EFFECT OF MACROECONOMIC VARIALES ON REAL ESTATE PRICES IN KENYA

BY

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DECLARATION

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

Signed.. Date...

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

Signed.. Date...

Dr. Cyrus Iraya Mwangi

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DEDICATION

To son Ethan and my mother, you have been my inspiration to work harder and aim

higher.

ABSTRACT

The Kenyan real estate market has been experiencing a boom in the past ten years and the latest findings have shown that the trend will continue into the foreseeable future. In a report published by Knight Frank in 2014, real estate in Kenya has rapidly expanded to become the fourth largest contributor to the economy. The study sought to determine the effects of macroeconomic variables on real estate prices in Kenya. Descriptive research design was used and also regression was also used to establish the relationship between macroeconomic variables and real estate prices. The study covered a period of ten years and monthly data was collected from secondary data from documentation from previous studies, property reports and magazines, journals, data from Housing Finance Corporation, Central Bank of Kenya, Kenya National Bureau of Statistics and Hass Consult Limited. Test of significance was carried out using Analysis of Variance (ANOVA). The test was to confirm whether any linear statistical relationship exists between a dependable variable and the predictor variable. The study concludes that real estate prices affect the interest rates; this is because interest rates affect housing affordability and thus demand for new and resale homes and thus an increase in interest rates increase the cost of borrowing. The study also concludes that increase in GDP leads to increased investment in real estates which increase the supply of houses which thus reduce real estate prices. The study also concludes that there was a strong positive relationship between real estate prices and level of money supply and inflation. This is because increase in money supply gives rise to greater inflation uncertainty and this has an adverse impact on real estate market hence increasing the prices. The study recommends that; the government of Kenya through the central bank should regulate the interest rates and inflation growth via the various monetary policies. The Kenyan government through the ministry of infrastructure and treasury should fast track availability of low-cost but good quality housing to majority of the Kenyan population. The government of Kenya through the Central Bank should control the level of money supply in the economy in order to minimize excessive price fluctuations, and promote economic growth. Monitoring money supply would also guard against inflation and ensures stability of prices, interest rates and exchange rates. This protects the purchasing power of the Kenya shilling and promotes investment and economic growth. By doing this it will encourage increased investment in real estate which reduces the prices.

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LIST OF ABBREVIATIONS AND ACRONYMS

CMA: Capital Markets Authority

GDP: Gross Domestic Product at Market Prices

INFR: Inflation Rate

INTR: CBK Average Interest Rates

LMS: Level of Money Supply

NSE: Nairobi Securities Exchange

OECD: Economic Co-operation and Development

REITS: Real Estate Investment Trusts

REP: Real Estate Prices

SPSS: Statistical package for Social and statistical Scientist

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Real estate is a term used to refer to things that are not movable such as land and improvements permanently attached to the land, and ownership rights associated with the real estate are referred to as real property. According to Brueggeman and Fisher (2005) and Pagourtzi, Assimakopoulous, Hatzichristos and French (2003) real estate refers to land and anything fixed, immovable or permanently attached to it such as buildings and fences. Real estate return is based on the two elements income and capital appreciation, the first refers to the housing rent, and the latter refers to the appreciation of the property value over time. Further, it can be divided into different sub-segments regarding type of investment and risk profile; Real estate professionals usually refer to these property types: (i) residential, (ii) retail, (iii) office and (iv) industrial plus a smaller sector of hotels and convention.

The commercial real estate market worldwide is increasingly dominated by institutional investors. This presents a challenge to private real estate investments because individual properties are not bought and sold on a regular basis like stocks and bonds (Kohnstamm, 1995). In the past decades, researchers have been devoting much of their time on the analysis of factors that affect house price dynamics, and it has become the hot issue especially following financial crisis. According to Otrok and Terrones (2005), some of the reasons were the role of housing in an individual portfolio, larger fraction of housing in GDP, larger fraction of household's expenditures in housing, mortgage debt as the major liability of most households and its effect on affordability. Tsatsaronis & Zhu

(2004) illustrated that housing prices influence the business cycle through their effect on the aggregate expenditure and financial system.

The real estate sector in Kenya has been growing at a high rate in recent years. It has attracted many investors, both individuals and institutions. The growing demand for residential and commercial premises is responsible for the booming real estate sector. Population explosion has been experienced in urban areas, especially the city of Nairobi due to rural-urban migration. The demand for housing is still far lower than its supply. Vision 2030 estimates that 200,000 housing units are required per annum, yet only 35,000 are produced (Ruitha, 2010). Home ownership level is low, estimated to be 16% (Ruitha, 2010). In Kenya, real estate markets are not yet well developed in terms of regulation. The real estate market consists of individuals and institutions who/which operate as real estate agents or developers. The Capital Markets Authority (CMA) is currently embarking on enhancing trading on real estates, on the Nairobi Securities Exchange (NSE) through establishing Real Estate Investment Trusts (REITs).

1.1.1 Macroeconomic Variables

Macroeconomic variables are indicators or main signposts signaling the current trends in the economy. They are factors that are pertinent to a broad economy at the regional or national level and affect a large population rather than a few select individuals. Macroeconomic Variables are systematic variables and as such through their impact on the market as a whole they have a direct influence on market risk (Radcliffe, 1998). Macroeconomic variables such as economic output, unemployment, level of money supply, inflation, savings and investment are key indicators of economic performance and are closely monitored by governments, businesses and consumers. The macro-economic

factors are; real GDP, the unemployment rate, the inflation rate, the interest rate, the level of the stock market, and the exchange rate (Khalid et al., 2012).

Inflation is often defined as a sustained increase in prices for a broad range of prices (Gallagher, 2011). According to Blanchard (2000), inflation is the sustained increase in the general price level of goods and services in an economy over a period of time. Inflation rates affect the purchasing power of money. It is theoretically expected that the higher the inflation rate the higher the house prices. The inflation rate measures changes in average price level based on a price index. This index measures the average retail prices that consumer pays. A high or increasing price index indicates the existence of inflation. Higher prices tend to reduce the overall consumer spending which in turn leads to a decrease in GDP. While inflation in itself is not a negative, rapidly increasing rates of inflation signal the possibility of poor macroeconomic health.

An interest rate is the rate at which interest is paid by a borrower for the use of money that they borrow from a lender (Brigo & Mercurio, 2006). Interest rate is a price that relates to present claims on resources relative to future claims on resources. In the real world, price changes are anticipated and this anticipation is part of the process that determines interest rates (Gardener, 1999). According to (Keynes, 1936) interest rates represent the cost of borrowing capital for a given period of time. Due to the fact that borrowing is a significant source of finance for many firms, prevailing interest rates are of much concern to many firms because of indexing of interest rates in some borrowing arrangement; interest rates continue to affect a firm for the whole period that the borrowing arrangement is outstanding (Keynes, 1936).

Money supply or money stock is the total amount of monetary assets available in an economy at a specific time (Cummings, 2010). If Keynes's theory is conceded, increases in money supply lead to a decrease in the velocity of circulation and that real income, the flow of money to the factors of production, increased, hence affecting the real estate market positively (Barkham, 2012). Therefore, velocity could change in response to changes in money supply. The excessive growth in money supply may lead to an inflationary environment and might affect the investments because of higher discount rates (Liow, Ibrahim & Huang, 2005).

A vast literature has investigated the linkages between volatility and macroeconomic and financial variables. Glosten et al. (1993) find evidence that short-term interest rates play an important role for the future market variance. Whitelaw (1994) finds statistical significance for a commercial paper spread and the one year treasury rate. Other research including Hamilton and Lin (1996) and Perez-Quiros and Timmermann (2000) have found evidence that the state of the economy is an important determinant in the volatility of the returns.

The question is what drives property prices? It is believed that it must be related to the macroeconomic variables. This is because macroeconomic variables give an idea about the purchasing power of the people on the street (i.e. GDP, inflation rate). In addition, some of the variables directly or indirectly impacted the purchasing power of people by making property prices cheaper or more expensive (i.e. exchange rate and interest rate). The relationship between property returns and the macroeconomic variable is important to investors' strategies. Pattern analysis based on correlation models reveals the ongoing macroeconomic links with major international property markets. Understanding key real

estate relationships has a strategic implication on real estate decision making and portfolio management. The changing real estate environment can be linked to the macro economy. Knowing the relationship between main macroeconomic variables and real estate performance, and knowing whether these links are consistent or changing over time can provide a useful tool in the decision-making process. Thus, this paper tries to determine whether the above macroeconomic variables do affect property sector index in Kenya. The first motivating factor of this research is simply because it is unclear whether rising house prices in Kenya is actually due to fundamental reasons and not speculative reasons.

1.1.2 Real Estate Prices

House prices are of great interest to real estate developers, banks, and policy makers or, in short, the general public as well as to actual and potential home owners (Schulz & Werwatz, 2004). Real estate pricing deals with the valuation of real estate and all the standard methods of determining the price of fixed assets apply. The price should equilibrate demand and supply in a well functioning market. The fundamental equilibrium price is the price at which the stock of existing real estate equals the replacement cost (Hilbers et al 2001). Therefore in theory a growth in prices indicates growth in demand and hence a growth in the market. Several factors drive the demand of the real estate market. From the long-term perspective, the equilibrium price a household is willing to pay for a house should be equal to the present discounted value of future services provided by the property, i.e., the present value of future rents and the discounted resale value of the house. From the short-term perspective, however, house prices can deviate from their fundamental values, on account of some unique

characteristics of the real estate market (such as asset heterogeneity, down payment requirements, short-sale restrictions, lack of information, and lags in supply). For instance, Leung and Chen (2006) show that land prices can exhibit cycles due to the role of inter temporal elasticity of substitution.

Wheaton (1999) and Davis and Zhu (2004) develop a model in which there are lags in the supply of real estate and bank lending decisions depend on the property's current market value (labeled as historical dependence). They show that in response to a change in fundamental values, real estate prices can either converge to or exhibit oscillation around the new equilibrium values. Previous research has pointed out that monetary policy can impact on housing prices (Bernanke and Gertler, 1995; Mishkin, 2007; Shiller, 2006). In the estimation of the value of residential property, three approaches are used (Brueggeman & Fisher, 2005). They are the sales comparison approach, the cost approach and the income approach. The use of a particular property valuation technique is dependent on property type and the purpose of the valuation. The sales comparison approach estimates the value of a property by making a comparison of the selling prices of recently paid similar properties followed by adjustments for dissimilarities. Income approach states that the market value of an interest in property is equal to the present value of the net income that should come from the property in future. The net income is the gross income less the cost of overheads, such as depreciation of the building stock and its maintenance and upkeep. The valuer's needs to determine the net benefits expected from the property by comparison with similar properties and then determine the market discount rate by analysis of recent sales of similar assets (Dale & Mclaughlin, 1988). The cost approach assumes that the cost of replacement, less appropriate

depreciation, is equal to the value. The problem is to assemble suitable cost data including the cost of the site, and to estimate depreciation rates. The method is particularly useful for insurance purposes, where the cost of site clearance may be added to cover the possibility of a building being destroyed by fire, and for valuing new constructions (Dale & Mclaughlin, 1988).

In Kenya, data from various real estate and housing development firms shows that a two bedroom apartment in Nairobi and most major Kenyan towns is selling for an average $44,048 to $90,000. In high income areas, the cost could go to as high as $95,238. About three years ago, the same units cost between $35,714 and $60,000. Similarly, the prices of three-bedroom apartments vary from $78,350 to $140,285 in high-end suburbs (www.housing.co.ke).

1.1.3 Macroeconomic Variables and Real Estate Prices

Like any other sector of investment, real estate is affected by diverse factors including; fluctuations in exchange rate, interest rate, inflation rate, money supply, national output etc. Bonnie (1998) found that fluctuation in employment results in change in the income which affects house price changes through its effect on demand. Magne &Rady (2002) describes that buying home requires financing. Changes in incomes especially ability of young households to afford down payment affect house price levels. Glaeser, Gyourko & Saks (2005) concluded that the rising of housing prices was related to increasing incomes. Taltavull & Paz (2003) identified that housing prices were related to family wage incomes and population. Inflation, especially the anticipated one, was thought by many researchers to have adherence with housing price changes. Kearl (1979) studied the

impact of inflation on housing investment and found out that inflation was found to affect house prices.

Theoretically, all prices are set by supply and demand. However, it is believed that demand is more relevant in setting up property prices. This is based on the belief that property prices should not exceed property buyers' purchasing power. A few variables that are believed affect demand of property (represented by Property Sector Index or PRP) are economic development, inflation rate, exchange rate and interest rate. Economic development reflects the purchasing power of the people. As economy becomes better and income rises, more people will have better purchasing power and demand for properties will increase. Consequently, the increasing demand will drive property prices. Real Gross Domestic Product (RGDP) as an indicator of Economic Development. Inflation rate will also impacts property prices albeit indirectly. It is expected that as inflation rate increases, most consumer product prices will increase. As a result, there will be less disposable income to be allocated towards property investment which may suppress demand for property. Consumer Price Index (CPI) is used to represent inflation rate. Gubta and Kabundi (2010) concluded that house price inflation was negatively responded by positive monetary shock, but the relative effect was diverse in different regions. Interest rate affects property price because most purchases are done on credit.

Wong, Hui, & Seabrook (2008) made an empirical study on the impact of interest rates upon housing prices of Hong Kong's market. The study was conducted on both inflationary and deflationary periods. The result was that during inflationary period lower interest rates was accompanied by higher house prices, however this was not true during

deflationary period and lowering interest rate did not have impact on falling real housing price.

1.1.4. Real Estate Market in Kenya

Real estate market is defined as one where housing services are allocated by the mechanism of supply and demand. One of the characteristics of the housing market that differs from the goods and services markets is the inelasticity of housing supply. The Kenyan real estate market has been experiencing a boom in the past ten years and the latest findings have shown that the trend will continue into the foreseeable future. In a report published by Knight Frank in 2014, real estate in Kenya has rapidly expanded to become the fourth largest contributor to the economy. Growth over the last 10 years was the real estate industry dislodges the retail sector as the fourth largest contributor to the economy even as traditional sectors such as agriculture, wholesale and financial services continued to diminish. Another reason to anticipate significant growth in the real estate market in the year 2013 is the dropping interest rates. Lower rates have spurred an uptake of mortgages which have in turn fueled the impending housing market boom. In June 2013, the CBK lowered its rate to 8.5%. Statistics show however that despite lower interest rates, less that 200,000 Kenyans have mortgage facilities. Only 6% of Kenyans own their own homes. Mortgage lending is still accessible to only a minority. In 2012, only 1.1% of the top 60% income earners in Kenya have a mortgage (Knight Frank, 2012). This means that there is still a huge deficit in the housing market. Statistics indicate that the demand for housing, which has possibly led to increase in house prices, has been on the rise at a faster rate than the number of houses available or under construction (National Housing Corporation, 2009). The estimate number of houses

constructed annually is about 30,000 whereas the demand is estimate at 150,000 (National Housing Survey, 2013). Another boost to the sector players is the introduction of Real Estate Investment Trusts (REITS) by the Capital Markets Authority (CMA). This will enable real estate companies be listed in the Nairobi Securities Exchange (NSE). It will also enable small investors to have access to an otherwise prohibitive market (Julius, 2012).

Values in Kenya's residential property market continue to rise, amidst robust economic growth and a sharp increase in the population of middle-class. Residential property values in Kenya have skyrocketed a stunning 357% from 2000 to Q3 2014, according to Hass Consult. Interest rates have a major impact on the real estate markets. Otwoma (2013) identified that property prices displayed a high inverse relationship with interest rates in the period December 2000 to May 2003 and November 2011 to June 2013 when interest rates were high. This inverse relationship reverses in the period June 2003 to October 2011, a period when interest rates were relatively low and stable. Another key factor that affects the value of real estate is the overall health of the economy. This is generally measured by economic indicators such as the Gross Domestic Product, employment data, manufacturing activity and the prices of goods, amongst others. In a research conducted by Muthee (2012), the results indicate that there is a relationship between the variables (GDP growth, inflation, and unemployment) revealing that a quarterly change in housing prices yields a quarterly change in GDP. Julius (2012) postulates that level of money supply can influence the level of real estate investments as well as real estate prices.

1.2 Research Problem

House price risk has attracted much attention in recent years. A number of industrialized economies, including the United States, the United Kingdom, and Spain, had witnessed a protracted period of significant increases in house prices in the mid-2000s. As identified earlier the key determinants real estate prices are interest rates, GDP, level of money supply, unemployment and inflation rate. These macroeconomic variables may affect real estate prices negatively or positively. For example interest rates affect house prices by raising the demand. Also, the degree to which each factor impacts the house prices varies. Knowing the relative effect is of paramount importance in making investment decisions as well as policy formulations in a bid to boost the market even further.

Studies have been conducted globally on house prices. In the Kenyan setting, studies done on the real estate sector include Muthee (2012) who sought to determine the relationship between economic growth and real estate prices in Kenya. Jumbale 2012 sought to determine the relationship between house prices and real estate financing in Kenya. Muli (2011) studied the relationship between property prices and mortgage lending in Kenya. Julius (2012) studied the determinants of residential real estate prices in Nairobi.

Though a similar research as this study had been conducted, Julius (2012) study was limited to the city of Nairobi and studied the relationship of house prices with interest rates, level of money supply, inflation rate, population and employment. Other studies have concentrated on the relationship between house prices and one particular variable without the relative comparison of other factors.

1.3 Research Objectives

The general objective of this study was to investigate the effects of Macroeconomic variables on real estate prices in Kenya. The specific objectives of the study are:

i.   To determine the effect of rate of interest on real estate prices in Kenya,

ii.   To investigate the effect of inflation on real estate prices in Kenya

iii. To establish the effect of level of money supply on real estate prices in Kenya

1.4 Value of the Study

Real estate is a major area of discussion and research and the study will provide relevant knowledge in the field of real estate which will be beneficial to academicians. It will also provide a basis for further research in the field and contributes to the literature on effects of macroeconomic variables on real estate prices.

The findings of this study may also be used by the government and other policy making bodies as a guideline in formulation and development of policies that are concerned with real estate sector of the economy. The government as the regulator of real estate sector would benefit with the findings of this study as it would be enlightened on the various approaches that real estate firms can adopt to determine the prices of properties. Information gathered through this study would help the government to formulate policies beneficial in the best approaches in the real estate sector in Kenya.

The financial institutions that provide housing such as commercial banks, savings and credit cooperative organizations, insurance companies and pension funds which have become equity investors in housing projects will benefit from this study. They will understand how interest rates will affect their influx of capital into the real estate

development in order to satisfy their needs for higher yield particularly in the development of new property. The lenders especially those advancing loans mortgages would find the research useful as the findings will be integrated in the loan advancement decisions to real estate investors.

The study will help real estate investors to make informed choices in the real estate property investment. Investors seeking to join or expand in the real estate sector will be able to make informed evaluation as to what is driving the changes in real estate prices and thus be able to make sound decisions. Understanding how macroeconomic variables effect on real estate prices is important to investors' strategies. Financial analysts will also find this study useful in providing information necessary in advising their clients on financial decisions.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter discusses review of past research works on macroeconomic determinants of real estate prices. The chapter discusses issues in relation effects of Macroeconomic Variables on real estate prices in Kenya especially review of the previous studies and materials written on the area of study to enable the researcher establish the factors affecting Real Estate Prices in Kenya.

2.2 Theoretical Framework

The increasing interest in the real estate investment in recent years has naturally caught the interest of academicians. Even though the literature on macroeconomic determinants on real estate is limited, comparison of the different available articles shows similar outcome i.e. that understanding of factors affecting the performance of real estate and management skills within the macro economy is a necessity to obtain good real estate returns. A number of theories have been developed on real estate property prices. These include Portfolio Theory, Agency Theory, Prospect Theory, and Game Theory.

2.2.1 Portfolio Theory and Real Estate

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 increase in expected portfolio returns while maintaining or lowering the portfolio risk. In real estate, a portfolio may consist of offices, apartments, retail and industrial buildings. Offices have volatile rent growth patterns, gross leases with narrowing net margins, and high risk premium on resale lead to most volatile return expectations. Market pricing for office

assets may be too aggressive given the risk, as this product type has the lowest expected returns and most volatility. In apartments there is low rent growth volatility and smallest risk premium on sale lead to low expected return volatility. Investors targeting stability should focus on apartments due to attractive return for every level of risk on a long term perspective. Retail buildings have minimal tenant capital obligations that lead to an excellent return/risk tradeoff. Industrial buildings have minimal tenant capital obligations help to offset volatile market rent growth patterns. With 100% occupancy this portfolio benefits from stable in place dynamics.

Harry Markowitz (1959) introduced the Modern Portfolio Theory (MPT), which attempted to model the benefits of establishing diversification strategies for portfolio investments. MPT is a breakthrough in financial research which has had impact on the practice of Investment management. Any discussion of the theory of stock price behavior has to start with Markowitz (1952 & 1959). The Markowitz model is a single-period model, where an investor forms a portfolio at the beginning of the period. The investor's objective is to maximize the portfolio's expected return, subject to an acceptable level of risk (or minimize risk, subject to an acceptable expected return). As securities are added to a portfolio, the expected return and standard deviation change in very specific ways, based on the way in which the added securities co-vary with the other securities in the portfolio. Feldman (2003) confirms that investments in real Estate companies help reduce the portfolio's total risk and improve overall asset allocation efficiency. Based on this approach a large volume of research has shown that adding direct real estate to the other asset classes leads to significant reductions in portfolio risk.

2.2.2 Prospect Theory

The prospect theory was developed by Tversky and Kahneman in 1979. According to Jordan and Miller (2008), Prospect theory is an alternative to classical, rational economic decision making. Prospect theory emphasizes that investors tend to behave differently when they face prospective gains and losses; investors are much more distressed by prospective losses than they are happy about equivalent gains, and a typical investor considers the pain of losing one dollar to be twice the pleasure received from the gain of one dollar. The prospect theory states that people value gains and losses differently and as such will base decisions on perceive gains rather than losses. Value is assigned to gains and losses rather than to final assets and probabilities are replaced by decision weights. In particular, people underweight outcomes that is merely probable in comparison with outcomes that are obtained with certainty. In addition, the value function is normally concave for gains, convex for losses depicting diminishing marginal value and is generally steeper for losses than for gains.

Decision weights are generally lower than the corresponding probabilities for events which are most probable but higher for those that are less probable (Kahneman & Tversky, 1979). Thus a house seller with a potential loss would be expected to set a higher reservation price than one with a prospective gain. Examining seller behaviour in Boston housing found evidence that loss aversion explained the behaviour of condominium sellers in their choices of asking prices and in their decisions as to whether to accept an offer or not (Genesove & Mayer, 2001). Under prospect theory, a seller with a potential loss compared to his purchase price would be expected to set a higher reservation price than a seller with a prospective gain. The former can avoid or mitigate

loss by setting a sufficiently high reservation price and sticking with it until trade goes through.

2.2.3 Game Theory

Game theory was developed by Van Neumann in 1928, it was only after 1944 when Von Neumann and Morgenstern published their work named "Theory of Games and Economic Behaviour" that the theory received significant attention. Game theory provides a model to study strategic interactions among economic agents in the markets. In game theory, the outcome depends on the number of players in the game, strategies employed by each player, information available to every player and the payoffs of every player for every profile of strategy employed (Duffy, 2012). Decision making of the players is always interdependent. Hence players have to think ahead and devise strategy based on expected moves of other players.

In the real estate market, individuals try to anticipate the moves of other players e.g. financing institutions and make decisions based on that. Developers can use their information advantage to influence consumers' decision and push up the real estate prices. This price game is likely to be a contributing factor in high housing prices (Duffy, 2012). Mu & Ma (2007) have studied game theory in the real estate market in a model with government, land developer and a real estate developer as the players. They concluded that the optimal strategy is cooperation and tax regulation is an efficient way for government to maintain social stability. Ning and Zhanglu (2006) studied the formation of housing price in China's real estate market and found that the developers would always develop and sell property at a high price. Geng and Yun (2006) pointed out that the real estate market is a typical asymmetric information market. The pricing of

commercial real estate and consumers' decision making constitutes a dynamic game with incomplete information. The developers could take their information advantage to influence consumers' decisions and push up the real estate price. Yuanbin (2006) thought that the price game between consumers and speculative investors are one of the factors contributing to the high housing price in China. Research shows that when land and real estate developers make price decision independently, the optimal price is higher than that of cooperative game.

2.2.4 Agency Theory

An agency relationship occurs where one party (principal) engages another party (the agent) to perform a task on their behalf. Real estate market is a classic example of conflict of interest between the principal who is the seller of a house and the agent who is the real estate broker. A study conducted by Arnold (1992) on the principal's-agent relationship between a home owner and her broker revealed two principal-agent problems between them. He first found the existence of agency problem since the broker plays the role as an agent who searches for buyers to purchase the house then advises the owner in setting a reservation price and provides information about current market condition. The broker may have an incentive to provide an inefficiently low level of effort if the owner is unable to monitor the broker's search activity. The second problem was that homeowners are infrequent market participants as they are not fully informed of demand and supply conditions in the housing market while brokers are well informed of market conditions. This makes the owner to rely on the broker in setting a reservation price.

In the real estate market, the principal is the seller or buyer of the house and the agent is the real estate broker (Rottke, 2001). An agency problem occurs in such a relationship

when asymmetric information is available to either party. The different types of asymmetric information that come into play in these relationships include hidden characteristics, hidden information, hidden action and hidden intentions. All these happen in the time between when the investor realizes he has a problem needing a solution and when the action is executed. This asymmetry affects the pricing of real estate because either party may overprice as they speculate the intentions of the other party. These threats can be countered by solution approaches which incorporate management and financial elements into an incentive compatible investment model (Rottke, 2001).

2.3 Determinants of Real Estate Prices

The determinants of real estate prices include: interest rates, GDP, level of money supply, and inflation rate (Mak, Choy, & Ho, 2012).Existing literature suggest that house price movements are closely related to a common set of macroeconomic variables, market specific conditions, and housing finance characteristics. Hofmann(2004) and Tsatsaronis and Zhu (2004) examine the determinants of house prices in a number of industrialized economies and find that economic growth, inflation, interest rates, bank lending, and equity prices have significant explanatory power.

2.3.1 Interest Rates

Interest rate is a price that relates to present claims on resources relative to future claims on resources. It is the price that borrower pays in order to be able to consume resources now (Kwak, 2003). In the real world, price changes are anticipated and this anticipation is part of the process that determines interest rates (Gardner, 1999). According to (Keynes 1936) interest rates represent the cost of borrowing capital for a given period of time. Trends in interest rates affect housing affordability and thus demand for new and

resale homes. An increase in interest rates increases the cost of borrowing. This results in high mortgage repayments thus reducing the affordability and also the demand for property. The linkage between property and bank lending is particularly remarkable, as also highlighted by Herring and Wachter (1999), Chen (2001), Hilbers, Lei, and Zacho (2001), and Gerlach and Peng (2005). This is not surprising given the heavy reliance on mortgage financing in the housing market.

2.3.2 Inflation

Inflation is often defined as a sustained increase in prices for a broad range of products. (Gallagher, 2011). Inflation rates affect the purchasing power of money. Inflation is measured by the changes in the Consumer price index (CPI) which measures the retail prices of goods and services purchased by households (Liow, Ibrahim and Huang, 2005). It is theoretically expected that the higher the inflation rate the higher the house prices. Kearl (1979) studied the impact of inflation on housing investment and found out that inflation was found to affect house prices. Taltavull and McGreal (2009) tried to study the effect of house price expectations on house price on residential properties. The result of the study indicated that price expectations account for 8 percent of the house price in Spanish house market.

Stiglitz (2003) suggested as cited in article (Taltavull and McGreal, (2009) that the reason for price increase was the expectation that higher selling price in future. With regard to the impact of inflation on the housing sector, different views have been held (Kearl, 1979; Hendershott, 1980; Feldstein, 1992; Poterba, Feldstein, 1992). In particular, Feldstein (1994) indicated that increasing inflation serves to reduce people's incentive to invest in real estate, which in turn lowers housing demand. On the other hand, Kearl

(1979) argued that inflation causes nominal housing payments to rise, which implies a lower housing demand. All investors when making decisions are concerned with how inflation will affect investment returns, more so mortgage firms who have long term investments. The rate of inflation is of particular importance to investors and lenders making or purchasing loans made at fixed rate of interest over long period of time.

2.3.3 Money Supply

As indicated earlier, Cummings (2010) presents money supply or money stock is the total amount of monetary assets available in an economy at a specific time. There are several standard measures of the money supply, including the monetary base, M1, and M2. The monetary base is defined as the sum of currency in circulation and reserve balances (deposits held by banks and other depository institutions in their accounts at the Federal Reserve). Increase in money supply gives rise to greater inflation uncertainty and this has an adverse impact on real estate market. The excessive growth in money supply may lead to an inflationary environment and might affect the investments because of higher discount rates (Liow, Ibrahim & Huang, 2005).

2.3.4 Gross Domestic Product

The gross domestic product (GDP) is the total market value overall for all final goods and services produced in a country in a particular year. The formula for the GDP is equal to the total consumer, investment and government spending, plus the value of exports minus the value of imports. The gross domestic product (GDP) is one of the most popular indicators in macroeconomics used by researchers to represent economic conditions (Maclennan and Pryce, 1996). The GDP is considered a popular indicator because of the

relationship between the macroeconomic activity and the housing price (Wheeler and Chowdhury, 1993).

2.3.5 Population Level

Population is the total number of persons inhabiting a country, city, or any district or area. Total demand for property is determined by population size and changes in the structure of the population caused by migration and long-term changes in the birth and death rates. Borowiecki (2009) indicated that residential house price changes were most sensitive to population growth in Switzerland housing economy. Egert and Mihaljek (2007) in his study of determinants of house price dynamics in eight transition economies of Central and Eastern Europe and 19 OECD countries concluded that demographic also played an important role in house price dynamics. This can cause a self-fulfilling speculative price bubble (Levin and Wright, 1997). The finding by Vermeulen and Van Ommeran (2006) states that "people will move to another area where houses are built, but houses are not necessarily built in the area where people would want to live".

2.3.6 Location of the Real Estate

Kagendo (2011) carried out a study to identify the determinants of real estate property prices on the case of Kiambu municipality. The study found that location and realtors were key factors affecting real estate prices in Kiambu municipality.

2.3.7 Real Estate Agency Fees

Kagendo (2011) found that agents played a key role in real estate price determination in Kiambu as many property owners bought their property through them. The agency fees charged by the agents are always included in the final buying prices of the real estate.

2.3.8 Disposable Income

Egert and Mihaljek (2007) in his study of determinants of house price dynamics in eight transition economies of Central and Eastern Europe and 19 OECD countries concluded that labour markets developments also played an important role in house price dynamics.

2.3.9 Construction of New Roads

A study done by Casey (2011) found out the following impacts of highways on property values, the highways provide substantial benefits to highways users, in terms of reduction in travel time, increased access to outlying locations and reduction in vehicle operating costs. The access to benefits accrues to property owners in the form of aggregate increase in property values.

2.4 Empirical Literature

Previous studies conducted on real estate have mainly focused on real estate bubbles, analyzing relationship between real estate market and other economic sectors and changes in real estate prices. Other studies have also concentrated on the determinants of real estate prices in the developed economies. Some of the empirical studies carried include:

Posedel & Vizek (2008) studied house price developments in six European countries that include Croatia, Estonia, Poland, Ireland, Spain and the United Kingdom. The main goal was to explore the factors driving the rise of house prices in transition countries. Because house price increases in the last two decades were not peculiar to transition countries, the analysis was extended to three EU-15 countries that have recorded house price rises. The similarities and differences between the two groups of countries in terms of house price determinants can thus be explored. In the first part of the empirical analysis VAR was

employed to detect how GDP, housing loans, interest rates and construction contribute to real house price variance. In the second part of the analysis multiple regression models were estimated. The results of both methods suggested that the driving forces behind house price inflation in both groups of countries were very similar and encompass the combined influence of house price persistence, income and interest rates.

Mikhed (2009) investigated whether rapidly decreasing U.S. house prices have been justified by fundamental factors such as personal income, population, house rent, stock market wealth, building costs, and mortgage rate. They first conducted the standard unit root and co-integration tests with aggregate data. Nationwide analysis potentially suffers from problems of the low power of stationary tests and the ignorance of dependence among regional house markets. Therefore, they also employed panel data stationary tests which are robust to cross-sectional dependence. Contrary to previous panel studies of the U.S. housing market, they considered several, not just one, fundamental factors. Their results confirmed that panel data unit root tests have greater power as compared with univariate tests. However, the overall conclusions are the same for both methodologies. The house price does not align with the fundamentals in sub-samples prior to 1996 and from 1997 to 2006. It appears that the real estate prices take long swings from their fundamental value and it can take decades before they revert to it. The most recent correction (a collapsed bubble) occurred around 2006.

Egert and Mihaljek (2007) used panel technique in their study of determinants of house price dynamics in eight transition economies of Central and Eastern Europe and 19 OECD countries. They analyzed fundamentals such as real income, real interest rates and demographic factors. They also analyzed the importance of transition specific factors

such as improvements in housing quality and in housing market institutions and housing finance. They established that GDP, real interest rates and housing credit are significant factors affecting house prices in both CEE and OECD countries. Demographic factors and labour markets developments also played an important role in house price dynamics.

Muli (2011) studied the relationship between property prices and mortgage lending in Kenya. The research was inspired by the fact that swings in the property prices have been extremely large in the recent years. This research employed a quarterly database from 2006 to 2010. A dynamic economic model was employed to assess the relationship between housing prices and credit using multiple regression. The study concluded that changes in housing prices are positively and significantly related to the long term evolution of mortgage credit. This result suggests that the evolution of housing prices is not triggered by bank real estate lending and that banks just accommodate real estate financing to the evolution of house prices. Though the study shows a bi-directional causality it concludes that the real estate market does not really affect housing price changes rather changes in housing prices do affect the amount of real estate financing.

Muthee (2012) studied the relationship between Economic growth and real estate prices in Kenya. Tracking the Hass Housing Price Index and Kenya's GDP numbers over a period of five years, data was retrieved from different sources but aligned in equal time and periods, reviewed and subjected to regression analysis and tested for significance. The results indicated that there is a relationship between the variables revealing that a quarterly change in housing prices yields a quarterly change in GDP. The data collected and analyzed indicated that property is a strong asset class which has been under exploited in portfolios. More consideration should be made by institutional investors.

Julius (2012) studied the determinants of Residential Real Estate Prices in Nairobi. Her objective was to evaluate factors that have been affecting the real estate market since there was little empirical study prior to this. In particular she evaluated how interest rates, level of money supply, rate of inflation, employment rate and population growth affected house prices. Using secondary data collected from the Central Bank of Kenya, Kenya National Bureau of Statistics and the Hass Consulting Ltd., a multivariate regression was done using SPSS to establish the relationships. The study found out that employment growth and the level of money supply information can give economists and financial analysts a better understanding of the real estate market and its influence on real estate prices. An increase in interest rates reduces residential real estate prices.

Omboi (2011) conducted a study on the factors influencing real estate property prices in Meru Municipality. The variables used in this study are income of real estate investors, location of a real estate property, demand and realtors and brokers. Income from real estate property was found to be the key factor influencing real estate property prices in Meru Municipality accounting for more than 70% of the changes in property prices other factors remaining constant. Demand for real estates in Meru was found to be the second most important factor influencing real estate prices as it contributed to 20% of the changes in prices. Location of the property and realtors and brokers were found to be insignificant in determining property prices in Meru Municipality.

2.5 Summary of Literature Review

In conclusion, there is wide literature to support residential real estate pricing. The hedonic model though widely used suffers a few setbacks due to the ideal assumptions on which it operates and the likelihood of misspecifications. The prospect, agency and game

theories each try to explain real estate pricing from different aspects and provide a good basis for empirical study.

Most of the studies on effects of Macroeconomic variables on real estate prices have been conducted in developed economies like USA, UK and Sweden and not in developing countries of the Sub Saharan Africa. These economies are different and the effects of Macroeconomic variables on real estate prices may not be the same for different economies. Locally no comprehensive research has been done to cover the whole nation. There is evidence that the real estate market is enlarging not only in Nairobi but also in other parts of the country. Hence there is need to extend the research.

Several studies have been carried out on the determinants of housing prices such as Case and Shiller (1990), Bourassa and Hendershott (1995) and Abelson et al., (2005). In Kenya a study on determinants of real estate prices in Nairobi was done by Julius S. M (2012) a similar study covering Kenya was conducted by Rita W. K (2013). While real estate continues to significantly impact investors in Kenya, there is no adequate information on the pricing to enable them invest wisely. This research aims to fill this gap in study and also provide information to interested stakeholders and concern to investors on key areas of opportunity in the real estate market.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter covered the methodology and procedures used for collecting and analyzing the data in this study. The chapter deals with the type of research design, the population and sampling technique, data collection methods and instruments used as well as data analysis methods suitable to the achievement of the stated objectives.

3.2 Research Design

The study used descriptive design. A descriptive research design is suitable where the study seeks to describe and portray characteristics of an event, situation, and a group of people, community, or a population. It enables the researcher to profile the sample or population by gathering accurate information (Mugenda & Mugenda, 1999). Regression was also used to establish the relationship between macroeconomic variables and real estate prices.

3.3 Data Collection Methods

The study covered a period of ten years and monthly data was collected from secondary data from documentation from previous studies, property reports and magazines, journals, data from Housing Finance Corporation, Central Bank of Kenya, Kenya National Bureau of Statistics and Hass Consult Limited.

3.4 Data Analysis Techniques

Data analysis is the process which start immediately after data collection and ends at the point of interpretation and processing (Mugenda & Mugenda, 2003). A multivariate regression analysis was used to come up with the model expressing the relationship between the dependent variable (Real Estate Prices) and the macroeconomic variables

namely interest rates, level of money supply and inflation rate. The regression model was generated to explore the degree to which macroeconomic variables affect real estate prices. The model was proposed by Green (1997). The form is:

$$y = a + \sum_{I=1}^{n} b1xi + e$$

Translating the variables to our study the formula is applied as follows:

$REP = \beta o + \beta 1 \text{ INTR} + \beta 2 GDP + \beta 3 LMS + \beta 4 \text{ INFR} + \varepsilon$

Where

REP = Real Estate Prices (monthly composite property index by Hass)

β = Regression Coefficient

INTR- CBK Average Interest Rates

GDP- Gross Domestic Product at Market Prices

LMS = Level of Money Supply (aggregate amount of monetary assets, M3)

INFR = Inflation Rate (Monthly change in the Consumer Price Index)

ε = the error term.

3.4.1 Test of Significance

The multiple regression function shown above was to investigate the effect of each of the independent variable on dependent variable at the same time and of the same set of analysis. Test of significance was carried out using Analysis of Variance (ANOVA). The

test was to confirm whether any linear statistical relationship exists between a dependable variable and the predictor variable.

The statements for hypothesis are: HO: $\beta 1= \beta 2= \beta 3=$…................................ $\beta k=0$

HO= $\beta j=0$ for at least one j. These inferential tests will be conducted at 95% confidence. Hypothesis Tests was used to give confidence model an assumption is that the error term ε is normal and independently distributed with a mean of zero and a variance of the square of the standard deviation.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and interpretation of the data collected. The data was obtained from published reports from Kenya National Bureau of Statistics, Central Bank of Kenya, Hass Consult Ltd and the World Bank. Its accuracy, validity and reliability were assumed on the authority of the publishers' credibility as trusted market information sources. The data was then fed into SPSS version 21.0 and used to detect how interest rates, GDP, level of money supply, inflation and location of real estate affect real estate prices, using descriptive and multivariate regression models. The results are presented in two parts: first using descriptive statistics to enable the researcher establish statistical conclusions about the behavior of the data and the inferential statistics to establish the relationship between the dependent and independent variables.

4.2 Descriptive Statistics

In section 4.2 the study present the research finding on the descriptive statistic in the data collected.

Table 4.1: Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
REP	10	16.18	17.04	16.674	0.3206
INTR	10	6.5	15.44	9.075	2.36876
GDP	10	19.5	19.91	19.708	0.13164
LMS	10	19.91	21.41	20.688	0.53913
INFR	10	3.91	26.19	11.116	6.24547

Real estate prices (REP), CBK monthly average interest rates (INTR), gross domestic products at market (GDP), Level of monthly supply (LMS) and inflation rate (INFR)

were used for the study. Their mean, maximum, minimum and standard deviation was taken in to account. From the findings, the study found that there was mean of 16.674 for REP, 9.075 for INTR, 19.708 for GDP, 20.688 for LMS and 11.116 for INFR. On standard deviation REP had 0.3206, INTR had 2.36876, GDP had 0.13164, LMS had 0.53913 while INFR had 6.24547. CBK monthly average interest rates (INTR) had the highest standard deviation hence the highest variation from the mean.

4.3 Correlation

Table 4.2: Correlation

		REP	INTR	GDP	LMS	INFR
	Correlations					
REP	Pearson Correlation	1	.797**	-.664**	.784**	.881**
	Sig. (2-tailed)		0.000	0.001	0.000	0.000
	N	10	10	10	10	10
INTR	Pearson Correlation	.797**	1	-.214	.347	.894**
	Sig. (2-tailed)	0.000		0.353	0.292	0.000
	N	10	10	10	10	10
GDP	Pearson Correlation	-.664**	-.214	1	.684**	-.413
	Sig. (2-tailed)	0.001	0.353		0.001	0.235
	N	10	10	10	10	10
LMS	Pearson Correlation	.784**	.347	.684**	1	.612**
	Sig. (2-tailed)	0.000	0.292	0.001		0.002
	N	10	10	10	10	10
INFR	Pearson Correlation	.881**	.894**	-.413	.612**	1
	Sig. (2-tailed)	0.000	0.000	0.235	0.002	
	N	10	10	10	10	10

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

On the correlation of the study variables, the researcher conducted a Pearson correlation. From the findings on the correlation analysis between real estate prices and various derivatives which were interest rates, GDP, level of money supply and inflation rate. The study found there was a strong positive relationship between real estate prices and the

interest rates as shown by a correlation coefficient of 0.797. The study found there was a strong negative relationship between real estate prices and GDP as shown by a correlation coefficient of -0.664. The study further found there was a strong positive relationship between real estate prices and the level of money as shown by a correlation coefficient of 0. 784. Finally the study found out there was a strong positive relationship between real estate prices and inflation as shown by a correlation coefficient of 0.881.

4.4 Regression Analysis

In this section the study presents the research findings on the relationship between various independent variables on the regression model and financial performance.

Table 4.3: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.886[a]	0.785	0.716	0.071052

a. Predictors: (Constant), INTR, GDP, LMS, INFR

From the table above, R is the correlation coefficient which shows the relationship between the study variables, from the findings shown in the table above there was a strong positive relationship between the study variables as shown by a correlation factor, R 0.886 at 5% significance level. The Adjusted R squared is coefficient of determination which tells us the variation in the dependent variable due to changes in the independent variable, from the findings in the table above the value of adjusted R squared was 0.716 an indication that there was variation of 72% on real estate prices due to changes in interest rates, GDP, LMS and Inflation rate at 95% confidence interval. This is an

indication that 72% of the changes real estate prices could be accounted for by the independent variables.

Table 4.4: ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.9	4	0.225	44.556	.006b
	Residual	0.025	5	0.005		
	Total	0.925	9			

a. Dependent Variable: REP

b. Predictors: (Constant), INFR, INTR, GDP, LMS

From the table above on the processed data, which are the population parameters, the model had a significance level of 0.6% which shows that the data is ideal for making a conclusion on the population's parameter as the value of significance (p-value) is less than 5%. The F critical at 5% level of significance, 4 d.f, 5 d.f was 5.192, while F computed was 44.556, since F calculated is greater than the F critical (value = 5.192), this shows that the overall model was significant, hence there was a significant relationship between the independent variables and the dependent variable.

Table 4.5: Regression Model

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.227	1.357		3.111	.014
Interest Rates	.794	0.269	.876	2.952	.028
GDP	-.638	0.212	.494	-3.009	.018
Money supply	1.474	0.483	1.807	3.052	.022
Inflation Rate	1.862	0.406	1.321	4.586	.011

a. Dependent Variable: Real Estate Prices

$$Y = 4.227 + 0.794\ X_1 - .638\ X_2 + 1.474\ X_3 + 1.862\ X_4$$

From the regression equation above it was found that holding number of interest rates, gross domestic products, money supply and inflation rate to a constant zero, real estate prices would be 4.227. A unit increase in interest rates would lead to increase on real estate prices by 0.794 units. A unit increase in GDP would lead to a decrease in real estate prices by 0.638 units, a unit increase in money supply would lead to increase in real estate prices by 1.474 units and a unit increase in inflation rate would lead to increase in real estate prices by 1.862 units. Overall inflation rate had the greatest effect in real estate prices while GDP had a negative relationship.

At 5% level of significance and 95% level of confidence, inflation Rate had a 0.011 level of significance; GDP had a 0.018 level of significance, money supply had a 0.022 level of

significance while interest rates had a 0.028 level of significance. All the variables were significant ($p<0.05$).

4.5 Discussions of Findings

From the findings the study revealed that there was a strong positive correlation between real estate prices and the interest rates. This is because in the real world, price changes are anticipated and this anticipation is part of the process that determines interest rates (Gardner, 1999). According to (Keynes 1936) interest rates represent the cost of borrowing capital for a given period of time. Trends in interest rates affect housing affordability and thus demand for new and resale homes. An increase in interest rates increases the cost of borrowing. This results in high mortgage repayments thus reducing the affordability making the prices to increase.

The study also found out that there was a strong negative correlation between real estate prices and GDP. This is because GDP is considered a popular indicator because of the relationship between the macroeconomic activity and the housing price (Wheeler and Chowdhury, 1993). The findings were supported by findings by Higgins and Cardew (2004) which indicated a positive relationship between real estate investment and the GDP level which reduces real estate prices. The findings contradicted with findings of Mbugua (2010) who established a positive relationship between house prices and GDP. He also noted that developers always turn to the lenders of housing finance in order to compliment their inadequate finances supported by the high levels of debt financing and the impact it has on value of housing supply.

The findings also revealed a strong positive correlation between real estate prices and level of money supply. This is because increase in money supply gives rise to greater inflation uncertainty and this has an adverse impact on real estate market hence increasing the prices. The excessive growth in money supply may lead to an inflationary environment and might affect the investments because of higher discount rates which lead to increased to increased prices (Liow, Ibrahim & Huang, 2005).

The study also found out that there was a strong positive correlation between inflation rate and level of money supply. The findings were supported by findings by Rossier (2002) who indicated that as inflation falls, real estate investment would increase and vice-versa, an increase in real estate investment would lead to fall in prices. Rising inflation raises the cost of acquiring capital thus lowering the country's capital formation, hence negatively affecting investment leading to increased prices. Also Kearl (1979) studied the impact of inflation on housing investment and found out that inflation was found to affect house prices positively.

The study found that all the variables affected housing prices as per the F-test. This was supported by Muli (2012) who indicated that GDP, interest rates and inflation rates were the major determinants of real estate investment. Karoki (2013) study on Determinants of real estate prices in Kenya using descriptive and multivariate regression models established significant relationships between residential real estate prices and interest rates, GDP, and level of money supply.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

From the analysis and data collected, the following discussions, conclusion and recommendations were made. The responses were based on the objectives of the study. The researcher had intended to establish the effects of Macroeconomic variables on real estate prices in Kenya.

5.2 Summary

On descriptive statistics the study found out that there was mean of 16.674 for REP, 9.075 for INTR, 19.708 for GDP, 20.688 for LMS and 11.116 for INFR. On standard deviation REP had 0.3206, INTR had 2.36876, GDP had 0.13164, LMS had 0.53913 while INFR had 6.24547. CBK monthly average interest rates (INTR) had the highest standard deviation hence the highest variation from the mean.

On correlation, the study found that there was a strong positive relationship between real estate prices and the interest rates as shown by a correlation coefficient of 0.797. The study found there was a strong negative relationship between real estate prices and GDP as shown by a correlation coefficient of -0.664. The study further found there was a strong positive relationship between real estate prices and the level of money as shown by a correlation coefficient of 0. 784. Finally the study found out there was a strong positive relationship between real estate prices and inflation as shown by a correlation coefficient of 0.881.

There was also a strong positive relationship between the study variables as shown by a correlation factor, R 0.886 at 5% significance level. The adjusted R squared was 0.716 an indication that there was variation of 72% on real estate prices due to changes in interest rates, GDP, LMS and Inflation rate at 95% confidence interval. This is an indication that 72% of the changes real estate prices could be accounted for by the independent variables

The ANOVA model had also a significance level of 0.6% which shows that the data is ideal for making a conclusion on the population's parameter as the value of significance (p-value) is less than 5%. The F critical at 5% level of significance, 4 d.f, 5 d.f was 5.192, while F computed was 44.556, since F calculated is greater than the F critical (value = 5.192), this shows that the overall model was significant, hence there was a significant relationship between the independent variables and the dependent variable.

On regression it was found that holding number of interest rates, gross domestic products, money supply and inflation rate to a constant zero, real estate prices would be 4.227. A unit increase in interest rates would lead to increase on real estate prices by 0.794 units. A unit increase in GDP would lead to a decrease in real estate prices by 0.638 units, a unit increase in money supply would lead to increase in real estate prices by 1.474 units and a unit increase in inflation rate would lead to increase in real estate prices by 1.862 units. Overall inflation rate had the greatest effect in real estate prices while GDP had a negative relationship. At 5% level of significance and 95% level of confidence, inflation Rate had a 0.011 level of significance; GDP had a 0.018 level of significance, money supply had a 0.022 level of significance while interest rates had a 0.028 level of significance. All the variables were significant ($p<0.05$).

5.3 Conclusions

The study concludes that real estate prices affect the interest rates; this is because interest rates affect housing affordability and thus demand for new and resale homes and thus an increase in interest rates increase the cost of borrowing. This results in high mortgage repayments thus reducing the affordability making the prices to increase. The study also concludes that there was a negative relationship between real estate prices and GDP. This is because GDP is considered a popular indicator because of the relationship between the macroeconomic activity and the housing price. The increase in GDP leads to increased investment in real estates which increase the supply of houses which thus reduce real estate prices.

The study also concludes that there was a strong positive relationship between real estate prices and level of money supply. This is because increase in money supply gives rise to greater inflation uncertainty and this has an adverse impact on real estate market hence increasing the prices. The study finally concluded that there was a strong positive relationship between inflation rate and level of money supply since rising inflation raises the cost of acquiring capital thus lowering the country's capital formation, hence negatively affecting investment leading to increased prices.

5.4 Policy Recommendations

The study sought to determine the effects of Macroeconomic variables on real estate prices in Kenya. The study recommends that; the government of Kenya through the central bank should regulates the interest rates and inflation growth via the various monetary policies this would help reduce the cost of borrowing and investing which would make investment in real estates affordable thus increasing supply and reducing the

prices.

The Kenyan government through the ministry of infrastructure and treasury should fast track availability of low-cost but good quality housing to majority of the Kenyan population. This can be by way of engaging other countries with a history of cheaper construction technology and enable set up of industries to manufacture the cheaper but quality construction materials.

The government of Kenya through the Central Bank should control the level of money supply in the economy in order to minimize excessive price fluctuations, and promote economic growth. Monitoring money supply would also guard against inflation and ensures stability of prices, interest rates and exchange rates. This protects the purchasing power of the Kenya shilling and promotes investment and economic growth. By doing this it will encourage increased investment in real estates which reduces the prices

5.5 Limitations of the Study

This study was not without limitations. In attaining its objective the study was limited to determining the effects of macroeconomic variables on real estate prices in Kenya over a 10 years period starting from year 2005 to year 2014.

The study was limited to secondary data collected from documentation from previous studies, Central Bank of Kenya, Kenya National Bureau of Statistics and Hass Consult Limited. While the data was verifiable since it came from the publications, it nonetheless could still be prone to shortcomings. Secondary data may also be unreliable as it may be intended for other purposes.

5.6 Suggestions for Further Study

Since the real estates is a major contributor of GDP and economic development in the economy a study can be done on the relationship between real estate industry and GDP. This is because GDP is a reflection of the economy. The study is useful Kenya's economy has grown due to growth of the Real Estate sector, reflected by contribution of the real estate sector to GDP.

A study can be done on an individual factor affecting real estate prices such as the effect of cost of finance on the growth of the real estate industry. Cost of financing is affected by the interest rate hence the study will be able to determine the effect of cot of financing on the growth of the real estate industry.

A study can also be done on how population growth in the country affects the real estate investment in Kenya. This will exclude the variables which are controlled through the monetary policies to determine whether real estate demand through population increase has an effect on investment.

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APPENDICES

Appendix I: Mean House Prices in Millions per year

Year	Mean R.E.P	Log Mean R.E.P
2005	10.665	16.18
2006	11.569	16.26
2007	12.875	16.37
2008	14.892	16.52
2009	18.004	16.71
2010	19.673	16.79
2011	22.015	16.91
2012	23.022	16.95
2013	24.293	17.01
2014	25.189	17.04

Appendix II: Mean Interest Rate per year

Year	Mean Interest Rates
2005	8.43
2006	9.44
2007	8.50
2008	8.88
2009	7.78
2010	6.50
2011	8.48
2012	15.44
2013	8.5
2014	8.8

Appendix III: GDP per Year in Million 000's per year

Year	Mean GDP	Log of Mean GDP
2005	293.81	19.50
2006	312.37	19.56
2007	334.21	19.63
2008	339.32	19.64
2009	348.60	19.67
2010	368.83	19.73
2011	384.98	19.77
2012	402.52	19.81
2013	421.44	19.86
2014	443.77	19.91

Appendix IV: Mean LMS in Million 000's per year

Year	Mean LMS	Log Mean LMS
2005	443.405	19.91
2006	514.378	20.06
2007	598.281	20.21
2008	714.320	20.39
2009	810.541	20.51
2010	1183.284	20.89
2011	1402.907	21.06
2012	1609.326	21.20
2013	1671.59	21.24
2014	1981.36	21.41

Appendix V: Mean Inflation Rate per Year

Year	Mean Inflation
2005	10.492
2006	14.467
2007	9.800
2008	26.192
2009	10.083
2010	3.913
2011	13.977
2012	9.640
2013	5.713
2014	6.884