomic factors (Ariemba, Kiweu & Riro, 2015). Macro-economic factors focus is on the overall economic of a nation. Macroeconomics measures the factors which are mainly used by the national government in its decision making (Manni & Chane-Teng, 2008). Macroeconomic factors usually show it through the securities exchange which is a proxy used to indicate the performance of the economy. According to Ozbay (2009), the major factors, which affect the economic performance, are; supply of money, rates of interest, inflation rate, and the economic growth, which have effect on the assets value and returns.

Inflation can be defined as the persistent rise in prices of commodities which in turn causes the erosion of the value of local currency as well as the loss of the property value (Singh, Mehta &Varsha, 2011). High inflation rate is associated with economic slump and shows economic instability (Kiat et al., 2015). Extreme inflation rate causes increased commodities price especially basic commodities which in turn forces individuals to divert funds intended for investment to finance the recurrent expenses hence reducing level of country's investment hence further affecting GDP growth of the host nation. (Anokye&Tweneboah, 2008). Inflation has an inverse relation to the corporate performance as it becomes expensive for them to borrow funds for investment through high interest rates (Zaighum, 2014).

Economic growth influences the number and types of real investment opportunities. Gross Domestic Product is the main proxy used in economic growth, which measures the total number of goods and services produced in a country (Manni & Chane-Teng, 2008). A change in real GDP implies a change in real economic growth which may directly

impact on the housing property market. In addition, economic certainty that arises from a rise in real GDP results in high business confidence (Kwangware, 2013).

Money supply is a measure of the money available in the economy. Many scholars have established an inverse relationship between money supply and real estate growth. Increased money supply causes inflation, which diverts funds from investment function to consumption function. Inflation further raises the lending rate which in this case is the interest rates hence limiting funds towards real estate investment (Gaspareniene, Remeikiene & Skuka, 2016). Money supply is critical in the economy as it limits the hyperinflation in the nation as more funds chasing limited resources in the economy causes inflation, which has an adverse effect on the growth of GDP (Singh, Mehta & Varsha, 2011).

Interest rate is simply put as the amount above the principal amount which borrowers pay bank for the loans borrowed (Kiat et al., 2015). Interest rate (nominal or real) as a macroeconomic factor usually reflects the state of the current and future business environment and investment opportunities. Generally, increased interest rates increase charges of borrowing as loan repayments become more costly (Kwangware, 2013). Interest rates affect an individual's ability to invest as well as cost of financing. It also represents return on substitute investments since it represents the yield on competing assets (Miregi & Obere, 2014).

Exchange rates, is a term used to refer to the amount at which the domestic currency is exchanged with the foreign currency which fluctuates from time to time (Goldberg, 2007). It's used as proxy for economic growth of a particular nation (Kiat et al., 2015).

Fluctuations are reflection of how the domestic economy is performing compared to the foreign economy which shows the amount to be invested in the country, appreciation means the domestic currency has appreciated in value while depreciation means the value of domestic currency decline (Singh, Mehta & Varsha, 2011).

1.1.2 Residential Real Estate Investment

Residential real estate refers to the housing units which accommodates families which are not for commercial use (Li, 2015). Residential properties are also defined as. They include flats, condominiums, bungalows and maisonettes. These properties are situated in urban, rural or suburban areas (Makena, 2012). Over 70 percent land in the towns around the country is for residential use. These lands are mainly comprised of the family houses which accommodate people working in the towns (Ojetunde, 2013).

Residential real estate structures are permanent and immovable and most importantly are long-term in natures which are some of the features which are most identifiable with property industry. This industry is so important to the socio-economic welfare of the country (Ojetunde, 2013). Its pricing criteria is based on the macroeconomic condition of a country whereby, a country whose macroeconomic performance is good experiences rise in the price of its properties and vice versa (Kiat et al., 2015). It offers the best conditions for those intending to diversify their investment especially in volatile economies. These are long term investment and usually attract those intending to invest for future purposes (Kamweru & Ngui, 2017).

Residential properties are synonymous with two terms which are; earnings and appreciation. Earning emanate from the monthly or annual rent collected from the tenants

while appreciation refers to the increase of the value of the property with passing time (Li, 2015). The value of an individual residential property is the difference between the agreed prices of the seller to that of the buyer (Kofod-Pihl, 2009). The difference between the expected residential property prices to the real price is what is known as the value appreciation. The house price index (HPI) is one of the measurements of the real estate investment over a given period of time. Other factors influencing property prices are the surroundings and proximity to public amenities such as schools and hospitals. The HPI is usually influenced by factors such as the mortgaging facilities which comply with the rules governing the industry (Kiat et al., 2015).

1.1.3 Macroeconomic Factors and Residential Real Estate Investment

Microeconomic factors are referred to as a set of characteristics of local environment where housing is located and the characteristics of housing itself. Macroeconomic factors have a significant impact on housing price level since they determine the state of the overall economics in a country, influence the prices of products and services generated in all industries, and define the structure of the overall demand (Gaspareniene, Remeikiene & Skuka, 2016). The prices in this industry relate to the economic condition of a nation. Fluctuations in macroeconomic variables affect all investments negatively by disturbing the trade smoothness (Grum & Govekar, 2016).

Inflation impacts on the pricing of the real estate as it makes borrowing so expensive through high interest rates (Safia, 2015). The population diverts the funds intended for investment purposes towards consumptions hence less funds are available for real estate property (Sabal, 2005). A rise in economic growth will lead to a rise in the demand for

property. This will lead to a rise in house prices and thus housing property returns (Kwangware, 2013). According to Apergis (2003) money supply, other economic variables, such as economic growth, the pricing structure as well as the investment in the industry and rising inflation reduces the disposable income available to people to buy the newly constructed houses. The nominal or real exchange rate also has a direct and indirect impact on the housing property market. For instance, a strong currency or an appreciation of the currency will discourage foreign investors from local property investment (Kwangware, 2013).

Empirically, Battinelli and Reid (2013) analyzed the effect economic variables on performance of the real estate investments and revealed a direct investment among the two variables. Gaspareniene, Remeikiene and Skuka (2016) assessed the macroeconomic impact on the pricing of houses in Lithuania and revealed a significant interdependence between aggregation of the major macroeconomic factors and the average annual housing price level. The study also found interest rate and credit availability are significant to housing price level. Azmin and Shariff (2016) evaluated the link between the performances of Real Estate Investment Trusts (REITs) and established that factors such as GDP per capita significantly affect real estate investments trust performance.

1.1.4 Residential Real Estate in Kenya

The country is leading in the country due to immense investment in the real estate industry which has positive externalities to other sectors of the economy and it has led to job creation especially among the youth, rise of various businesses especially those in the

construction industry (Makena, 2012). The demand for houses in Kenya has been increasing as well as their prices over the last decade (Gathuru, 2014). This is due to the increased population to the mostly in urban areas caused by the search of greener pastures and employment opportunities especially among the youth (Ndung'u, 2014).

According to Hass Consult, real estate property returns have performed extremely well with average returns of 25% to 30% on development and 8% for rentals (Akumu, 2014). Housing prime land prices have skyrocketed, increasing at an annual rate of; 16% for apartments/flats, 28% for masionettes and annual rents for selected markets increasing at the rate of 10% per annum (Obong'o, Nyakundi & Mogwambo, 2016).

1.2 Research Problem

The real's estate industry is characterized by huge investments and it's vital in boosting economic growth (Omboi & Kigige, 2011). In both developing and developed nations, real estate investments have been increasing dramatically, over the last decade in both nominal and real terms (Sabal, 2005). However, the industry is faced with the liquidity problem especially when an investor needs money to invest in other sectors of the economy and it's a non-transparent market as well (Kofoed-Pihl, 2009). Unlike other financial markets, the residential housing market is quite unique since the market is subject to several laws and regulations besides being complex (Omagwa & Kaijage, 2015). This is caused by the variations in the available data pertaining to the industry which varies in various nations across the globe (Kainulainen, 2015).

In Kenya, the real estate industry is vital in the economic performance of the country and the sector has been experiencing growth over the last decade, which is vital in the

country, which has been faced by excess demand for housing, and this is seen as the only way of meeting the excess demand in the sector (Kioko, 2014). Due to the excess demand, the prices in the industry have increased rapidly when as compared to other sectors in the economy (Gatauwa & Murungi, 2015). Compared with other developed countries, the Kenya's real estate is growing at an accelerating rate despite the fact that the Kenyan economy is coupled with high rates of inflation, high level of unemployment, interest fluctuations and other adverse economic fluctuations. Additionally, the industry faces limited capital due to few financial institutions specific to the industry and the few which are available cannot meet the excess demand for funds by the construction industries (Kibiru, Pokhariyal & Obwocha, 2014).

Various scholars have explored the existing relationship between macroeconomic conditions and real estate investment and obtained varied results. A study by Pashardes and Savva (2009) was conducted to establish the macroeconomic factors on pricing of housing sector in Cyprus and found that house prices are highly affected by costs of construction materials as well as the fluctuations in the exchange rates. The study however focused on house prices and not the amount of investment in the real estate sector. Similarly, West and Worthington (2006) studied the correlation between the macroeconomic factors and returns and found a strong and direct link between the two but the study was inclined to commercial real estate and not residential real estate investment.

In Kenya, Ariemba, Kiweu and Riro (2015) examined the correlation between macroeconomic factors and growth of the mortgage and found an insignificant influence between inflation, economic growth, bonds and propensity to save in the economy. The

researchers however concentrated on the mortgage market using real estate loan portfolio and not the residential property index. Obong'o, Nyakundi and Mogwambo (2016) examined the influence of behavioral factors on real estate and established that behavioral factors like herding and representativeness had a direct effect on real estate investment but the study was inclined to behavioral factors and not macroeconomic variables.

Most of the available literature examines the influence of macroeconomic factors of commercial and residential real estate investment. As such, this industry is characterized by sectoral submarkets hence different macroeconomic factors in different countries may affect residential real estate investment differently and in a unique way. The studies also provide conflicting results on whether macroeconomic factors affect residential real estate investment. This leads to a pertinent question on what is the effect of macroeconomic factors on residential real estate investment in Nairobi County?

1.3 Research Objective

To determine the effect of macroeconomic factors on residential real estate investment in Nairobi County

1.4 Value of the Study

It will be of value to residential real estate investors who may use the findings in establishing major macroeconomic aspects influencing residential real estate investment. The findings will also be of value real estate portfolio managers and who may use the study recommendations to come up with strategies that would mitigate the adverse effects of macroeconomic factors. The study will also be of value to Real Estate Investment Trusts (REITs) who may also use the study recommendations to determine the

appropriate time to invest in different economic situations. The County of Nairobi and the Government of Kenya may also use the findings to make appropriate investment decisions since there are major investors in the real estate sector. The study will also provide addition literature on to the relationship between macroeconomic factors on residential real estate investment in Nairobi County.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The section previewed past work on macroeconomic factors and real estate investment as advance by various authors. The section outlines the theoretical review, the various factors that influence residential real estate investment and a preview of related studies. The section finally, presents the conceptual framework of the study.

2.2 Theoretical Review

This study explored the Q theory of housing investment, the standard Gordon growth model, the modern portfolio theory and the arbitrage pricing theory.

2.2.1 The Q Theory of Housing Investment

This theory was introduced by Tobin (1969). The theory implies that the investment is expressed as a function in a ratio form: which is expressed using the quotient of the prevailing market price to the replacement cost. The firms are advised to make investments as long as the ratio remains less than 1 and stop making investments when it equals 1, the firm should refrain from making investment decisions based on the fact that, if the asset is cheaper on the market then they should make the investment (Jud & Winkler, 2003). The Q theory suggests that investment rate should be based on Q, which is the amount for replacing an asset. The investors' decisions are influenced by the ratio of the Q, which helps them decide whether to make that investment, or not depending on its size (Kaijser, 2014).

The theory is also used as market indicator with ratio less than one signaling deficiency on the demand side of the economy and when it equals to 1 indicates the market is at equilibrium (Berg & Berger, 2005). The Q theory suggests that the firm can apply the theory to gain profit in the market by making sound investment decisions (Kaijser, 2014). In the real estate market, the formula used is Q (= price on new house). The model suggests that the investors can make investment decisions based on the value of Q with ratio greater than 1 signaling that there is need for new houses hence they should invest to meet the excess demand for housing as returns will be high due to increased prices of assets (Berg & Berger, 2005). Based on the q theory of housing microeconomic variables can affect the value or prices of real estate and reduce the amount of replacing a real estate investment.

2.2.2 Standard Gordon Growth Model

This theory is an advancement of Gordon growth model (GGM) which is the common method for finding the end value in a Discounted Cash Flow (DCF). This method involves discounting the cash flows for various years to determine the terminal value. The terminal value can also be used to determine the present value (Rotkowski & Clough, 2013). The Gordon growth Model argues that the assets value is changes to keep up with the rising prices of other commodities in the market unlike, most fixed income products. The model argues that property prices are charged on the expected future prices, which are expected to grow at a constant rate for unforeseeable future (Miregi & Obere, 2014).

The model further reveals that the property market can be used to avoid inflation. The industry is a long-term instrument, which can withstand the varying rates of inflation over time. The industry's pricing criteria is determined through finding the NPV value, which is assumed to continue growing ad infinitum given the market interest rate (Yishuang, 2012). The model can be interpreted in the case of the real estate in such a way that Price (P) = $\text{Rent} / (\text{Interest Rate} - \text{Rental growth rate})$, this reveals that the property prices have a negative correlation to the market interest rates in such a way increase in interest rates causes a fall in prices of property market (Miregi & Obere, 2014). According to the standard growth model, macroeconomic variables can affect the rental or the required rate of return required to determine the values of real estate.

2.2.3 Modern Portfolio Theory

Its abbreviation is (MPT), was pioneered by Markowitz (1952). MPT was developed from the idea that investment returns should be assessed in light of quantitative risks and makes the assumption that investors are risk averse and prefer the highest earnings at a given risk (Hines, 2009). According to the MPT, the investment is based on the objectives of maximizing returns at minimal risk level (Safia, 2015). MPT is an investment theory whose objective is clarifying on the ways of maximizing expected return and minimizing expected risk. The models deal with the portfolio, which classifies the assets into a single pool so as to easily determine the market assets prices with ease (Hines, 2009). The theory emphasizes on the accuracy of determining the risks associated with the assets to avoid misleading the investors who may end up suffering huge losses (Manni & Chane-Teng, 2008).

MPT is developed on the hypothesis that there exists a strong and positive correlation linking risk to property returns and the risks are the major factors on investors' decision making which can be minimized through investment diversification (Safia, 2015). The model is vital in making sound investment decisions. It's significant to the management of construction firms in such a way that they can be able to understand what they expect from the investments through the risks that are associated with various investments (Hishamuddin, 2007). The industry attracts many investors due to its low risk rates and stability which encourages the investors to the industry. There is no guaranteed return on the amount invested and therefore managers need to make informed decisions on the portfolios to invest in (Kainulainen, 2015). The modern portfolio theory supports that holding several types of real estate investment can help to mitigate the risk associated with macroeconomic variables.

2.2.4 Arbitrage Pricing Theory

This theory was put forward by Ross (1976). It mainly focuses on the risks and the rate of returns. The theory also points out the existence of a positive correlation linking the expected return to the risks (Manni & Chane-Teng, 2008). It outlines the main risks that investors in the industry may encounter. The model uses the macro-economic variables as the proxy for determining the risks (Zaighum, 2014). APT illustrates that the macroeconomic variables affect the property market through exogenous factors which the firms have no control over them, inflation rate that affects the purchasing as well as the saving power of the citizens (Singh, Mehta & Varsha, 2011).

APT reveals that there are numerous macroeconomic factors which operate to explain asset returns. The theory assumes that expected asset returns is influenced by various factors including: the unanticipated variations in the inflation as well as the interest rates. Other factors include the unexpected variations in the rates of interest as well as the growth of the output in the industry. Thus, investment in residential property is affected by similar variables (Manni & Chane-Teng, 2008). The theory further states that in a well-functioning economy, the model can be accurately being used to determine the returns and the securities are operating in autonomous market whereby the securities are traded freely (Battinelli & Reid, 2013). The APT theory indicates that macroeconomic variables like interest rates, inflation, money supply and others affect the value of real estate investment.

2.3 Determinant of Residential Real Estate Investment

The cost of construction and land, mortgage financing, location and rental prices will be exploring as the other determinants of residential real estate investment apart from the microeconomic factors.

2.3.1 Cost of Construction and land

The land is the most crucial in the construction of houses as it takes a larger proportion of the total cost of the total cost of building which hinders expansion of houses and even some are too squeezed (Feng et al., 2010). High land prices discourage potential homeowners from mortgage and financing due to lack of timely verification of the prospective developmental properties and in ability to service the huge amounts demanded (Ndung'u, 2014).

Building costs also affect the supply schedule for new construction such as the high building costs prevents the attainment of the general objective which is to meet the excess demand for housing in the country (Miregi & Obere, 2014). Higher construction prices determine higher self-costs of housing and this way raise the final price of housing (Gaspareniene, Remeikiene & Skuka, 2016). A study by Moko and Olima (2012) revealed that the land is the main hindrance to the provision of cheap housing units to the residents of Nairobi.

2.3.2 Mortgage Financing

Mortgage refers to the financing instrument, which provides finances for property development at a cheaper rate as compared to the commercial banks whose interests are higher hence inflating the prices of real estate market. The industry is characterized by high construction cost which requires high capital which can be accessed from many financiers. This makes it impossible to exclusively finance a property construction from personal finances without accessing for help. This opens doors for seeking financial help from the financial institutions which include the mortgage financing, commercial banks, Sacco's, Microfinance institutions (Ezimuo, Onyejiaka & Emoh, 2014). Financing of this industry is characterized by periodic payments, long-term financial outlays as well as the prices increasing into perpetuity (Kioko, 2014).

Mortgage helps the investors and homeowners to have ease of accessing finances which are paid back with interest rates which constitutes profits to the mortgage institutions. (Gaspareniene, Remeikiene & Skuka, 2016). The funds availed to the borrowers depends on the macroeconomic performance of the market which influences the prices of

the property in this industry. The ease at which one can access the finances accelerates the development of the industry and helps to meet the excess demand for housing especially in developing countries (Ezimuo, Onyejiaka & Emoh, 2014).

2.3.3 Location

Location is a major factor in determining the price of a real estate property as some areas have land which cost higher than others which in turn affects the pricing of the real estate property. Locality helps determine housing prices depending on their proximity to social amenities such as hospitals, schools, road network, electricity, supply of water among other things (Owusu-Ansah, 2012).

Location covers both physical locations of an estate as well as its place in the socio-economic environment. A very important, one of basic factors that determine the attractiveness of real estate investment and influence investment value is the location, so a geographical location factor may be one of the main determiners of making investment decisions. The investment in the sector is characterized by long-term and permanence features which make it vital for investors to consider while making their decisions. Good location translates into prospective high income and property appreciation whilst bad locality implies low income and property depreciation (Klimczak, 2010).

2.3.4 Rental Prices

The rental price is a part of other asset prices in the economy, so its growth results in the increase of the price of overall commodities in the economy, which in turn causes an increase of the house price. Holding housing demand constant, reduction in the pricing of the property raises the demand for housing (Li, 2015). The rental prices are the major

factor considered by the real estate financiers and locality as well as they mainly target the leafy suburbs.

2.4 Empirical Review

Grum and Govekar (2016) investigated the influence of macroeconomic factors, rate of employment, and the securities exchange market, gross domestic product in Slovenia, Greece, France, Poland and Norway. The study revealed a strong and direct correlation linking the variables under study. The results revealed a varying data on the countries studied revealing prices of housing units were higher at the countries whose economies were almost at full employment.

Kanjumba, Njuguna and Achoki (2016) examined the correlation linking macroeconomic variables to meeting the excess demand for houses in Kenya. The research adopted an explanatory research approach and collected data through the use of questionnaires which were distributed to financial institutions across the Country. The study used the linear regression and to determine the correlation as well as the strength of the two variables under study. The results revealed an inverse correlation between macroeconomic variables and mortgage financing institutions.

Zheyu (2015) explored the economic variables on property pricing among the countries in Asian continent. The study used secondary data from various real estate departments of the countries studied in order to determine correlation linking variables under study. The results showed an inverse correlation linking locality and housing unit pricing, as well as the mortgage financiers which has direct correlation to house prices.

Ariemba, Kiweu and Riro (2015) examined the impact of economic factors on mortgage institutions in Kenya. The study used time data series running for a time period of 20 years targeting the default rate among the borrowers to the economic factors like annual inflation, GDP, annual forex exchange, unemployment rate as well as the bonds as the proxies. Using the linear regression method, the study revealed weak correlation between the study variables. Though, the results revealed a strong multicollinearity linking the intervening variables.

Gatauwa and Murungi (2015) analyzed the economic impact of the real estate development among the central Kenya counties. Their study employed a descriptive survey research design and targeted 1000 real estate developers in the region. Primary data was collected using questionnaire and secondary data from Knight Frank price index reports for a five year period. Using the multiple linear regressions, the findings established the major reasons for high pricing of houses are; good road network, proximity to roads, proximity to social amenities, among other things.

Akumu (2014) examined the impact of selected macroeconomic variables on the performance of residential housing properties in Kenya using quarterly data from 2000 Q1 to 2010 Q4. The study used secondary data and tested three main issues to determine any linkages between the selected variables and housing property markets in Kenya. The findings revealed that the performance of the housing sector in Kenya is influenced significantly by changes in macroeconomic variables used in this study. The study also established that changes in gross domestic product, money supply and public debt positively impact on the house price returns whereas changes in domestic interest rates,

Kenya shilling US dollar exchange rate, inflation, and rental income negatively affect house price returns.

Mugodo (2014) assessed the factors affecting the growth of small scale real estate companies in Trans - Nzoia County, Kenya through a descriptive research design and targeted a population of 51 respondents. Primary data through questionnaires which was analyzed through descriptive statistics. The study found that access to marketing information services, technology, managerial training and experience in small and medium sized real estate sector, have a positive influence on the growth of small scale real estate companies in Kenya while poor government policies and regulations negatively affects the growth of small scale real estate companies in Kenya. The study recommended that the management of financial institutions should consider reviewing their policies regarding access to finance by small and medium sized real estate companies.

Ojetunde (2013) investigated the relation linking macro economy to performance of the real estate in Nigeria applying econometrics through pair wise correlations, cointegration, granger causality and vector auto regression. The findings of the research established a strong and direct association linking economic factors and the pricing of properties in the country. Granger causality results found a strong correlation between interest rates and rent. The authors concluded that the fluctuations in property pricing causes changes in the economic factors in the country.

Kwangware (2013) examined the effects of economic variables on the prices of real estate among countries in southern part of the African continent covering January 1996 to

June 2008. The study adopted the VAR modeling. The results revealed that house price returns are influenced by most of the macroeconomic and financial variables specifically the real effective exchange rate, interest rate spread and manufacturing production positively impact on house price returns while the domestic interest rate, the dividend yield and expected inflation had a negative effect. The study also found that manufacturing production has a lagged effect on house price returns while the real effective exchange rate and domestic interest rate have a contemporaneous effect.

Galati, Teppa and Alessie (2011) studied the economic factors influencing house prices in Dutch by analyzing survey data on housing and mortgages for the period 1993–2009. The study found that subjective housing pricing is dependent on the earning of an individual, age of an individual, literacy rate among other factors. The study also found that mortgaging facilities also influence on the advancement of the industry. The study further revealed the importance of the economic factor in the pricing of the property in the industry and that there was a varying pricing factor depending on the locality, earnings, and proximity to social amenities.

Feng et al (2010) analyzed the correlation linking economic variables to housing price fluctuation in China. The study revealed a direct correlation linking housing pricing and economic growth. Further, the study found that the pricing fluctuations are high on short-term but stabilize in the long term.

2.5 Conceptual Framework

This is schematic representation of correlation linking research variables. The q theory of housing microeconomic variables like interest rates, inflation and GDP growth can affect

the value or prices of real estate and reduce the amount of replacing a real estate investment. The standard growth model also suggests that macroeconomic variables can affect the rental or the required rate of return required to determine the values of real estate. The APT theory indicates that macroeconomic variables like interest rates, inflation, money supply and others affect the value of real estate investment. This study comprises of independent variables, which include inflation, economic growth, employment rate, money supply, interest rates and the dependent variable, which will include residential real estate investment. The conceptual framework is as follows

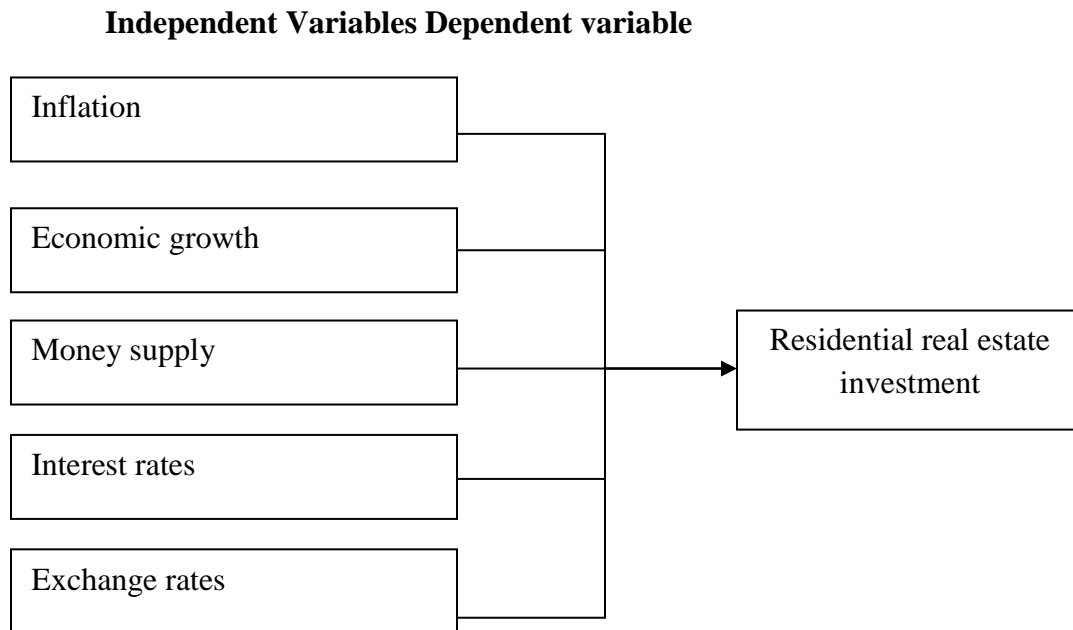


Figure 2.1 Conceptual Model

2.6 Summary of Literature Review

This section reviewed a number of studies factors on macroeconomic and on real estate investments. Some of the reviewed global studies included Grum and Govekar (2016) who explored macroeconomic factor and property prices in Slovenia, Greece, France,

Poland and Norway. Zheyu (2015) also explored the macroeconomic factors that effect on housing price index in china. Further, Ojetunde (2013) investigated the interaction between the Nigerian macro economy and the operation of its residential property market in Nigeria. In South Africa, Kwangware (2013) examined the impact of macroeconomic and financial variables on the performance of the housing property market in South Africa. Most of international studies focus on both commercial and residential properties and due to heterogeneity of residential real estate investment the macro-economic fundamentals in other countries cannot completely explain the return of real estate investments in Kenya.

Studies in Kenya by Kanjumba, Njuguna and Achoki (2016) examined the relationship between economic factors and funding of the supply-side of housing and collected data from 212 financial institutions. Ariemba, Kiweu and Riro (2015) also examined the influence of macro-economic variables on the growth of the mortgage market in Kenya. Additionally, Gatauwa and Murungi (2015) analyzed the effects of infrastructure development on real estate values in Meru County, Kenya. Akumu (2014) also examined the impact of selected macroeconomic variables on the performance of residential housing properties in Kenya. Mugodo (2014) assessed the factors affecting the growth of small-scale real estate companies in Trans - Nzoia County. The studies conducted in Kenya focused in specific counties whose real estate investment and housing patterns are different from Nairobi County. Additionally, prices of land and construction cost are different in various counties in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter shows the research design, the target population, data collection procedure and the data analysis method.

3.2 Research Design

This is used to refer to the way in which data is to be collected and analyzed (Bryman & Bell, 2011). This study sought to examine the impact of microeconomic conditions on residential real estate investment in Nairobi County. To achieve this objective, the study used a descriptive research design. Descriptive studies are more formalized and typically structured with study objective being comprehensively stated (Cooper & Schindler, 2011).

3.3 Data Collection

Secondary data was the preferred method for data collection. Secondary data refers to the past data which already exists or had been used for other studies. Secondary data on the macroeconomic conditions was obtained from Central Bank of Kenya. Secondary data on residential property index was obtained from the Hass Consult, which is the only publicly available property index in Kenya. The study used quarterly secondary data covered 10 years from January 2007 to December 2016.

3.4 Diagnostic Test

The study checked for normality using skewness and kurtosis. The study also checked for multicollinearity using correlation analysis and the variance inflation factors. Finally, the study checked for independence of observations (serial correlation) using the Durbin Watson statistic

3.5 Data Analysis

The collected data was analyzed through descriptive and inferential statistics. Descriptive statistics comprised of the measures of central tendency among them the arithmetic mean, variance and standard deviation. Correlation and pooled regression analysis made up the inferential statistics and they were used to find out the existing correlation linking the research variables. The regression equation was as follows

$$Y_t = \beta_0 + \beta_1 CPI_{t-1} + \beta_2 GDP_{t-1} + \beta_3 M3_{t-1} + \beta_4 IR_{t-1} + \beta_5 EXCH_{t-1} + \varepsilon$$

Where,

Y_t = Residential real estate investment, which will be proxied using the quarterly residential property index as provided by the Hassconsult for the t^{th} time period

CPI_{t-1} = Quarterly consumer price index as a measure for inflation for the $t-1$ time period

GDP_{t-1} = Natural log of the quarterly Gross domestic product as a measure for economic growth for the $t-1$ time period

$M3_{t-1}$ = Natural log of the quarterly broad money supply as a measure for money
in circulation for the t-1 time period

IR_{t-1} = Quarterly lending interest rates for the t-1 time period

$EXCH_{t-1}$ = Quarterly exchange rates for the t-1 time period

t = time period which is equals 40 periods

$\beta_1, \beta_2, \beta_3, \beta_4$ & β_5 = Coefficients of the regression equation

β_0 & ε = Constant and the Error term

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND INTERPRETATION

4.1 Introduction

This chapter presents the findings of the analyzed data and an interrelation of the findings. The chapter contains the summary statistics, graphical analysis, correlation, regression and the interpretation of the findings.

4.2 Descriptive Statistics

Descriptive statistics were used to summarize the study data using the mean, standard deviation, minimum, maximum and other descriptive methods.

4.2.1 Summary Statistics

Table 4.1 shows the summary statistics comprising of the mean, median standard deviation and other measures of central tendency.

Table 4.1 Summary Statistics

Variable	RPI	CPI	Ln_GDP	Ln_M3	INT	EXCH
Mean	304.46	125.47	13.61	6.1307	15.788	83.814
Median	310.19	130.09	13.607	6.1783	15.33	84.871
Minimum	175.3	78.458	13.359	5.7464	12.87	62.646
Maximum	436.86	175.18	13.906	6.4412	20.34	103.89
Std. Dev.	74.891	29.035	0.1602	0.21645	2.0681	11.493
C.V.	0.24598	0.23141	0.011771	0.035306	0.131	0.13713
Skewness	-0.11824	0.006855	0.25076	-0.28368	0.71023	-0.03978
Ex. Kurtosis	-0.7975	-1.2106	-1.0759	-1.1494	-0.39027	-0.73856

Source: Research findings

Table 4.1 shows that the average value of the residential property index was 304.46 with minimum and maximum values of 175.3 and 436.86 respectively. The table also indicates that average consumer price index value over the research period was 125.47 with maximum and minimum values of 175.18 and 78.458 correspondingly. The table indicates that the average GDP was 13.61 whereas the mean value of broad money supply was 6.1307 while the average value of interest rates was 15.788 respectively. The table also shows that the average exchange rates value over the study period was 83.814. Finally, the kurtosis and skewness values range between -2 and +2 which indicates that the variables data was normally distributed.

4.2.2 Graphical Analysis

4.2.2.1 Residential Property Index Trend

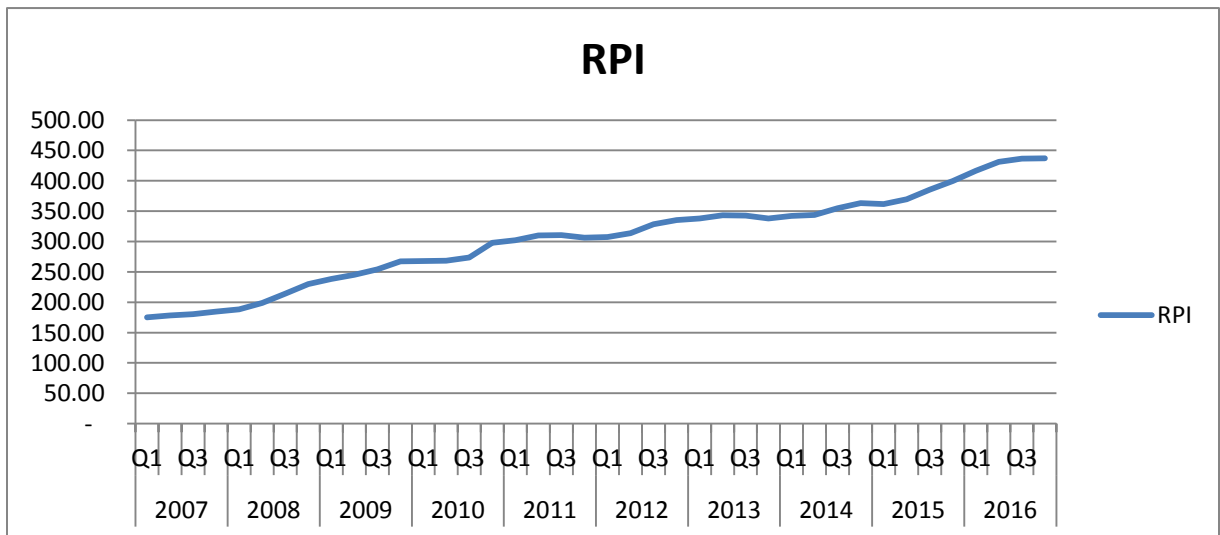


Figure 2.1 Residential Property Index trend

Source: Research findings

Figure 4.2 shows the residential property index trend which shows that the index has steadily been increasing over the period from 2007 and 2016. This indicates that the value of residential real estate investments has been increasing in the country.

4.2.2.2 CPI Trend

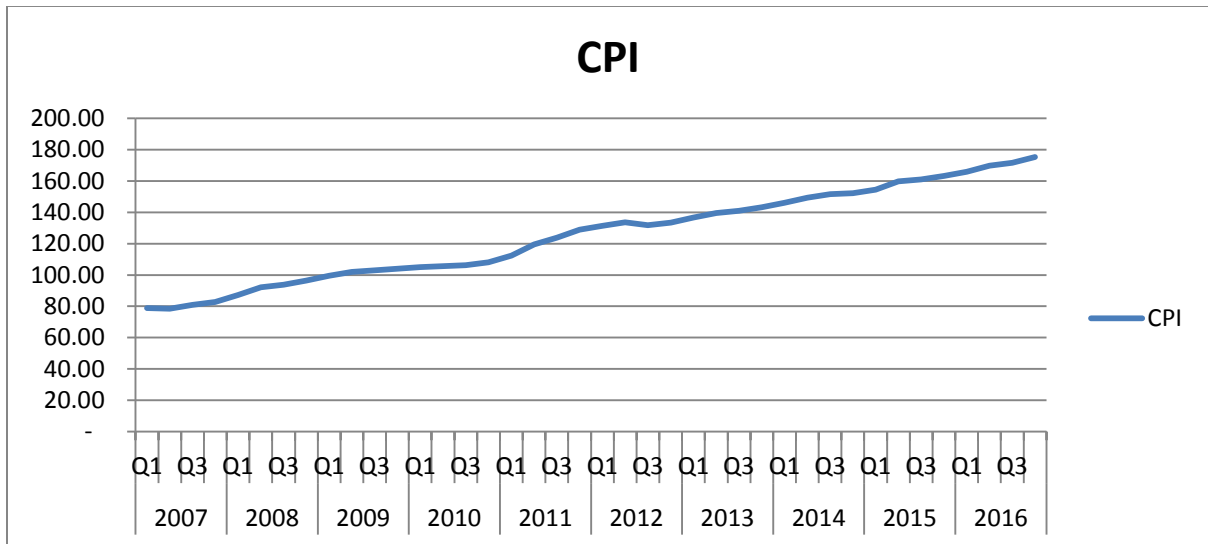


Figure 4.2 CPI trend

Source: Research findings

Figure 4.2 shows the CPI trend from 2007 to 2016. The figure indicates that the consumer price index has been gradually increasing from 2007 to 2016. This indicates that inflation levels have been rising in the country.

4.2.2.3 GDP Trend

Figure 4.3 graphically shows the GDP trend over the considered study period from 2007 through 2016. The figure shows that GDP has been increasing but slumps have been witnessed in some quarters hence the growth in GDP has not been gradual in the country.

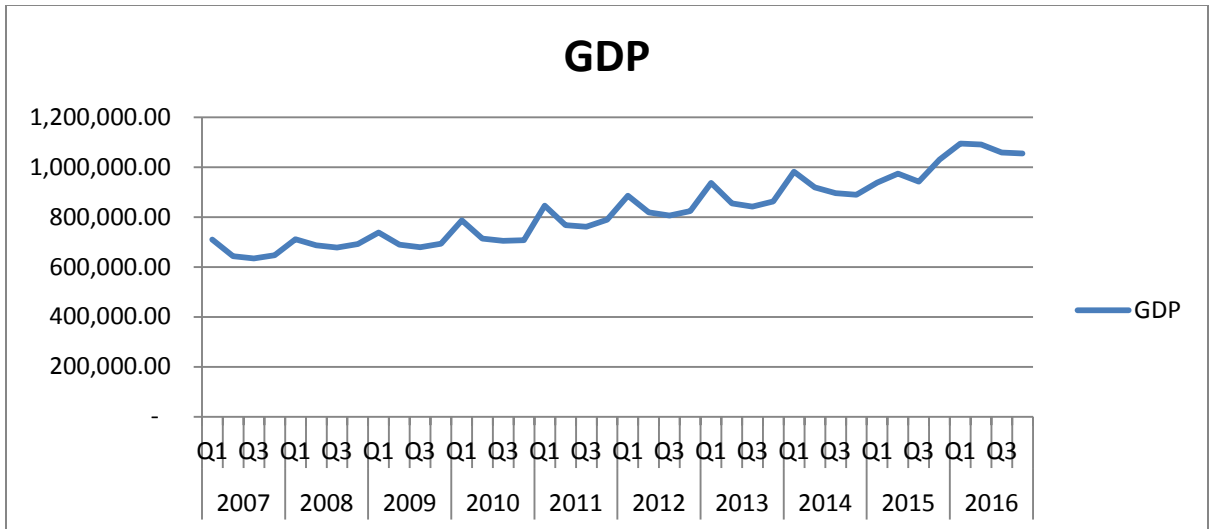


Figure 4.3 GDP trend

Source: Research Findings

4.2.2.4 Broad Money Supply Trend

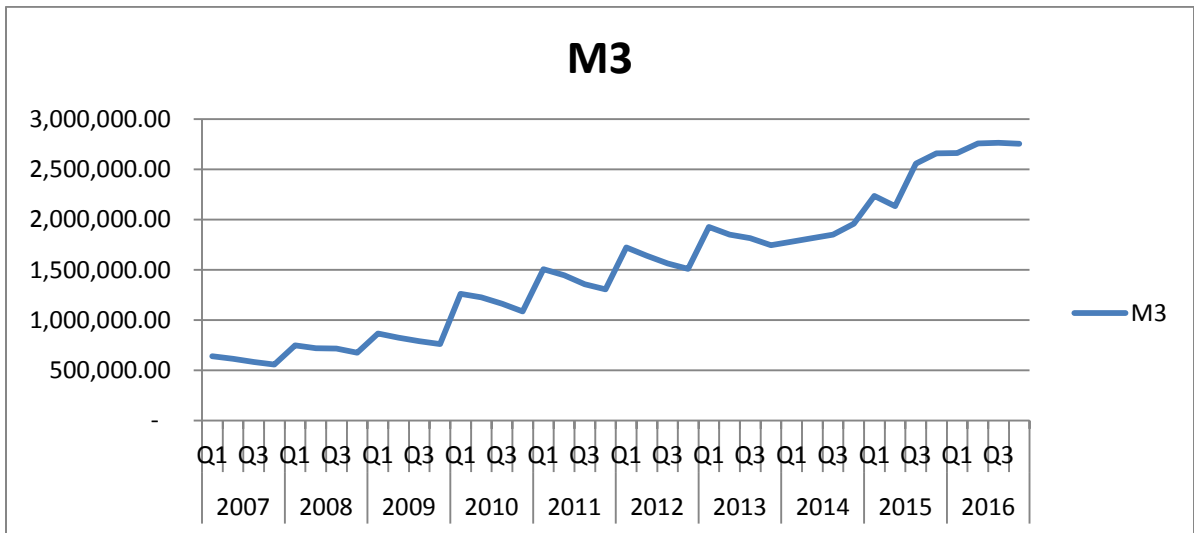


Figure 4.4 Money Supply trend

Source: Research findings

Figure 4.4 graphically illustrates the broad money supply trend. According to the figure the amount of money supplied in Kenya has been gradually increasing over the study period with some reduction being witnessed in some quarters of 2009, 2010, 2012 and 2013.

4.2.2.5 Interest Rates Trend

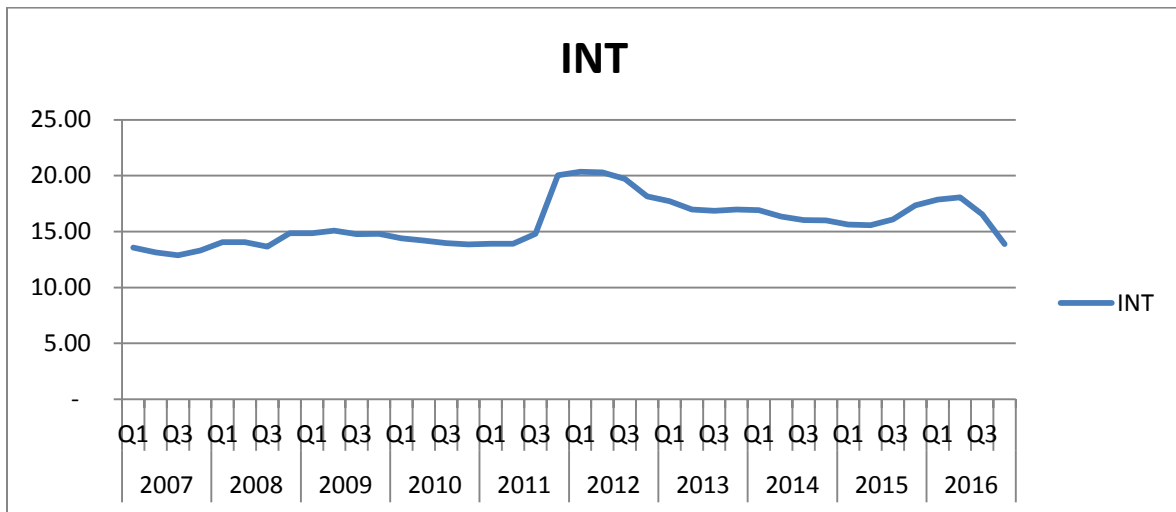


Figure 4.5 Interest rates trend

Source: Research findings

Figure 4.5 shows the trend of interest rates in Kenya for the period between 2007 and 2016. The figure shows that the Country has witnessed interest rate fluctuation over the period with high rates of interest being witnessed the third quarter of 2011 although to 2012 and in the second and third quarter in 2016.

4.2.2.6 Exchange Rate Trend

Figure 4.6 graphically illustrates the trend of exchange rates for the period between 2007 and 2016. According to the results on the figure, the country has witnessed exchange

rates fluctuations of the period but generally the rates have been steadily increasing over the considered study period.

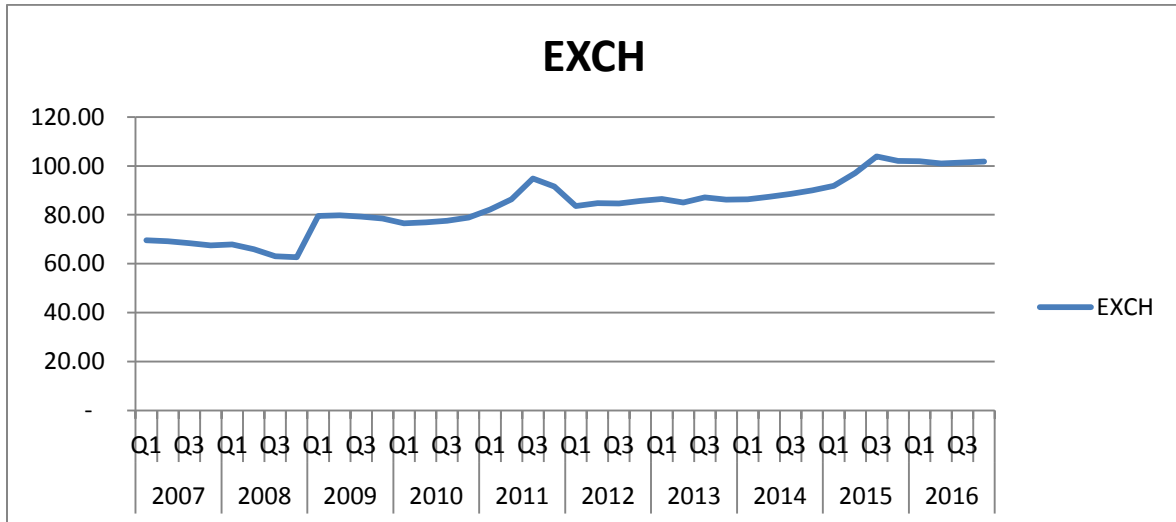


Figure 4.6 Exchange rate trend

Source: Research findings

4.3 Correlation Analysis

Table 4.2 indicates the correlation analysis results with an indication of all analyzed variables.

Table 4.2 Correlation Matrix

	RPI	CPI	Ln_GDP	Ln_M3	INT	EXCH
RPI	1.0000					
CPI	0.390507	1.0000				
Ln_GDP	0.460234	0.450238	1.0000			
Ln_M3	0.555310	0.467265	0.347657	1.0000		
INT	0.57805	0.581003	0.549098	0.578498	1.0000	
EXCH	0.419619	0.523499	0.473689	0.215762	0.511178	1.0000

Source: Research findings

The correlation results on table 4.2 indicates that there is a fairly weak positive correlation between CPI, GDP and exchanges rates and the residential real estate index as indicated by correlation coefficients of 0.3905, 0.4602 and 0.4196 respectively. The figure also shows there is a strong correlation between the money supply, interest rate and residential real estate index as indicated by correlation coefficients of 0.5553 and 0.57805 respectively.

4.4 Regression Analysis

The study used the pooled regression analysis and the following results were obtained. The results on figure 4.3 indicate that the R squared value is 0.95266, which indicates that 95.27% of the variation in the dependent variable is explained by the independent variables. The results also show that the value of the F statistics is 162.69021 and the P value is 0.00042. This means that the pooled regression model is significant and its can be used to explored the relationship between the dependent and independent variables. The Durbin statistics value is 1.044591, which is within the range of 1 and 4 which indicates that there is no serial correlation and the assumption of independence of observations has not been violated.

Table 4.3: Pooled Regression Analysis

Model 1: Pooled OLS, using 38 observations
 Dependent variable: RPI
 Robust (HAC) standard errors

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t</i>	<i>p-value</i>	
const	3.33020	0.751522	4.431	<0.0001	***
CPI _{t-1}	0.00251060	0.000547020	4.590	<0.0001	***
Ln_GDP _{t-1}	-0.226649	0.0266462	-8.506	<0.0001	***
Ln_M3 _{t-1}	0.312835	0.0763757	4.096	<0.0001	***
INT _{t-1}	0.000122034	0.000716531	0.1703	0.8648	
EXCH _{t-1}	0.000109761	0.000287361	0.3820	0.7025	

Mean dependent var	2.481224	S.D. dependent var	0.105051
Sum squared resid	0.019328	S.E. of regression	0.024577
R-squared	0.952664	Adjusted R-squared	0.945268
F (5, 34)	162.69021	P-value(F)	0.0004291
Log-likelihood	90.17196	Akaike criterion	-168.3439
Schwarz criterion	-158.5184	Hannan-Quinn	-164.8481
rho	0.360038	Durbin-Watson	1.044591

Source: Research findings

From figure 4.3 the following regression equation was generated

$$Y_t = 3.33020 + 0.00251CPI_{t-1} - 0.2266GDP_{t-1} + 0.3128M3_{t-1} + 0.00012IR_{t-1} + 0.000109EXCH_{t-1} + \varepsilon$$

The generated equation indicates that there is a positive and significant relationship between the consumer price index, money supply and the residential real estate index.

The results also show a significant but negative relationship between the residential real estate index and the gross domestic product. The results further indicate that there a

positive but insignificant relationship between interest rates, exchange rates and the residential real estate index.

4.4.1 Test for Multicollinearity

Table 4.4 Collinearity Diagnostics

Variable	VIF
CPIt_1	2.406
Ln_GDPt_1	1.497
Ln_M3t_1	7.827
INTt_1	1.817
EXCHt_1	6.451

Source: Research findings

The variance inflation factors were used to determine whether there was multicollinearity among the independent variables. According to the findings on table 4.4, all the calculated variance inflation factors (VIF) were between 1 and 10, which indicates the absence of multicollinearity

4.5 Interpretation of the findings

The study found a significant and positive relation between the consumer price index and the residential real estate index. This indicates that inflation has a direct and significant effect on the value of residential real estate investment in Kenya. The study found a significant and positive relation between money supply and the residential real estate index. This indicates that amount of money in circulation has a direct and significant effect on the value of residential real estate investment in Kenya. Accordingly, Akumu (2014) established that changes in gross domestic product, money supply and public debt

positively affect the house price returns whereas changes in domestic interest rates, Kenya shilling US dollar exchange rate, inflation, and rental income negatively affect house price returns.

The results also show a significant but negative relationship between the residential real estate index and the gross domestic product. This indicates that there is an inverse relationship between the gross domestic product and the value of residential real estate investments in Kenya. Feng et al (2010) revealed a positive relationship between housing pricing and economic growth. Grum and Govekar (2016) also revealed that prices of housing units were higher at the countries whose economies were almost at full employment.

The results further indicate that there a positive but insignificant relationship between interest rates and the residential real estate index. This means that interest rates do not have a significant effect of residential real estate investments in Kenya. The results further indicate that there a positive but insignificant relationship exchange rates and the residential real estate index. This means that exchange rates do not have a significant effect of residential real estate investments in Kenya. However, Ojetunde (2013) established a strong and positive correlation between economic factors and the pricing of properties in the country. Granger causality results found a strong correlation between interest rates and rent.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section provides a summary of the findings, the conclusions, recommendation, limitations and areas, which require further research.

5.2 Summary

This study was carried out to assess the effect of macroeconomic factors on residential real estate investment in Nairobi County. The study explored the Q theory of housing investment, the standard Gordon growth model, the modern portfolio theory and the arbitrage pricing theory. To achieve this objective, the study used a descriptive research design and used quarterly secondary data, which covered a period of 10 years from January 2007 to December 2016. The collected data was analyzed through descriptive and inferential statistics. Descriptive statistics comprised of the measures of central tendency among them the arithmetic mean, variance and standard deviation. Correlation and pooled regression analysis made up the inferential statistics.

The summary statistics analysis indicated that average value of the residential property index was 304.46 while the average consumer price index value was 125.47 while the average GDP was 13.61 respectively. The summary statistics also showed that the mean value of broad money supply was 6.1307 while the average value of interest rates was 15.788 whereas the average exchange rates value over the study period was 83.814. Graphically, it was established that the residential property index trend, CPI trend, GDP

trend, broad money supply trend, the trend of interest rates and exchange rates trend had been increasing over the study period but some fluctuations were witnessed in some quarters of the year.

The findings on correlation analysis revealed that there is a weak positive correlation between CPI, GDP and exchange rates and the residential real estate index but a strong correlation between the money supply, exchange rate and residential real estate index. The findings established that 95.27% of the variation in the dependent variable was explained by the independent variables and the pooled regression model was significant since the value of the F statistics was 162.69021 and the P value is 0.00042 less than the significance value of 0.05. The regression coefficient result found a positive and significant relationship between the consumer price index, money supply and the residential real estate index. The results also show a significant but negative relationship between the residential real estate index and the gross domestic product. The results further indicate that there is a positive but insignificant relationship between interest rates, exchange rates and the residential real estate index.

5.3 Conclusions

The findings of the research found a significant and positive relation between the consumer price index and the residential real estate index. The research therefore concludes that inflation has a direct and significant effect on the value of residential real estate investment in Kenya. The research findings found a significant and positive relation between money supply and the residential real estate index. The research thus concludes that amount of money in circulation has a direct and significant effect on the

value of residential real estate investment in Kenya. The findings of this research revealed a significant but negative relationship between the residential real estate index and the gross domestic product. The research therefore concludes that there is an inverse relationship between the gross domestic product and the value of residential real estate investments in Kenya

The finding of this research also found that there a positive but insignificant relationship between interest rates and the residential real estate index. The study based on this finding concludes that interest rates do not have a significant effect of residential real estate investments in Kenya. Finally, the findings of the research established that there was positive but insignificant relationship exchange rates and the residential real estate index. This leads to the conclusion that exchange rates do not have a significant effect of residential real estate investments in Kenya.

5.4 Recommendations

The research concluded that inflation has a direct and significant effect on the value of residential real estate investment in Kenya. This research recommends that the government and other policy institutions should ensure that inflation levels are properly checked so that they do not interfere with investments in the real estate sector since housing is important in any economy.

The research also concluded that amount of money in circulation has a direct and significant effect on the value of residential real estate investment in Kenya. The study therefore recommends that the central bank of Kenya should ensure that there are

adequate amounts of currency in circulation to ensure they boost investment in real estate in Kenya since housing shortage is very rife in the country.

The study further concluded that there is an inverse relationship between the gross domestic product and the value of residential real estate investments in Kenya. This lead to the recommendation that the government should always ensure that there is good economic growth in the country to enable the growth of the real estate sector.

The study also concludes that interest rates and exchange rates do not have a significant effect of residential real estate investments in Kenya. However, the government and policy institutions should ensure that that the level of interest rates and exchange rates are optimal so that they do not affect the cash flows arising from investments in residential real estate.

5.5 Limitations of the Study

This study was carried out using quarterly data from 2007 up to 2016 therefore the findings are only applicable within the study period since macroeconomic factors keep changing from year to year and their effects are different every time they change.

The study also used the Hassconsult property index however there are other property indices provided by other real investment firms in Kenya but they are not publicly available. Finally, the study is limited to the examined macroeconomic variables including inflation, economic growth, money supply, interest and exchange rates.

5.6 Suggestion for Further Research

This study assessed inflation, economic growth, money supply, interest and exchange rates as they key macroeconomic variable. However, the several other macroeconomic variables like unemployment, national income, stock prices and foreign direct investments. The study therefore recommends an additional research using the macroeconomic factors that were not considered by this research.

Finally, a similar study can be carried out using a longer period of time and advanced econometric methods like the granger causality test to establish the bidirectional relationship between real estate investment and macroeconomic variables.

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