

**DETERMINANTS OF RESIDENTIAL REAL ESTATE PRICES IN
KENYA**

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DECLARATION

Student Declaration

I hereby declare that this research project is my original work and has not been presented for a degree by myself or any other person from any other institution known or unknown to me.

Signed.....Date

Rita Wachera Karoki

D61/P/8714/2005

Supervisor Declaration

This research project has been submitted with my approval as university supervisor.

Signed.....Date

Mr. Mirie Mwangi

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DEDICATION

To the love of my life, my husband and my best friend, Duncan Gatoto.

To the most beautiful little jewels: my treasured children, Wema, Roni and Joel.

To my dear parents Leah and Charles Kamau and Esther Njeri.

ABSTRACT

The real estate market plays a very important role in any economy. It is known to have a dramatic multiplier effect and is a key economic indicator. The real estate market has experienced significant growth in the last decade with many countries experiencing house price fluctuations. 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. To ensure the economy is properly positioned a study into forces behind the price fluctuations and hence the market growth is paramount. This study investigates the determinants of residential real estate prices. Monthly secondary data for a period of eight years spanning from 2005 to 2012 was collected from publications in government and financial institutions. Descriptive as well as multiple regressions were run using SPSS version 21.0. A multivariate regression model showing the relationship between residential real estate prices and various variables was tested. The results show that there are significant negative relationships between residential real estate prices and interest rates, and positive relationships with GDP, and level of money supply. Interest rates have the most significant effect on house prices followed by GDP and level of money supply. Thus the rise in property prices is well explained by macroeconomic variables. Although the study established a positive relationship between residential real estate prices and inflation rates, the relationship was found to be insignificant. The trend also indicates an overall increase in property prices with time hence the real estate market in Kenya is expected to continue to grow. Even without significant changes in the variables, the effect of time is that house prices increase. This also indicates that the real estate market is significantly stable.

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ABBREVIATIONS

CBK	-	Central Bank of Kenya
CEE	-	Central Eastern Europe
CMA	-	Capital Markets Authority
CPI	-	Consumer Price Index
GDP	-	Gross Domestic Product
KNBS	-	Kenya National Bureau of Statistics
LMS	-	Level of Money Supply
NSE	-	Nairobi Securities Exchange
OECD	-	Organisation for Economic Cooperative Development
REITS	-	Real Estate Investment Trusts
SPSS	-	Statistics Package for Social Sciences

CHAPTER ONE - INTRODUCTION

1.1 Background of the Study

The real estate market plays a very important role in any economy. It is known to have a dramatic multiplier effect and is a key economic indicator. The business dictionary defines real estate as land and anything fixed, immovable, or permanently attached to it such as appurtenances, buildings, fences, improvements, roads, shrubs and trees (but not growing crops), sewers, structures, utility systems and walls. Title to real estate normally includes title to air rights, and surface rights which can be bought, leased, sold, or transferred together or separately. It includes improvements, natural resources and structures both above and below.

The real estate market has experienced significant growth in the last decade. Theoretically, the condition of a market is driven by forces of demand and supply. Demand refers to how much (quantity) of a product or service is desired by buyers. When demand is high, prices of a commodity go up. Higher prices on the other hand decrease the demand of a particular good and service (Baumol & Bunder, 2011). Aggregate supply is the relationship between the economy's price level and the amount that the output firms are willing and able to supply. Therefore Residential Real Estate prices are guided by the relationship between supply and demand.

Many countries have in the past experienced house price fluctuations. This has been associated with economic instability. In many countries, like the U.S., price fluctuations have led to accelerated housing defaults with millions of residential properties having

negative equity mortgages with outstanding loan balances being greater than the property values (Burnside et al, 2011). House prices are a significant indicator of the real estate market because prices are driven by the demand in the market. Demand on the other hand is determined by a number of macro and micro economic factors in an economy. Thus to fully understand the changes and developments in a real estate market, it is important to fully understand the forces behind price fluctuations. Higher property prices also tend to stimulate the economic activity through wealth effects, thereby encouraging investment and consumption spending.

1.1.1 Residential Real Estate Prices

Real estate markets are heterogenous, with a series of geographical and sectoral submarkets that lack a central trading market. Every property is usually unique and information on the market transactions is often not available. The pricing process is usually negotiated and the market is characterized by large transaction costs. The prices of an existing property should theoretically be equal to discounted present value of the expected stream of future income (rents), which depend on expected growth in income, anticipated real interest rates, taxes and other structural factors. 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.

There are two ways to measure real estate demand and these involve an evaluation of real estate investments and real estate prices. As demand for real estate increases, real estate

prices rise and therefore real estate investors will increase their in real estate to meet the demand and therefore it can be said that real estate prices and real estate investments are directly proportional to real estate demand.

The real estate market is a key contributor to the Socio- economic development of nations through creation of employment in construction and other areas. It is also a key contributor to the GDP. For many families, the house is their one major investment representing over 30% of their wealth. Thus house pricing is of utmost importance to them. House prices are also of great interest to real estate developers, banks and policy makers in general.

1.1.2 Determinants of Residential Real Estate Prices

The size and scale of the real estate market makes it attractive and lucrative sector for many investors. House prices are a good indicator of the size of a real estate market. Several factors affect residential real estate prices and hence the growth of the market. These include: interest rates, GDP, level of money supply, and Inflation rate (Mak, Choy, & Ho, 2012).

1.1.3 How the Factors affect Residential Real Estate Prices

Interest rates have a major impact on the real estate markets. Changes in interest rates can greatly influence a person's ability to purchase a residential property. That is because as the interest rates fall, the cost to obtain a mortgage to buy a home decreases, which creates a higher demand for real estate, which pushes prices up. Conversely, as interest rates rise, the cost to obtain a mortgage increases, thus lowering demand and prices of real estate. When

interest rates are low, buyers can afford more homes for their money because less of the mortgage payment goes toward interest charges to the lender. This scenario could draw more buyers into the market, which could lead to multiple bids on houses and an uptick in overall prices. Because the influence of interest rates on an individual's ability to purchase residential properties (by increasing or decreasing the cost of mortgage capital) is so profound, many people incorrectly assume that the only deciding factor in real estate valuation is the mortgage rate. However, mortgage rates are only one interest-related factor influencing property values. Because interest rates also affect capital flows, the supply and demand for capital and investors' required rates of return on investment, interest rates will drive property prices in a variety of ways (Liow, Ibrahim & Huang, 2005).

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 GDP, employment data, manufacturing activity, the prices of goods, etc. The GDP is the market value of all officially recognized final goods and services produced within a country in a given period of time. GDP per capita is often considered an indicator of a country's standard of living. Under economic theory, GDP per capita exactly equals the Gross Domestic Income per capita. When the GDP is low it means that the people's purchasing power is also low hence the demand for real estate and consequently the house prices will decrease. Conversely, when the GDP increases, the purchasing power also increases hence increasing the demand of Real estate and house prices go up. Broadly speaking, when the economy is sluggish, so is real estate. However, the cyclicity of the economy can have varying effects on different types of real estate. For example, an investment in hotels would typically be more affected

by an economic downturn than one in office buildings. Hotels are a form of property that is very sensitive to economic activity due to the type of lease structure inherent in the business. Renting a hotel room can be thought of as a form of short-term lease that can be easily avoided by hotel customers should the economy be doing poorly. On the other hand, office tenants generally have longer-term leases that can't be changed in the middle of an economic downturn (Case et al, 2005).

Money Supply is a broad measure of money in an economy. Increase in money supply gives rise to greater inflation uncertainty and this has an adverse impact on the real estate market. Excessive growth in money supply may lead to an inflationary environment and might affect the investments because of higher discount rate (Liow, Ibrahim & Huang, 2005).

Inflation is often defined as a sustained increase in prices for a broad range of prices (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.

1.1.4 Real Estate Market in Kenya

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 and Citi Private Bank, it was found that luxury homes in

Nairobi, Mombasa, Malindi, and Lamu were ranked among the top-notch residential property markets in the world for attaining the highest rise in prices among properties surveyed globally in 2011. Nairobi was reported to have had the highest growth rate with 25% price increase for top-notch residential properties, followed by Kenyan coastal properties in Mombasa, Malindi and Lamu with 20% price growth. Properties in Miami, Bali, Jakarta, London, Vancouver, Moscow, Toronto, Beijing and Cape Town were rated on the price increase index with 19.1%, 15%, 14.3%, 12.1%, 10.4%, 9.8%, 8.1% and 2.4% in that order (Knight Frank & Citi Private Bank, 2011).

In 2010, growth was higher than expected at 5.6 percent, and this rate is expected to be maintained over the medium term. If growth accelerated to 6 percent, Kenya could reach Middle Income Country status by 2019. This means Kenya is at the threshold of a major demographic transition and is urbanizing rapidly. Each year, Kenya will continue to grow by more than one million people, who will live longer, be better educated, and increasingly live in cities. This social and economic transformation needs to be managed well to catalyze its development impact (World Bank, 2011). This increase in urbanization will affect the demand for housing significantly.

According to UN Habitat Statistics, E.A is the fastest urbanizing region in the world with its urban population expected to double between 2007 and 2017 (UN Habitat, 2013). Nairobi is one of the fastest growing cities in the world. Recent report by the Kenya National Bureau of Statistics, shows that demand for real estate in the urban areas in the last ten years, exceeded supply by more than five times.

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 than 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).

In Nairobi the demand for real estate is at an all time high. With improved infrastructure like the Thika Superhighway, access to utilities, growth in information technology, the performance of the sector continues to grow. A major innovation has been the multibillion – dollar gated communities and mini cities coming up. These include the Kihingo Village, Thika Greens Golf Estate, Fourway Junction, Tatu City, Konza City, Migaa Golf Estate, Roslyn Heights, and EdenVille Estate among others. This has spurred the growth of the sector tremendously. These communities are preferred as they are perceived to present a sense of higher security and provide access to high end facilities like swimming pools and

gyms at a lesser cost than if homeowners were to construct their own. Hence property in these communities has increased in value.

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).

1.2 Research Problem

As identified earlier the key determinants of residential real estate prices are interest rates, GDP, level of money supply and inflation rate. The factors may have a negative or a positive relationship with the house prices. The factors may also affect the market directly or indirectly. 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 relationship 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. Egert and Mihaljek (2007) studied the determinants of house prices dynamics. Selim (2008) studied the determinants of house prices in Turkey for both urban and rural areas. Mak et al, 2012 studied the specific estimates of the determinants of real estate investments in China. Lieser & Groh (2011) studied the determinants of commercial real estate investments. Posedel & Vizek (2009) studied house price developments in six European countries. Alves et al (2011) conducted a research to test other dimensions of asset pricing other than the hedonic modeling.

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' 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. This study sought to extend and fill the research gap by widening the scope to the whole country of Kenya. It also included economic growth as a variable.

1.3 Research Objective

To investigate the determinants of residential real estate prices in Kenya.

1.4 Value of the Study

It is expected that this study will add to the body of knowledge in existence in the real estate field which will be beneficial to academicians. It will also provide a basis for further research in the field. Thus it will make a contribution to the literature on determinants of residential real estate prices.

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. Individuals seeking to own their own homes will also benefit in understanding the market forces and make the best buy. Financing institutions will find this study useful in regard to fluctuations in prices since this affects the long term evolution of real estate financing. The government and regulatory bodies will benefit in knowing how government policies on issues like taxation affect the sector and hence formulate appropriate regulatory framework for enhancing the growth of the sector.

CHAPTER TWO - LITERATURE REVIEW

2.1 Introduction

This chapter brings up the relevant literature relating to residential real estate pricing. First, a review of the theories that guide this study is made to give the research a firm theoretical base. Second, the empirical studies done in this area are also reviewed.

2.2 Review of Theories

2.2.1 Prospect Theory

The prospect theory states that people value gains and losses differently and as such will base decisions on perceived 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 are 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).

2.2.2 User Cost Model

According to the User Cost model, to a homeowner, the cost of using an owning one unit of housing in a given period is the user cost. The cost is made up of the opportunity cost (forgone after-tax returns of housing equity on alternative assets), out of pocket expenses (mortgage interest payments, maintenances, taxes etc) and value variation (depreciation and capital losses). When the user cost of owner- occupied housing is lower than rental price, households would prefer to purchase houses instead of renting and liquidity constraints are likely to be the main deterrence from home ownership (Rosen, 1979).

2.2.3 Efficient Market Hypothesis

The State of the economy is influenced by various forces and the capital market is no exception. Efficiency of the market generates fast responses to the economic factors that surround any investment. Furthermore, market players are increasingly focusing on the real estate industry as the safe mode of investment.

Fama (1991) observed that a market is efficient if it adjusts rapidly to fully reflect all available information, processes the information rationally in that the information is not ignored and systematic errors are not made. In an efficient market, information is quickly reflected in the market prices hence giving no opportunity for abnormal profits. In our

context, it means that the values of real estate and the growth in the sector will be a perfect reflection of all the information available at any one time.

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. 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 parties. 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 residential real estates 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).

2.2.5 Game Theory

Game theory has several features: there are two or more players, some choice of action is to be taken where strategy matters, the game has one or more outcomes (someone wins, someone loses) and the outcome depends on the strategies chosen by all players. Game theory provides a model to study strategic interactions among economic agents in imperfect

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.

2.2.6 Hedonic Model of Pricing

Lancaster's (1966) seminal paper was the first attempt to create a theoretical foundation for hedonic modeling. To this end, Lancaster presented a ground breaking theory of hedonic utility. Lancaster argued that it is not necessarily a good itself that creates utility, but instead the individual "characteristics" of a good that create utility. Specifically, an item's utility is simply the aggregated utility of the individual utility of each of its characteristics. Furthermore, he argued that items can be arranged into groups based on the characteristics they contain. Consumers make their purchasing decisions within a group based on the

number of characteristics a good possesses per unit cost. Although Lancaster was the first to discuss hedonic utility, he said nothing about pricing or pricing models.

Rosen (1974) was the first to present a theory of hedonic pricing. Rosen argues that an item can be valued as the sum of its utility generating characteristics; that is, an item's total price should be the sum of the individual prices of its characteristics. This implies that an item's price can be regressed on the characteristics to determine the way in which each characteristic uniquely contributes to the price. Although Rosen did not formally present a functional form for the hedonic pricing function, his model clearly implied a nonlinear pricing structure.

The application of the hedonic price model to the housing market rests on several key assumptions. First, homogeneity of the housing product is assumed. Another assumption is that the market operates under perfect competition, and there are numerous buyers and sellers with free entry and exit. The model also assumes that buyers and sellers have perfect information concerning housing product and price. Finally, the hedonic price model only works under the assumption of market equilibrium, and that there are no interrelationships between the implicit prices of attributes (Rosen, 1974).

A major issue frequently associated with the hedonic price model is the misspecification of variables where an irrelevant independent variable is included (over-specification), or where a relevant independent variable (attribute of a product) is omitted (under-specification). This can lead to biased and inconsistent coefficients (Rosen, 1974).

The main advantage of this model is that one only needs to have certain information, such as the property price, the composition of housing attributes, and a proper specification of the functional relationships. The marginal attribute prices are obtained by estimating the parameters of the hedonic price function. It is a straightforward approach because only the coefficients of the estimated hedonic regression are needed to indicate the preference structure. No information whatsoever about individual characteristics or personal particulars of either the house buyers or the suppliers is required (Rosen, 1974).

2.3 Empirical Studies

Mak, Choy, & Ho, (2012) studied Region- Specific Estimates of the determinants of Real Estate Investments in China. Their paper utilized a reduced – form equilibrium model to investigate the possible sources of real estate investments differentials among 22 provinces, five autonomous regions and four municipalities of the People’s Republic of China. The model was estimated using panel data from 2001 to 2006, yielding a total of 186 observations. Specifically, empirical results suggested that demographics, economic and planning factors are the major determinants that cause real estate investments to vary among Chinese regions. The relatively small coefficient estimate of real interest rates indicated that it has a significant but modest impact. Based on the coefficient estimates, the paper finally suggested that the Chinese government should focus on several policy parameters in order to achieve a more balanced state of real estate investments across Chinese regions.

Alves et al (2011) conducted a research to test other dimensions of asset pricing other than the hedonic modeling (quality of life in the neighbourhood and macro-economic variables). They collected data about the real estate market in San Paulo City from January 2001 to March 2008. The results were: the longer the maturity of mortgage financing, the larger the housing price, but decreasing interest rate spread stimulated the real estate market. According to the study the hedonic model loses its relative importance in pricing, while market risk variables become much more relevant.

Lieser & Groh, (2011), examined the determinants of commercial real estate investments using a unique set of panel data series for 47 countries from 2007 to 2009. They explored how different Socio- economic, demographic and institutional characteristics affect commercial real estate investment activity through both cross- sectional and time series analysis, running augmented random effect panel regressions. Their results showed that economic growth, rapid urbanization, and compelling demographics attract real estate investments and also confirmed that lack of transparency in the legal framework, administrative burdens of doing real estate business, socio-cultural challenges and political instabilities of countries reduce real estate allocations.

When houses are sold, they come with a deed attached that spells out the legal guarantees on good title. Some deeds give clues about the characteristics of the seller or the house. Using 37,043 observation house price hedonic with a Bayesian spatial error model, Brasington & Sarama, (2008) studied and found out that the type of deed attached to a housing sale can have a dynamic correlation with the sales price. Ten deed types were

found to command a discount while one; in particular the survivorship deed commanded a premium relative to general warranty deeds. Deeds like the quit claim were sold at as much as 100% discount, limited warranty deeds at 19% discount and executors deeds at 8% discount. In addition, mortgage rates for sheriffs and foreclosure deeds were lower than warranty deeds indicating more sophisticated buyers.

Chinese Real Estate Enterprises, broadly affected by factors like sub-prime crisis, stock market turmoil, and fierce market competition have been vigorously seeking new marketing tools, amongst them e-commerce.(Lu, 2012). Sun Lu conducted a questionnaire based study on actual conditions of 27 real estate companies in China. He pointed out that deterministic factors influencing whether to adopt e-commerce business model are: intensity of industry completion, support from senior executives, organization size, costs etc. The factors influencing the choice of an application model of e-business include, inter-alia, the degree of support from senior executives, organization size, compatibility and attached risks. A review of the relationship between e- business model and their performance revealed the disparities in enhancing customer service, growth of economic return and improving overall corporate image. His study would help enterprises tailor their applications to their conditions to achieve an optimized organizational performance.

Selim (2008) using hedonic regression model analysed the determinants of house prices for both urban and rural areas. The study revealed that water system, number of rooms, type of house, pool, house size, type of building and location are the most significant variables affecting house prices.

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 cointegration tests with aggregate data. Nationwide analysis potentially suffers from problems of the low power of stationarity tests and the ignorance of dependence among regional house markets. Therefore, they also employed panel data stationarity 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.

Using a unique 15-year panel of Florida cities that includes both detailed revenue and house price data, Doerner (2011) investigated the pathways whereby a change in house price may affect city revenue per capita and test for symmetric effects during housing booms and busts. For the median-sized city, they found that while increases in house price raise revenues, decreases in price have no effect on revenues. In addition, the former impact is small in magnitude. While the strongest pathway is through assessed values, their results illustrate that a change in house price can also affect other sources of revenue besides ad valorem taxes. The overall conclusion was that movements in Florida housing

markets are only weakly related to a city's property taxes and total revenues per capita, which fails to support the argument portrayed in the popular press that house price changes strongly impact local budgets.

Stadelmann (2010) investigated the robustness of 33 community-specific explanatory variables for house prices in the Swiss metropolitan area of Zurich using Bayesian model averaging. The analysis suggested a new way to perform hedonic variable selection and provides a minimal list of variables which may serve as a priori constraints when predicting house prices or estimating the effect of other community-specific characteristics in a metropolitan area in a highly developed country. In the context analyzed, the main variables which capitalize with a high posterior probability are location-specific real estate characteristics, municipal taxes and expenditure for culture, health and social well-being. Demographic as well as other socio-economic controls seem to be of minor importance.

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 analysed fundamentals such as real income, real interest rates and demographic factors. They also analysed 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.

Posedel & Vizek (2009) studied house price developments in six European countries: 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.

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 analysed indicated that property is a strong asset class which has been under exploited in portfolios. More consideration should be made by institutional investors.

Jumbale 2012, studied the relationship between house prices and real estate financing in Kenya. The objective of the study was to determine the relationship between house prices and real estate financing in Kenya. Causal study design was employed in this research. Purposive sampling technique was used to select the sample. The study purposively selected a total of 20 respondents who formed the sample size of this study. The researcher administered a survey questionnaire to each member of the target population. Secondary data was collected for this study. Quantitative data collected was analyzed by the use of descriptive statistics using SPSS latest version (20.0).Regression analysis was done to establish the relationship between growth in Real Estate financing and house prices. The study found that the changes in housing prices are positively and significantly related to the long-term evolution of real estate financing. 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.

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.

2.4 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.

Empirical studies have also been undertaken on the determinants of house prices globally. 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.

CHAPTER THREE – RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology used to conduct the research and analyse the data collected. We shall review the Research design, Population, Sample design, Data Collection and Data Analysis.

3.2 Research Design

The design of a research can be either descriptive or causal. Causal research involves observing existing phenomena and searching back through the available data to identify relationships. Descriptive design on the other hand is one in which information is collected without changing the environment (i.e., nothing is manipulated). Sometimes these are referred to as “correlational” or “observational” studies. It is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation.

This study uses descriptive research design because it is the best method for collecting information that will demonstrate relationships and describe the situation as it is.

3.3 Population

Target population is the entire set of units for which survey data is to be used to make inferences. It is a well-defined or set of people, services, elements, events, group of things or households that are being investigated (Ngechu, 2004). In this study the population is all

residential real estate including apartments, townhouses, villas, bungalows, cottages and maisonettes.

3.4 Sample Design

Sampling is the process by which inference is made to the whole by examining a part. The purpose of sampling is to provide various types of statistical information of qualitative or quantitative nature about the whole by examining a few selected units. In sampling a scientific procedure is used to select those sampling units which would provide the required estimates with associated margins of uncertainty arising from examining only a part and not the whole. Sampling may either be Random or Systematic. In this study, the researcher used a composite property index published on a quarterly basis for the last 8 years by Hass Consulting Ltd.

3.5 Data Collection

Data can be either primary or secondary. Primary data is gathered directly from the respondents. It can either be quantitative or qualitative where open ended questions are asked. Secondary data is acquired from published materials. Secondary data is mostly collected where a researcher is seeking to establish relationships between variables.

In this study, quarterly secondary data for a period of 8 years was collected from; Central Bank of Kenya regarding interest rates, and level of money supply; Kenya National Bureau of Statistics regarding GDP and inflation rate; and Hass Consulting Ltd regarding Residential Real Estate Prices.

3.6 Data Analysis

Data analysis was carried out by use of Simple Mean, Standard Deviation, Percentages, Regression and Correlation Analysis by use of SPSS.

A multivariate regression analysis was used to come up with the model expressing the relationship between the dependent variable (Residential Real Estate Prices) and the macroeconomic variables namely interest rates, GDP, Level of money supply and Inflation rate . A multivariate regression analysis was used where a particular internal attribute measure may have a significant impact in a multivariate context. The model was proposed by Green (1997). The form is:

$$y = a + b_1x_1 + b_2x_2 + e$$

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

$$RREP = \beta_0 + \beta_2 INTR + \beta_3 GDP + \beta_4 LMS + \beta_5 INFR + \epsilon$$

Where

RREP = Residential Real Estate Prices (composite property index)

β = Regression Coefficient

INTR- CBK Interest Rates

GDP = Gross Domestic Product at Market Prices

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

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

ε = the error term.

The multiple regression function expresses the effect of each of the independent variables on the dependent variable. The value of β will be the degree of the effect on RREP. A positive or negative sign will show the direction of the relationship. The higher the value of β , the higher the effect of that particular variable on RREP (Julius, 2012).

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 was 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 and level of money supply and demographics affect house 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 then inferential statistics to establish the relationship between the dependent and independent variables.

4.2 Descriptive Statistics

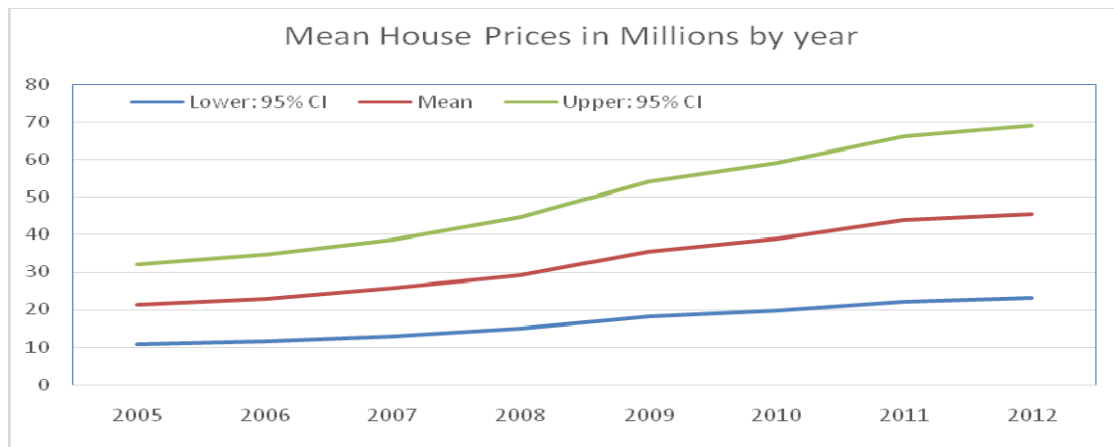
4.2.1 Residential Real Estate Prices

Table 1: Mean House Prices in Millions by year

Year	Mean House Prices	Std. Dev	95% CI	
			Lower	Upper
2005	10.665	0.238	10.528	10.801
2006	11.569	0.556	11.250	11.888
2007	12.875	0.270	12.721	13.030
2008	14.892	1.200	14.204	15.580
2009	18.004	0.835	17.525	18.482
2010	19.673	0.631	19.311	20.034
2011	22.015	0.293	21.847	22.183
2012	23.022	0.848	22.536	23.509

Table 1 shows the mean residential real estate prices from 2005 to 2012. These are prices from a composite index comprising of apartments, townhouses, villas, bungalows, cottages and maisonettes. The prices have risen steadily from KSh. 10.665million in 2005 to KSh. 23.022 million in 2012. This is further presented in Figure 1 below:

Figure 1: Mean House Prices in Millions by Year



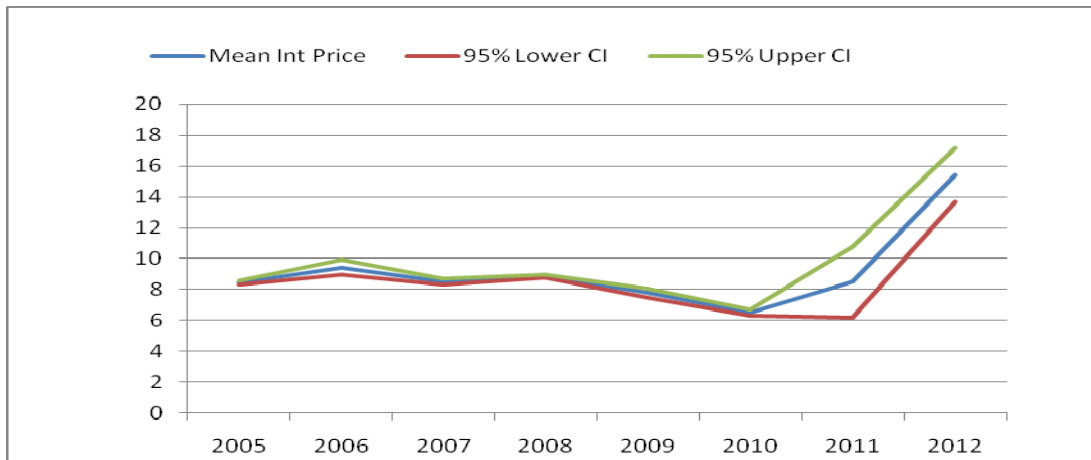
4.2.2 Interest Rates

Table 2: Mean Interest Rates by year

Year	Mean Interest Rates	Std. Dev	95% CI	
			Lower	Upper
2005	8.43	0.26	8.29	8.58
2006	9.44	0.86	8.95	9.94
2007	8.50	0.32	8.32	8.68
2008	8.88	0.13	8.80	8.95
2009	7.78	0.53	7.48	8.08
2010	6.50	0.36	6.30	6.70
2011	8.48	4.04	6.16	10.80
2012	15.44	3.01	13.71	17.16

Table 2 shows the mean interest rates from 2005 to 2012. Interest rates were 8.43 in 2005 and varied over time with the lowest being in 2010 at 6.50 and the highest being in 2012 at 15.44. This is further presented in figure 2 below:

Figure 2: Mean Interest Rates by year



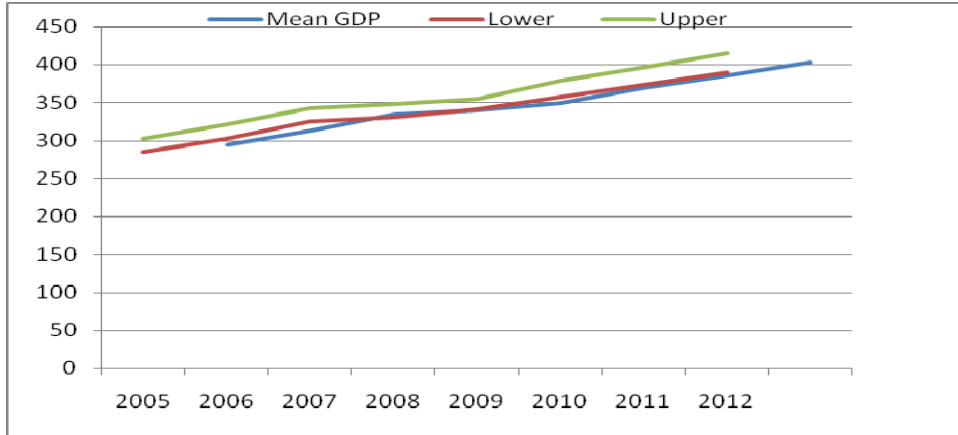
4.2.3 GDP per Year

Table 3: Mean GDP in 000's by year

Year	Mean GDP	Std. Dev	95% CI	
			Lower	Upper
2005	293.81	15.35	285.02	302.61
2006	312.37	16.47	302.93	321.81
2007	334.21	15.38	325.40	343.02
2008	339.32	15.60	330.38	348.25
2009	348.60	12.43	341.47	355.72
2010	368.83	19.56	357.62	380.03
2011	384.98	20.89	373.01	396.95
2012	402.52	23.16	389.25	415.79

Table 3 shows the mean GDP per year from 2005 to 2012 with the lower and upper limits. GDP has risen steadily from 293,810 in 2005 to 402,520 in 2012. Figure 3 below gives a clearer picture of the trend:

Figure 3: Mean GDP in 000's by year



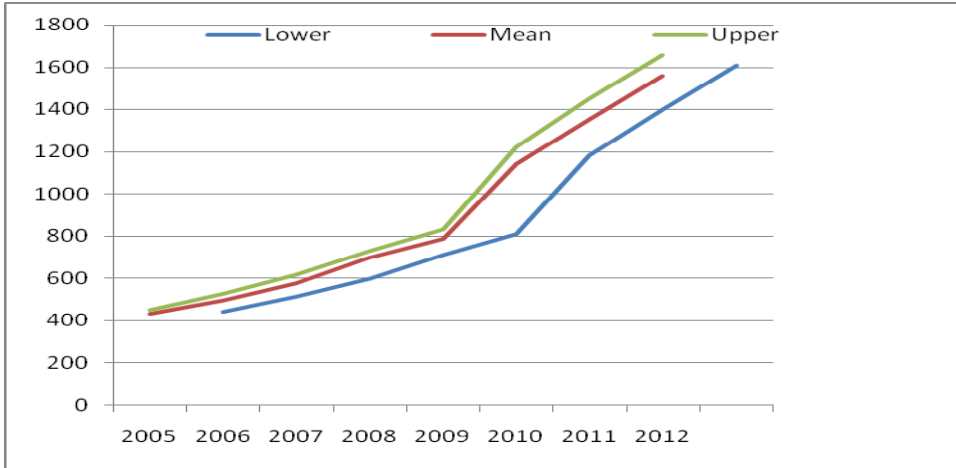
4.2.4 Level of Money Supply

Table 4: Mean LMS in 000's by year

Year	Mean LMS	Std. Dev	95% CI	
			Lower	Upper
2005	443.405	16.707	433.830	452.980
2006	514.378	27.150	498.818	529.937
2007	598.281	33.063	579.333	617.229
2008	714.320	31.418	696.315	732.325
2009	810.541	42.387	786.249	834.833
2010	1183.284	72.386	1141.800	1224.768
2011	1402.907	83.689	1354.945	1450.868
2012	1609.326	86.526	1559.739	1658.914

Table 4 shows the mean Level of Money Supply per year from 2005 to 2012 with the lower and upper limits. Level of money supply has risen steadily from 443,405 in 2005 to 1,609,326 in 2012. Figure 4 below gives a clearer picture of the trend:

Figure 4: Mean LMS in 000's by year



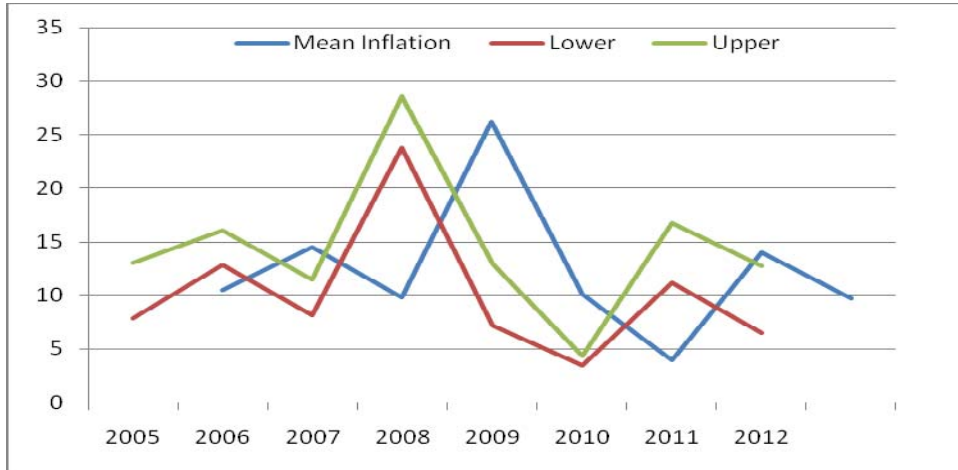
4.2.5 Inflation Rates

Table 5: Mean Inflation Rates by year

Quarter	Mean Inflation	Std. Dev	95% CI	
			Lower	Upper
2005	10.492	4.498	7.914	13.070
2006	14.467	2.827	12.847	16.087
2007	9.800	2.849	8.167	11.433
2008	26.192	4.210	23.779	28.605
2009	10.083	4.965	7.238	12.928
2010	3.913	0.714	3.503	4.322
2011	13.977	4.854	11.195	16.758
2012	9.640	5.448	6.518	12.762

Table 5 shows the mean Inflation rates per year from 2005 to 2012 with the lower and upper limits. Interest rates varied significantly over the years going as high as 26.19% in 2008 and as low as 3.9% in 2010. Figure 5 below gives a clearer picture of the trend:

Figure 5: Mean Inflation Rates by year



4.3 Inferential Statistics

Inferential analysis in this study is used to determine whether there is a relationship between the independent variable and the independent variables as well as the strength of that relationship. This study uses a Bi-variate regression as well as a multiple regression analysis to determine the strength of the relationship between the dependent and the independent variables.

4.3.1 Bi-variate Regression Analysis

Table 6: Bi-variate analysis: Regression analysis on the association between housing prices and other variables

Variable	95% CI					P-Value	R-square
	Constant	β Coefficient	Lower	Upper	Upper		
Interest Rates	12.907	0.401	0.110	0.692	0.007	0.074	
GDP (in 000's)	-20.877	0.108	0.094	0.122	0.000	0.821	
Inflation	18.247	-0.135	-0.224	-0.045	0.018	0.046	
LMS (in 000's)	6.942	0.011	0.010	0.012	0.000	0.932	

Table 6 shows the relationship between residential real estate prices with each of the other variables while holding the others constant. The results show that there is a relationship between each of the variables with the house prices. Holding all other factors constant, a unit increase in interest rates would lead to 0.401 increase in residential real estate prices. Likewise, a unit increase in GDP would lead to 0.108 increase in the house prices. A unit increase in inflation rates, on the other hand would lead to 0.135 decrease in house prices. This may be explained by the high variations of inflation rates over the period hence measuring the short term effect of the changes. A unit increase in the level of money supply would lead to 0.011 increase in residential real estate prices. The p- values denotes the level of significance of each variable and shows that each of the variables taken separately is significant in determining the residential real estate prices.

4.3.2. Multiple Regression Analysis

Table 7: Multiple regression analysis on the predictors of housing prices between 2005 and 2012

Variable	β Coefficient	95 % CI		p-Value
		Lower	Upper	
Interest Rates	-0.201	-0.279	-0.122	0.000
GDP (in 000's)	0.016	0.003	0.029	0.017
Inflation LMS (in 000's)	0.024	-0.008	0.055	0.138
Constant	0.010	0.009	0.011	0.000
R-squared	3.51			
number of cases	0.95			
DoF	96			
F	4, 91			
Prob > F	444.64			
	0.000			

Table 7 shows the relationship between residential real estate prices and four variables in relation to the other variables. A total of 96 data points were used by use of monthly data for eight years. This gives the research more accuracy.

The results give us the model indicating that all factors being constant, residential real estate prices would be KSh. 3.51 million. However, after incorporating the variables the model becomes:

$$\mathbf{RREP = 3.51 - 0.201INTR + 0.016GDP + 0.024INFR + 0.01LMS + \varepsilon}$$

Where,

RREP = Residential Real Estate Prices

INTR- CBK Interest Rates

GDP = Gross Domestic Product at Market Prices

LMS = Level of Money Supply (M3)

INFR = Inflation Rate

4.3.3. Discussion

The results indicate that the Y- intercept is 3.51. Holding all other factors constant, residential real estate prices would be KSh 3.51 million. The coefficients of correlation indicate the way each of the variables “go together” with house prices. When taken in consideration with other variables, which is the ideal situation, interest rates now have a negative correlation with the house prices. A unit increase in interest rates would lead to 0.201 decrease in house prices. Unit increases in GDP leads to 0.016 increase in house prices. A unit increase in inflation rates would lead to 0.024 increase in house prices. A

unit increase in the level of money supply would on the other hand lead to 0.01 increase in houses prices. These coefficients indicate the extent to which each of the variables affect the house prices. From the results a change in interest rates would have the highest effect on the house prices. The lower and upper limits indicate the short term effects of the variables on house prices. In the short term inflation could also have a negative relation. This is likely to be the case because inflation rates also affect interest rates.

. The p- values indicate the level of significance of each of the variables to house prices. A value of less than 5% show that the variable is significant. This shows that interest rates and LMS are the most significant determinants of residential real estate prices followed by GDP. On other hand, although the co-efficient for inflation rate shows a positive correlation, the p-value of more than 10% indicates that it is insignificant. This is apparent in that despite high variations in inflation rates, the house prices continued to rise over time hence other factors were more significant.

The R- square of 0.95 gives the coefficient of determination. This indicates that 95% of changes in the residential real estate prices can be explained by the determinants studied. Due to the reliability of the data having come from published government and financial institutions the model is likely to be accurate as indicated by the prob>F of 0.000.

CHAPTER FIVE - SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The purpose of the study was to investigate the determinants of residential real estate prices. The researcher sought to confirm theoretical relationships between house prices and interest rates, GDP, and level of money supply.

Descriptive as well as inferential statistics were obtained. The study found out that residential real estate prices have increased over time from KSh. 10.665million in 2005 to KSh. 23.022 million in 2012. Interest rates have varied from period to period with the lowest mean interest rates being in 2010 at 6.50 and the highest being in 2012 at 15.44. GDP has risen steadily from 293,810 in 2005 to 402,520 in 2012. The mean levels of money supply have risen steadily from 443,405 in 2005 to 1,609,326 in 2012. Interest rates varied significantly over the years going as high as 26.19% in 2008 and as low as 3.9% in 2010.

The regression analysis indicates that holding all factors constant, the residential real estate prices would be KSh. 3.51 million. A relationship was established between all the variables and residential real estate prices. The positive relationship between interest rates and house prices when all other factors are held constant as reversed by the introduction of the other variables in the multiple regression. A unit increase in interest rates would lead to a 0.201 decrease in residential real estate prices. A unit increase in GDP would lead to a 0.016 increase in house prices. A unit increase in the level of money supply would lead to 0.01

increase in house prices. A unit increase in inflation rates would lead to 0.024 increase in house prices. Although this coefficient is higher than that of GDP and level of money supply, the p- values show that interest rates and LMS have the most significant effect on house prices while the effect of inflation rates is insignificant.

The study went further to establish a model which incorporates the effect of time on the house prices. This showed that from year to year the real estate prices increase by a coefficient of 0.38 million in 2006 to 5.273 million in 2012. This may be explained by other factors not included in this study as well as effect of time.

5.2 Conclusions

This study concludes that there are significant relationships between residential real estate prices and interest rates, GDP, and level of money supply. Interest rates have the most significant effect on house prices followed by GDP and level of money supply. Thus the rise in property prices is well explained by macroeconomic variables. Although the study established a positive relationship between residential real estate prices and inflation rates, the relationship was found to be insignificant.

The trend also indicates an overall increase in property prices with time hence the real estate market in Kenya is expected to continue to grow. Even without significant changes in the variables, the effect of time is that house prices increase. This also indicates that the real estate market is significantly stable.

5.3 Policy Recommendations

From the findings and conclusions, the sustained increase in residential real estate prices is explained by macroeconomic fundamentals. Financial analysts should realize the need to sensitize their clients on the monitoring these factors so as to be able to make informed predictions of residential real estate prices. Investors would also be encouraged to invest in the real estate market which is relatively stable.

Government should also closely monitor interest rates and maintain it at reasonable levels. This is because of the significant effect they have on the house prices and they determine lending rates and hence drive the demand through increased or reduced access to financing.

The study also recommends that government takes a proactive role in collecting and analysing data on housing. The data available was very scanty and very important in making policy decisions.

5.4 Limitations of the Study

The study encountered various limitations which hindered access to information. The first limitation was limited information regarding house prices. He researcher had to rely on information from one real estate company regarding residential real estate prices. No information was accessible from other institutions including government institutions responsible for housing. However, the researcher did establish that the real estate company collects data from 20 other institutions and compiles a composite index. Hence the data is believed to be reliable. The study further sought to increase the reliability and accuracy by

stretching the period of study to 8 years and using monthly data hence establishing 96 data points.

The study also experienced a limitation in collecting data on other variables such as demographics and number of houses on offer. The study could have covered more variables but with time constraints, information regarding number of houses constructed per month or number of houses on offer for sale could not be obtained. This information would have assisted the study to incorporate supply as a variable. Likewise, information regarding number of household per period to establish demand was not available.

5.5 Suggestions for Further Research

The findings of this study set a ground for further research in the a number of areas. First, the results indicated that inflation rate is insignificant in determining house prices. Further studies could be done to confirm these findings and get explanations.

Secondly, the findings indicated most changes in residential real estate prices could be explained by the determinants examined. It is not clear why this is so as the coefficients of correlations were relatively small. Further studies could seek explanations for this.

This study faced the limitation of unavailable data. However there were indications that government is working to collect and analyse data relating to housing in its efforts to achieve vision 2030. With more information available, the study should be extended to include more variables like demographics and supply side of housing.

From the findings it was not clear why a bi-variate regression showed a positive correlation between interest rates and house prices while the multiple regression showed a negative one. More studies should be done to establish the short term and long term effects of interest rates and residential real estate prices.

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APPENDICES

Appendix 1: Data for Residential Real Prices per Quarter

Y= Residential real estate prices

Quarter	Average Prices
2005 Q1	10,327,531
2005 Q2	10,679,370
2005 Q3	3,602,993
2005 Q4	10,842,062
2006 Q1	10,973,816
2006 Q2	11,200,411
2006 Q3	11,819,583
2006 Q4	12,282,800
2007 Q1	12,564,342
2007 Q2	12,764,759
2007 Q3	12,940,715
2007 Q4	13,230,342
2008 Q1	13,487,888
2008 Q2	14,246,628
2008 Q3	15,353,991
2008 Q4	16,479,519
2009 Q1	17,093,536
2009 Q2	17,557,885
2009 Q3	18,202,382
2009 Q4	19,161,037
2010 Q1	19,207,918
2010 Q2	19,237,051
2010 Q3	19,624,350
2010 Q4	30,931,658
2011 Q1	21,637,352
2011 Q2	22,217,417
2011 Q3	22,249,551
2011 Q4	21,954,148
2012 Q1	22,025,546
2012 Q2	22,483,319
2012 Q3	23,554,131
2012 Q4	24,026,169

Source: Hass Consult Ltd

Appendix 2: Quarterly GDP at Market Prices

Quarterly GDP Values		
Year	Quarter	GDP
2005	1	281,335
	2	277,857
	3	303,053
	4	313,004
2006	1	298,153
	2	295,111
	3	327,868
	4	328,338
2007	1	319,289
	2	319,696
	3	348,672
	4	349,189
2008	1	322,757
	2	326,599
	3	357,649
	4	350,258
2009	1	342,820
	2	332,800
	3	364,423
	4	354,344
2010	1	347,744
	2	352,979
	3	390,817
	4	383,763
2011	1	364,549
	2	365,470
	3	406,453
	4	403,440
2012	1	378,795
	2	381,962
	3	425,119
	4	424,209

Source: Kenya National Bureau of Statistics

Appendix 3: Quarterly Inflation Rates

Inflation Rates Per Quarter		
Year	Quarter	Rate
2005	1	14.30
	2	14.23
	3	7.67
	4	5.77
2006	1	17.80
	2	12.97
	3	11.80
	4	15.30
2007	1	7.47
	2	7.70
	3	12.57
	4	11.47
2008	1	19.70
	2	29.13
	3	27.43
	4	28.50
2009	1	17.03
	2	10.20
	3	7.47
	4	5.63
2010	1	4.58
	2	3.68
	3	3.33
	4	3.84
2011	1	7.05
	2	13.16
	3	16.51
	4	19.19
2012	1	16.87
	2	11.78
	3	6.38
	4	3.53

Source: Kenya National Bureau of Statistics

Appendix 4: Quarterly Level of Money Supply, M3

LMS Quarterly Values		
Year	Quarter	Amount
2005	1	428,743
	2	431,830
	3	446,857
	4	466,190
2006	1	478,763
	2	504,457
	3	528,507
	4	545,783
2007	1	557,650
	2	581,440
	3	615,595
	4	638,440
2008	1	673,720
	2	716,890
	3	719,543
	4	747,127
2009	1	761,007
	2	789,807
	3	824,550
	4	866,800
2010	1	1,086,504
	2	1,160,438
	3	1,224,547
	4	1,261,646
2011	1	1,305,511
	2	1,355,670
	3	1,444,592
	4	1,505,853
2012	1	1,509,222
	2	1,564,173
	3	1,640,561
	4	1,723,349

Source: Central Bank of Kenya

Appendix 5: Quarterly CBK Interest Rates

Quarterly Interest Rates		
Year	Quarter	Interest rates
2005	1	8.49
2005	2	8.61
2005	3	8.61
2005	4	8.02
2006	1	8.02
2006	2	9.75
2006	3	10.00
2006	4	10.00
2007	1	8.00
2007	2	8.50
2007	3	8.75
2007	4	8.75
2008	1	8.75
2008	2	9.00
2008	3	9.00
2008	4	8.75
2009	1	8.38
2009	2	8.00
2009	3	7.75
2009	4	7.00
2010	1	7.00
2010	2	6.75
2010	3	6.38
2010	4	6.00
2011	1	5.88
2011	2	6.25
2011	3	6.63
2011	4	15.17
2012	1	18.00
2012	2	18.00
2012	3	14.75
2012	4	11.00

Source: <http://www.tradingeconomics.com/kenya/interest-rate>