

**THE RELATIONSHIP BETWEEN SELECTED  
MACROECONOMIC VARIABLES AND THE PERFORMANCE  
OF REAL ESTATE PROPERTIES IN NAIROBI COUNTY**

**BISHAR ADAN HASSAN**

**D63/79410/2015**

**A RESEARCH PROJECT SUBMITTED IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD  
OF THE DEGREE OF MASTER OF SCIENCE IN FINANCE,  
UNIVERSITY OF NAIROBI**

**2016**

## DECLARATION

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

Signature: .....

Date.....

**Bishar Adan Hassan**

**D63/79410/2015**

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

Signature: .....

Date.....

Dr. Kennedy Okiro

Lecturer,

Department of Finance and Accounting

University of Nairobi

## **ACKNOWLEDGEMENT**

This research would not have been possible without the support of my supervisor Dr. Kennedy Okiro. I am deeply thankful to him for his dedication, invaluable guidance, scholarly support and commitment of time throughout this process, without this the research would not have been a reality.

I thank God for his blessings and good health. I also could not have completed this journey without the love and encouragement of my family and friends and I express my gratitude and deep appreciation to them for their tireless support.

## **DEDICATION**

I dedicate this research project to my family and friends for their love, support, patience, encouragement and understanding. They gave me the will and determination to complete this research project.

## TABLE OF CONTENT

<b>DECLARATION.....</b>	<b>ii</b>
<b>ACKNOWLEDGEMENT.....</b>	<b>iii</b>
<b>DEDICATION.....</b>	<b>iv</b>
<b>LIST OF TABLES .....</b>	<b></b>
<b>LIST OF ABBREVIATION.....</b>	<b>vii</b>
<b>ABSTRACT .....</b>	<b>ix</b>
<b>CHAPTER ONE : INTRODUCTION.....</b>	<b>1</b>
1.1 Background of the Study .....	1
1.1.1 Selected Macroeconomic Variables.....	2
1.1.2 Performance of Real Estate Properties .....	4
1.1.3 Effects of Selected Macroeconomic Variables on Performance of Real Estate Properties .....	5
1.1.4 Real Estate Properties in Nairobi County .....	5
1.2 Research Problem .....	6
1.3 Objective of the study .....	8
1.4 Value of the study .....	9
<b>CHAPTER TWO : LITERATURE REVIEW.....</b>	<b>10</b>
2.1 Introduction.....	10
2.2 Theoretical Review. ....	10
2.2.1 Decision theory and real estate investment .....	10
2.2.2 Appraisal Theory .....	13
2.2.3 Property Development Model. ....	13
2.3 Determinants of Performance of Real Estate Properties.....	14
2.3.1 Interest Rate.....	14
2.3.2 Inflation Rates .....	16
2.3.3 Unemployment Rate.....	17
2.3.4 Real GDP.....	18
2.3.5 Real Estate Property Prices .....	18
2.4 Empirical Review.....	19

<b>CHAPTER THREE : RESEARCH METHODOLOGY .....</b>	<b>24</b>
3.1 Introduction.....	24
3.2 Research Design.....	24
3.3 Population .....	24
3.4 Data Collection .....	24
3.5 Data Analysis .....	25
3.5.1 Analytical Model .....	25
 <b>CHAPTER FOUR : DATA ANALYSIS RESULTS AND DISCUSSION .....</b>	 <b>27</b>
4.1 Introduction.....	24
4.2 Reliability Analysis.....	27
4.3 Descriptive Analysis .....	27
4.4 Correlation Analysis .....	28
4.5 Regression Analysis.....	29
4.6 Interpretation of the Findings.....	33
 <b>CHAPTER FIVE:SUMMARY CONCLUSION AND RECOMMENDATIONS</b>	<b>35</b>
5.1 Introduction.....	35
5.2 Summary .....	35
5.3 Conclusion .....	36
5.4 Recommendations for Policy .....	37
5.5 Limitations of the Study.....	37
5.6 Areas of Further Studies .....	38
 <b>REFERENCES.....</b>	 <b>39</b>
<b>APPENDICES .....</b>	<b>42</b>
APPENDIX 1: DATA.....	42

## LIST OF TABLES

Table 4.1: Reliability Statistics .....	27
Table 4.2: Descriptive Statistics for the Averages of Variables .....	28
Table 4.3 Correlation Analysis .....	29
Table 4.4: Model Summary .....	30
Table 4.5: ANOVA .....	31
Table 4.6: Distribution of Coefficients .....	31

## **LIST OF ABBREVIATION**

<b>GDP</b>	Gross Domestic Product
<b>OLS</b>	Ordinary Least Squares



## **ABSTRACT**

Real estate is basically property consisting of land and the buildings or various improvements that have been done on such a property. Real estate properties are the improvements done on land through the construction of buildings on the land. The study sought to find out to establish the relationship between selected macroeconomic variables on the performance of real estate properties in Nairobi County. The study investigated factors such as interest rate, inflation rate, unemployment rate and real GDP. The study adopted descriptive research design. The study targeted real estate property prices, inflation rates, unemployment rates and real GDP data for a period of 5 years (2009-2013) in Nairobi County. Data was collected from the Kenya National Bureau of Statistics for all the variables for the period of 5 years. The study found that there was a positive correlation between real estate property prices, interest rate and inflation rate. It found that the interest rate can increase real estate property prices, hence improving its performance. An increase in interest rate results to an increase in real estate performance and vice versa. The study also found that inflation rate leads to increase of property prices, which contributes a better performance of real estate properties. This means that an increase in inflation rate results in an increase in real estate performance and vice versa. However, the study found a negative correlation between real estate property prices, real GDP and unemployment rate. A decrease in real GDP results to a decrease in real estate performance and vice versa. The unemployment rate is affecting real estate property prices negatively lowering performance of real estate properties. The study recommends further studies should be done in various other counties so as to determine which factors are considered in the determination of real estate property prices.



# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background of the Study**

Globally, the real estate market has shown significant fluctuations since the 1960s. According to Du Toit (2005), real estate property market has been in a boom worldwide since the year 2000 and this is considered as the largest financial bubble experienced so far. This is attributed to the fact that real estate market indicators such as the real house price level, house prices as a ratio of income levels and rentals have reached their peak in the records, growing at double digit rates in many developed countries such as the USA, UK, Canada and Australia, and other developing countries.

Nel and Mbeleki (2005) assert that internationally, real estate prices have probably been catching up with other asset prices since 2000. Two factors have been mentioned as the key drivers for this boom in the real estate market. These are traditionally low interest rates and the outstanding performance of property compared to other asset classes such as equities.

The number of properties in comparison to the demand in the country is not at all equal to the supply of such properties due to the fact that the growth rate of demand outweighs the supply. Vision 2030 estimates 200,000 units are required yet only 35,000 are produced. This was an opportunity that many investors have taken up in the real estate sector properties in Kenya. In the last decade, Kenya's real estate has been anything but robust. The real estate boom survived the 2008 Post Election

Violence and global economic downturn that crippled other sectors such as tourism and agriculture. The construction sector is approximated to have created 82,000 private sector jobs in 2010 (Mulupi, 2012).

Theory of prices asserts that the market price reflects interaction between two opposing considerations; on one side are demand considerations based on marginal utility, while on the other side are supply considerations based on marginal cost, (Messah & Kigige, 2011). This basically means that the prices of various real estate properties had key factors that determine them. One had to have proper information of such factors in order to ascertain the right prices for such properties. In free markets there is need for valuers to advice buyers and sellers on market value, but the need to define value and valuation practice, in form of national and international standards only emerged in the 1970's (Mackmin, 1999). There were international standards that determine the value of given properties and the proper valuation of real estate properties must be done so as to ascertain their correct price. This valuation is considered by a number of underlying factors. There are a wide range of purposes for which valuation are required; these range from valuations for purchase, sale, transfer, tax assessments, exploration, inheritance or estate settlement, investment and financing (Bonbright, 1937). This shows the various importance's of valuations being carried out from time to time.

### **1.1.1 Selected Macroeconomic Variables**

Debelle (2004) describes that the significant rise in the household debt for the past two decades in the developed countries was found to be lowering interest rates and decreasing the number of credit constraints of mortgage loans. In addition to this,

most households that had variable mortgages were found to be very sensitive with small changes in interest rates because of the impact on their incomes and asset prices. Ferrer, Gonzalez, & Soto (2010) also supported this fact for the very sensitiveness of the price of high-levered industries like construction and real estate to changes in interest rates.

Wong et al. (2003) state that rental rates and the real value of assets are positively related. Furthermore, the real cost of housing occupancy is adjusted to include the real cost of holding housing capital, the gains from inflationary expectations and losses from deflationary expectations. Therefore, since the real cost of housing capital is included as a major determinant of housing demand, expected inflation or deflation is relevant for housing decisions.

The demand for houses generates housing industry investment and helps the recovery of the GDP growth rate. (Ong, Factors Affecting the Price of Housing in Malaysia, 2013). Lui et al carried out a research and found that since commercial housing investment was the largest and the most important segment in real estate development investment in China, its rapid growth inevitably lead to a high growth rate of real estate investment. The Monetary Policy Analysis Group of People's Bank of China (2002) reports that, of the GDP growth rate of 7.3% in 2001, 1.3 percent was directly contributed by the real estate sector and 1.9-2.5% was directly or indirectly contributed by the real estate sector. This implied that the real estate sector accounted for 30% of the GDP growth rate in 2001.

### **1.1.2 Performance of Real Estate Properties**

The real estate business was one of the most growing businesses with high performance in various developing countries. There are various factors that this business had done very well in such areas and many investors had seen it as a possible business venture. It was a profitable business and this can be seen by the numbers of buildings that had been put up in various locations around Nairobi, Real estate prices in Kenya had doubled even tripled in the past few years. The prices of real estate properties had been constantly increasing more than the economic growth in the country since most of these prices cannot be afforded by the normal Kenyan, In Africa, changes in real estate property markets have led to a growing interest in studying the relationship between macroeconomic variables on the performance of real estate properties. The real estate property market in South Africa has performed extremely well from 2000 to 2007. According to Nel and Mbeleki (2005) the South African real estate property market, with a record of 21.4%, 32.1%, 23.3% annual nominal real estate price growth rates in 2003, 2004 and 2005 respectively has performed outstandingly above all real estate property markets of selected developed countries.

Maun (2007) affirms that between 2000 and 2006, the real estate property market in Ghana experienced strong average real price growth of about 14.5% per annum and approximately 20% per annum in nominal terms. However, the average annual nominal house price growth rate<sup>^</sup>was 6.4% during the first six months of 2008, compared with 15.6% in the first half of 2007.

### **1.1.3 Effects of Selected Macroeconomic Variables on Performance of Real Estate Properties**

During the period in 2011 and part of 2012 the real estate sector growth had a severe negative effect this was due to the high interest rates that were experienced during the period. This lead to a lot of construction of properties being postponed and left hanging for some time due to the mortgage interests at the time going to as high as 30%. However, with the fall of interest rates the sector picked up and the growth rate increased. This was from a study carried out by Knight Frank for the 3rd quarter for the year ended 2012.

There various factors that affect the prices of such real estate properties. Some of the known factors are the financing used to finance construction of such properties, demand and supply of such properties in the markets, economic conditions of the country in which such properties were in, cost of the material used in the construction of such properties, size or square meter of such real estate properties and also the income that an individual earns is also a key point in the determination of the price. Such factors are general factors that affect some areas greater than others and for this reason various locations around the region had to be carefully studied so as to properly ascertain the main factors that affect the prices of such properties in the location/area.

### **1.1.4 Real Estate Properties in Nairobi County**

An office space market largely remains a buyer (lessee) market because of the oversupply of space. Out of the CBD offices remain more attractive largely because of the parking and traffic congestion problems. Demand of low income residential

housing in Nairobi outstrips the supply. The middle income market activity is far from optimal with mostly flats built. The move by mortgage houses to make credit cheaper was enhancing activity in this sector. The situation in the high income residential market sector is quite different. There were many vacant houses and few people seeking either to rent or purchase (Knight Frank, 2012).

Nairobi occupies an area of about 700 km<sup>2</sup> at the southeastern end of Kenya's agricultural heartland (Tibaijuka, 2007). There are various corporations that are venturing on starting their business in Kenya and this was an opportunity for real estate developers to sell their real estate properties to such corporations.

## **1.2 Research Problem**

According to Wolff (2010), unlike the purchase made at retail stores, real estate prices were not fixed. This basically means that the prices of various properties are always dependent on various factors that have to be looked at before the final price is determined. These factors are of high significance due to the different locations that various properties are found in. Messah and Kigige (2011) alludes that no two real estate properties are alike, but some are similar enough to compare prices. This basically means that most properties had different prices due to a given number of factors.

Messah and Kigige (2011) pointed out that real estate sellers try and sell for as much as they can and buyers try to buy for as little as they can. This was a concept that highly applies throughout the globe and this was the reason there are standardized procedures for the valuation of such properties so as to be able to attain the proper value/price for the real estate properties.



Based on the economic theory on a research carried out in Malaysia, house price movements were inherent in the regional demographics and regional economics, such as population, real property gains tax, house finance, inflation rate and cost of construction (Ong, Factors Affecting the Price of Housing in Malaysia, 2013). The theory of demand and supply enables us to understand the determination of prices and quantities in different markets (Mudida, 2009). These are mostly the factors that had been identified to affect the prices of real estate property prices. Countries had various economic markets and no one economic market of a country can be exactly the same as another economic market of a different country. Since every economic market is different from the other some factors may apply in one market but not in another market.

Kenya's economy expanded overall by 4.9 per cent in the first quarter 2011 compared to 4.3 per cent in the same period in 2010; the real estate sector, renting and business services grew by 3.8 per cent in the same period which analysts attribute to a more vibrant property market and shifting consumer demands (Waithaka, 2011).

Research in the real estate property market is important because this market is considered as a component of the basic pillars among cash, bonds and equity of any well-diversified portfolio. This arises from the idea that investors may feel more comfortable with owning a tangible fixed asset rather than "paper" assets (Luus, 2003). Secondly, according to Brooks and Tsolacos (1999), it is important to establish empirically the relationship between selected macroeconomic variables on the performance of real estate properties to facilitate the prediction of property market returns. This project therefore sought to determine whether there exists a relationship

between these factors and the performance of real estate properties in Nairobi County. The study sought to answer the following research questions: what is the relationship between interest rate and performance of real estate property in Nairobi County? What is the relationship between inflation rate and performance of real estate property in Nairobi County? What is the relationship between the unemployment rate and performance of real estate property in Nairobi County? What is the relationship between real GDP and performance of real estate property in Nairobi County?

### **1.3 Objective of the study**

The objective of the study was to establish the relationship between selected macroeconomic variables on the performance of real estate properties in Nairobi County.

The specific objectives of the study were:

- i. To determine the relationship between interest rate and performance of real estate property in Nairobi County.
- ii. To find out the relationship between inflation rate and performance of real estate property in Nairobi County.
- iii. To determine the relationship between the unemployment rate and performance of real estate property in Nairobi County.
- iv. To find out the relationship between real GDP and performance of real estate property in Nairobi County.

## **1.4 Value of the study**

Boye (2012) states that, due to the increasing significance attributed to real estate and its value in the process of taking various economic and political decisions, it had become necessary to develop and propagate knowledge of real estate buildings as well as the principle and methods of valuation. This basically means that it had become a matter of the whole economy to gain proper knowledge of the real estate properties and their proper valuation since the real estate sector had become one of the major areas that contribute to the economy of various countries all around. The central government could use such information to be able to properly plan for the 2030 vision and since Nairobi was one of the major cities in Kenya where most businesses are found it will be of importance to get this information so as to be able to assist in the continued growth of the county.

The information of this research would be of importance to the County Government which can help it plan for the county's future. With the introduction of county governments getting such information was critical so as to keep record of the various factors that affect the prices of real estate properties around Nairobi.

It would also be of relevance to the financial analysts in determining the analysis of various real estate property prices around Nairobi. This information could also be useful to the developers so that they could be able to know the factors that they were to take into consideration when pricing such properties so as not to overprice or under price such properties.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews the existing literature about macroeconomic variables and performance of real estate properties. It discusses the theoretical review, selected macroeconomic variables, empirical literature and presents the summary of the literature review.

#### **2.2 Theoretical Review.**

Housing demand and supply changes are usually used to model house price dynamics (Naylor, 1967; Arcelus and Meltzer, 1973). Therefore, one can distinguish between changes in housing demand and supply when examining house price dynamics. The housing property market can be classified into four interrelated sub markets namely; newly built houses not yet sold or occupied; new rental units; previously occupied units being; offered for resale; and previously occupied units offered for rent (Naylor, 1967). Therefore, when discussing housing models one needs to distinguish carefully between the supply of existing units and that of new units. The focus of this study is the stock of existing real estates.

##### **2.2.1 Decision theory and real estate investment**

Explains that the focus of decision theory is on the mathematical models. These may be probability based; loss functions or other forms of statistical representations of judgments. Yet, much of decision theory does not lie entirely within any one discipline: it draws on psychology, economics, mathematics, statistics, social sciences

and many other areas of stud'. Investigates investors' perceptions and attitudes towards real estate. Highlights the important difference between theoretical exposure levels and pragmatic business considerations. Suggests a prescriptive model to explore judgments, beliefs and preferences of decision makers and to inform decision making. Examines the concept of risk and its place in developing a prescriptive model. Maintains that a decision must be judged on factors other than the risk of a single outcome.

Egert and Mihaljek (2007) assert that the key determinants on the demand side of the housing property market generally consist of changes in house prices ( $pH$ ), household disposable income ( $Y$ ), financial wealth ( $WE$ ), housing expected rate of return ( $e$ ), the real interest rate charged on housing loans ( $r$ ), demographic factors and labour market determinants ( $D$ ), and other demand determinants ( $X$ ) such as the state of housing, age, location, and institutional factors for example financial development which affect individuals<sup>5</sup> access to loans for housing purposes. Thus, Egert and Mihaljek (2007) mathematically represent the demand function for the housing market as follows:

$$DH = f(P, Y, r, WE, D, e, X) \dots\dots\dots(1)$$

In the short-run, housing supply is assumed to be fixed given the fact that land is fixed in supply and also that it is not feasible to increase the supply of housing in a short time (Hort, 1998). According to Seidel (1978) (Windapo and Iyagba, 2007), house prices and rents tend to reflect at least over the long-term, the cost of producing that house. Thus, changes in housing supply imply changes in the long-term supply of housing. In addition, Egret and Mihaljek (2007) state that the long-run supply of

housing generally depends on the construction business's profitability, which on the other hand, is considered to depend positively on house prices (pH) and negatively on real construction costs (C). Real construction costs include wages and salaries of workers (W), the price of land (pL), and costs of building material (M). Egert and Mihaljek (2007) mathematically represent this as follows:

$$SH = f(P, C(P, W, M)) \dots\dots\dots(2)$$

As shown in Equation 2 above, the long-run supply of housing is positively related to the level of house prices. This is so because of the law of supply and the fact that since supply of land is fixed, land prices tend to rise with the size of the housing stock, that is, as land for development becomes more scarce (Hart, 1998).

Assuming an equilibrium condition in the house property market, house prices can be mathematically represented as follows:

$$PH = f(Y, r, WE, D, e, X, C(P, W, M))$$

Therefore, Equation 1.3 tells us that equilibrium real house prices arise from the interaction between the forces of supply and demand for housing. However, this does not mean that there are no volatility in house prices. In several countries it is commonly discovered that the volatility of house prices is extensively greater than the anticipated volatility as given by the changes in the key factors of demand and supply. Additionally, long-run dynamics of house prices may be influenced considerably by factors such as housing finance structure and tax management of owner occupation (Egert and Mihaljek, 2007).

### **2.2.2 Appraisal Theory**

An appraisal, in itself, is nothing more than an opinion of value. This does not imply, however, that one opinion is necessarily as good as another; there are valid and accurate appraisals, and there are invalid and inaccurate appraisals. The validity of an appraisal can be measured against the supporting evidence from which it was derived, and its accuracy against that very thing it is supposed to predict - the actual behavior of the market. Each is fully contingent upon the ability of the appraiser to record adequate data and to interpret that data into an indication of value. Appraising real property, like the solving of any problem, is an exercise in reasoning. It is a discipline, and like any discipline, it is founded on fundamental economic and social principles. From these principles evolve certain premises which, when applied to the valuation of property, serve to explain the reaction of the market. This section concerns itself with those concepts and principles basic to the property valuation process. One cannot overstate the necessity of having a workable understanding of them.

### **2.2.3 Property Development Model**

A property development model creates a theoretical concept of property development practice that is able to be generalized. This is no mean feat as will be revealed, since property development occurs across many sectors of property which have their own distinct natures (residential, commercial, industrial, hospitality and so on). In addition to this, property development is not of itself 'real estate' but is seen by the author as a particular state of transition or change in the form of real estate toward a different state with an associated change in potential or real value e.g. a rezoning of land, development application, subdivision, construction of a titled property etc. Of interest

and confounding the ability to define also, is the fact that for a particular form of real estate that is in such a state of transition, much of it can remain invisible to the naked eye; the site that has changed hands, the site that is undergoing a development approval or rezoning again can seem, to the uninvolved to be in a static state. Add to this the fact that to change a form of real estate into a different ‘titled property’ that is another form of real estate may take years if not decade::, and pass from hand to hand in the process, between various actors at transaction points like a baton. The discussion below explains the determinants of housing property prices and returns.

## **2.3 Determinants of Performance of Real Estate Properties**

The global literature on the real estate property market suggests that there are several key determinants that probably affect the performance of the real estate property market by affecting house prices and returns. According to Standish et al. (2005) such variables include nominal and real interest rates, real GDP, the nominal and real exchange rate, the effect of the securities market as represented by the All share index and the cost of construction. Clarke and Daniel (2006) also add business confidence, motor vehicle sales, gold and oil prices, and transfer costs as determinants of house prices. Other important determinants include the rate of unemployment, the yield spread, inflation rate, unexpected inflation and the dividend yield (Brooks and Tsolacos, 1999).

### **2.3.1 Interest Rate**

Brooks and Tsolacos (1999) suggest that the interest rate (nominal or real) as a macroeconomic series usually reflects the state of the current and future business environment and investment opportunities. Generally, a rise in interest rates increases



the cost of borrowing as loan repayments become more costly. In other words, it can be safely stated that high interest rates tend to increase the burden of debt settlement. Follain (1982) (in Wong et al., 2003) states that high rates of interest cause financial problems for households which may lead to a decrease in the demand for housing. Thus, a high prime rate leads to high mortgage repayments, reducing the affordability and ultimately the demand for property. Therefore, interest rates and housing property prices (and returns) are inversely related (Clarke and Daniel, 2006). Many researchers share the above view and note that interest rate related variables are key drivers of real estate returns.

Windapo and Iyagba (2007) consider the supply side of housing by analyzing the determinants of housing construction costs in Nigeria. They state that capital or finance is important in any housing development project and the ability of a developer to channel enough funds for the project determines its success. Thus, most developers are forced to look for funds from many sources including financial institutions which most of the time charge high interest rates. This will lead to a rise in housing construction costs and ultimately increases house prices, *ceteris paribus*. Thus, in summary either a positive or negative relationship between interest rates and house prices and returns can be expected.

At the aggregate level the approximately equal and opposite signs on the nominal mortgage rate and the inflation rate indicate that there were changes in real interest rates that affect the real growth rate of Australian house prices (Otto, 2006). Joe Wong, Eddie Hui, & Seabrook (2003) 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.

### **2.3.2 Inflation Rates**

According to Brooks and Tsolacos (1999) the effects of inflation rate are examined by using different elements of inflation, namely, the actual inflation rate and unexpected inflation.

Unexpected inflation is the difference between actual inflation and anticipated inflation. When inflation is anticipated, house prices would increase, *ceteris paribus*. This is so because when inflation increases, the investment market for income-generating properties recognizes the need to include an estimated growth rate in future yearly income (Wong et al. 2003). In other words, changes in inflation and house prices are positively related, thus when inflation rises or is expected to increase, house prices (and ultimately nominal housing property returns) will also increase, all other things remaining constant. However, in the case of an inflation targeting framework, when inflation rises, interest rates will be increased to curb inflation. This will lead to a higher cost of borrowing which decreases housing demand and house prices.

It had long been recognized that the existence of inflation raises the value of real assets relative to financial assets that are not hedged against inflation risks. From the research carried out in Korea the results easily confirmed that a rise in the

inflation rate would raise the price of real asset relative to that of financial asset. Inflation had direct effects, not necessarily positive, on the real value of housing (Pukthuanthong-Le & Roll, 2009). In addition Tsatsaronis and Zhu (2004) showed the strong and long-lasting link between inflation and house pricing. During inflation most things in the economy would increase their price as a result cost of raw materials for buildings would go up and this then drove the cost of real estate properties as well (Ong, Factors Affecting the Price of Housing in Malaysia, 2013).

### **2.3.3 Unemployment Rate**

Assume that the housing and labor markets are in equilibrium. Now, suppose that there is an unfavorable shock on the demand for labor which results in a decrease in wages and salaries and a rise in unemployment, *ceteris paribus*. The increase in unemployment will imply a decrease in disposable income for the affected workers and hence a fall in demand for housing. Durability of housing means that the short-run supply of housing is fixed hence house prices will decrease in this case (Vermeulen and Ommeren, 2005). In short, house prices decrease as the unemployment rate increases, *ceteris paribus*. Zenou and Smith (1995) and Brueckner and Zenou (1999) indicate that unemployment and house prices have a negative relationship.

From the review of the theoretical literature on housing property markets above, it can be noted that there are mixed expectations about the relationship between the housing market and most of the macroeconomic and financial variables considered.

However, having analyzed the theory of the housing property market, the next section reviews the empirical literature on the house property market and its macroeconomic determinants.

#### **2.3.4 Real GDP**

GDP is a measure of overall economic activity. Thus, a change in real GDP implies a change in real economic growth which may directly impact on the housing property market. In addition, economic certainty that arises from a rise in real GDP results in high business confidence. Hence, it is argued that a rise in economic growth will lead to a rise in the demand for property. This will lead to a rise in house prices and thus housing property returns, *ceteris paribus*. Furthermore, real GDP growth means the level of occupants' willingness to pay increases, which further leads to a general increase of rental rates, *ceteris paribus* (Peng and Hudson-Wilson, 2002). Therefore, one can expect changes in real GDP and housing property returns to be positively related (Clarke and Daniel, 2006).

#### **2.3.5 Real Estate Property Prices**

Leung (2003) developed a model, in which a persistent economic growth had a long run effect on housing prices. Leung showed that a long-term increase in housing prices can result from a persistent economic growth and suggests that persistent price run-ups recently observed in several cities and countries in Asia and North America may be due to the persistent economic growth in these regions.

The findings of a study carried out in Hong Kong showed to have a number of implications. First, real estate prices, office and residential prices in particular, were

found to lead GDP growth. Therefore, movements in real estate prices could be used to forecast GDP growth. Second, since real estate prices lead GDP, policies that stabilize residential prices were also likely to stabilize economic growth. Third, any policy that suppresses or deters the real estate sector, especially the residential sector, was likely to negatively affect economic performance. Similarly, any policy that stimulates real estate prices would also stimulate the economy. (Chui & Chau, 2005). At the same time, GDP was affected by residential prices (Hui & Yiu, 2003). Another study done by Chau and Lam (2001) on speculation and property prices in Hong Kong revealed that nominal GDP is a leading indicator of housing price. Chau (2001) suggested that due to the high land price policy and importance of the property sector in Hong Kong, its economic performance had been dependent on the performance of the property market, which means that property price led to economic growth and drove inflation. According to Coulson and Kim (2000), as consumption forms a large part of GDP, it was reasonable to expect that housing prices would have a leading relationship to GDP.

## **2.4 Empirical Review**

The linkage between the real estate market and equity market arise from the twofold nature of property as a financial asset in capital markets and as a factor of production in the space or industrial markets (Hakfoort, 1994). Fisher (1992) also suggests that the rental income stream generated in the space market is a cash flow valued in the capital market. Corporate growth in profitability (expected or actual) results in business expansion as well as increasing rental levels given the inelastic short-run supply in the real estate market. An increase in rental rates result in high capital values in the capital market (both through increased income and reduced

capitalization rates). This ultimately increases net asset values and prices for property companies, property unit trusts, and real estate investment trusts (REITs) (Lizieri and Satchell, 1997).

The real estate and equity markets and lagged values of these markets between peaks and troughs in the economy can also be expected to be inversely related. Harvey (1982, 1985) (in Lizieri and Satchell, 1997) states that if profitability decreases in the industrial sector, investors will switch capital into the real estate market in pursuit of higher profits. In the equity market (and hence in the exchange-traded property company sector), the adjustments should be faster than in the direct, non-exchange traded market. For instance, a switch of capital into the real estate market will reduce capitalization rates and hence increase capital values. Indication of this will only materialize after completion of sales. In turn, this will be shown in the published net asset value of property companies only after revaluation (which often occurs annually).

Conflicting results have been obtained from such research as some conclude that the real estate and stock markets are segmented and this implies that there is no co-movement between the two markets, while the other strand of studies finds that these two markets are integrated implying a significant positive contemporaneous co-movement (Gyourko and Keim, 1992). On the other hand, Ambrose et al. (1992) and Yang (2005), show that the real estate and stock markets are integrated by using both linear and nonlinear causality tests.

Another growing body of literature examines the link between real estate investment trust (REIT) and property share price movements, equity market returns and returns to appraisal based real estate indices (Gyourko and Keirn, 1992; and Eichholtz and Hartzell, 1996). Although the results differ, studies relating property shares to appraisal indices confirm strong correlations, with the share returns tending to act as leading indicators of changes in the appraisal-based real estate index, Gyourko and Keim (1992) indicate that important information about property market fundamentals is impounded in REIT returns, especially when these returns are adjusted to control for general market factors.

Later, Hui and Yue (2006) investigate whether a housing price bubble existed in 2003 in Shanghai and Beijing. The presence of the bubble was inferred from the irregular relationship between the selected key market factors and house prices. Granger causality tests, the reduced form of house price determinants and generalized impulse response analysis were the econometric techniques applied. The variables used as an input in the study are urban household disposable income, GDP, stock price index and the stock of new vacant units in Beijing, Shanghai and Hong Kong. In relation to the influence of the selected market fundamentals of the housing market, the study concludes that house prices and the selected market determinants are integrated and that abnormal interactions exist (Hui and Yue, 2006). This conforms to the findings of the studies on the influence of macroeconomic variables on house prices.

Chan et al. (1990), analyze the impact of selected pre-specified macroeconomic variables using a multifactor arbitrage pricing model and USA data. The five variables used are changes in expected inflation and industrial production, the risk and term structure return factors, and unexpected inflation. The results obtained from the regression analysis show that the equity REIT and NYSE indexes are significantly positively related to the risk and term structure return factors in a consistent way over the sub-periods 1973-1979 and 1980-1987. The indices are also systematically negative, although not always statistically significantly, related to unexpected inflation. However, the impact of changes in expected inflation and industrial production is mixed and insignificant. Both REIT and NYSE indices are significantly positively related to changes in expected inflation in the 1980s, but unrelated (with negative coefficients) in the 1970s.

Ling and Naranjo (1997) examine the influence of selected macroeconomic variables on the performance of real estate returns and analyze whether variables that constantly affect asset returns bear a premium. The authors use nonlinear multivariate regression techniques to estimate jointly the risk factor sensitivities and return premium. The non-linear multivariate regression techniques are used mainly to overcome some of the econometric problems such as the generated regression problems. Furthermore, Ling and Naranjo (1997) apply non-linear multivariate regression methods, in order to overcome the limitation evident in the literature that the fixed- coefficient model<sup>8</sup> may be highly restricted since risk sensitivities and risk premia are confined to be time invariant.



The study concludes that the real Treasury bill rate, real per capita consumption growth rate, unexpected inflation and the term structure of interest rates have a systematic impact on real estate returns. This finding is contrary to that of Chan et al. (1990). Ling and Naranjo (1997) claim that their result of a constantly significant risk premium on consumption rectifies the omitted variables problem evident in the results of earlier research, such as Chan et al. (1990) that ignores consumption as a macroeconomic variable. Instead of analyzing the link between the housing property market and the macro economy, several studies on housing property markets in developing countries focus on housing policy to

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter will cover the research methodology to be used in the collection and analysis of the data so as to find out the effects of the identified factors on the prices of real estate properties around Nairobi.

#### **3.2 Research Design**

According to Ngechu (2006), a research design is a plan showing how the problem under investigation will be solved. The design selects methods to be used to answer the research questions and solve the research problem. This study adopted descriptive research design. Owing to the nature of this study, the design was appropriate. The descriptive design was used to obtain and describe information regarding the relationship between selected macroeconomic variables on the performance of real estate prices.

#### **3.3 Population**

According to Cooper and Schindler, (2003) a population element is the amount of quantitative data on which measurements are being taken. The study targeted real estate property prices, inflation rates, unemployment rates and real GDP data for a period of 5 years (2011 - 2015) in Nairobi County.

#### **3.4 Data Collection**

Secondary data was used for the purpose of this study. Data was collected from

Kenya National Bureau of Statistics for all the variables for the period of 5 years (2011 - 2015) which was the period of the study.

### **3.5 Data Analysis**

The collected data was edited and cleaned for completeness in preparation for coding. Once coded, they were entered into the Statistical Package for Social Sciences (SPSS) version 20 for analysis. Descriptive statistics such as mean and standard deviation was used to describe the variables.

In order to identify the relationship that exists between selected macroeconomic variables on the performance of real estate properties, the study used Ordinary Least Square (OLS) analysis. The OLS regression, also called the constant coefficients model is one where both intercept and slopes are constant, where the cross-section firm data and time series data are pooled together in a single column assuming that there is no significant cross-section or temporal effects.

#### **3.5.1 Analytical Model**

Regression analysis was done using the analytical model below;

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it}$$

Where:

Y = Real Estate

Property Prices

X1 = Interest Rates

X2 = Inflation Rates

X3 = Unemployment Rates

X4 = Real GDP

$\beta = \text{Constant}$

$\beta_{1-4} = \text{Model Coefficients}$

$\varepsilon_{it}$  Error Term

## CHAPTER FOUR

### DATA ANALYSIS RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter presents analyzed data that was collected, interpretation and discussion of findings. Ordinary Least Square (OLS) analysis through correlation and regression models of analysis was used. The section is divided into three sections; descriptive, correlation and regression analysis. The study relied on secondary data only.

#### 4.2 Reliability Analysis

The study used Cronbach statistics to test for reliability. In Cronbach, any alpha of more than 0.7 shows that the data was reliable. The findings are presented in table 4.1 below.

**Table 4.1: Reliability Statistics**

Cronbach's Alpha	No. of items
.921	5

The findings show Cronbach alpha of 0.921 which is more than 0.7 indicating that data was reliable.

#### 4.3 Descriptive Analysis

This section sought to provide a description of the variables for the averages of the variables used in describing the relationship between variables. Results are presented in table 4.2 below.

**Table 4.2: Descriptive Statistics for the Averages of Variables**

	Mean	Std. Deviation	N
Real Estate Property Prices	8.9400	.28810	5
Interest Rate	7.9900	4.78807	5
Inflation Rate	8.4620	3.87655	5
Real GDP	4.4400	1.09711	5
Unemployment rate	9.2800	.08367	5

In the findings above, there were 5 observations which were used for this study for all the variables. Mean score for the dependent variable (Real Estate Property Prices) was 8.94. Mean scores for independent variables, Interest Rate, Inflation Rate, Real GDP and Unemployment rate, were 7.99, 8.462, 4.44 and 9.28 respectively.

The mean for Real Estate Property Prices shows that over the period under study, Real Estate Property Prices was averaging at 8.94%, interest rate averaged 7.99%, inflation rate averaged 8.462% real GDP averaged 4.44% and an unemployment rate averaged 9.28.

#### **4.4 Correlation Analysis**

Pearson correlation was used to examine if there was any correlation or degree of association between selected macroeconomic variables and real estate property prices.

Table 4.3 presents the results.

**Table 4.3 Correlation Analysis**

	Real Estate Property Prices	Interest Rate	Inflation Rate	Real GDP	Unemployment Rate
Real estate Property Prices	1				
Interest Rate	0.052	1			
Spearman's rho Inflation	0.051	-0.4	1		
Rate	-0.205	0.6	0.7	1	
Real GDP	-0.46	-0.58	0	- 0.527	1
Unemployment rate					

The findings show a positive correlation between real estate property prices and interest rate with a correlation coefficient of 0.052. This implies that interest rate can increase real estate property prices hence improving its performance.

The findings also show a positive correlation between real estate property prices and inflation rate with a correlation coefficient of 0.051. This implies that inflation rate leads to increase of property prices which contribute a better performance of real estate properties.

However, the findings are showing a negative correlation between real estate property prices and real GDP with a correlation coefficient of -0.205. The findings also show a negative relationship between unemployment rate and real estate property prices. This shows that unemployment rate is affecting real estate property prices negatively lowering performance of real estate properties.

#### **4.5 Regression Analysis**

A multivariate regression model was used to determine the relationship between selected macroeconomic variables (Interest Rate, Inflation Rate, Real GDP and

Unemployment rate) and real estate property prices. This involved the use ordinary least squares (OLS). The resultant regression model was as follows;

$$Y_{it} = \beta_0 + \beta_1 X1_{it} + \beta_2 X2_{it} + \beta_3 X3_{it} + \beta_4 X4_{it} + \varepsilon_{it}$$

Where:

Y = Real Estate Property Prices

X1 = Interest Rates (annually)

X2 = Inflation Rates (annually)

X3 = Unemployment Rates (annually)

X4 = Real GDP (annually)

$\beta_0$  = Constant

$\beta_{1-4}$  = Model Coefficients

$\varepsilon_{it}$  = Error Term

To conduct regression analysis using ordinary least squares, the researcher ran a model in which all the variables under study were included. Table 4.4 presents the model summary.

**Table 4.4: Model Summary**

Model	R	R square	Adjusted R Square	Std Error of the Estimate
1	.811 <sup>a</sup>	.658	.501	.17068

a. Predictors: (Constant), Unemployment rate, Inflation Rate, Real GDP, Interest Rate

Analysis in table 4.4 shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R<sup>2</sup> equals 0.658 that is, Interest Rate, Inflation Rate, Real GDP and



Unemployment rate explains 65.8% only of real estate performance leaving 34.2 percent unexplained.

The P- value of 0.000 (Less than 0.05) as presented in Table 4.5 below, implies that the model is significant at the 5 percent significance.

**Table 4.5: ANOVA**

Model		Sum of squares	Df	Mean Square	F	Sig.
1	Regression	.332	4	.083	.000	.000 <sup>b</sup>
	Residual	.000	0			
	Total	.332	4			

a. Dependent Variable: Real Estate Property Prices

b. Predictors: (Constant), Unemployment rate, Inflation Rate, Real GDP, Interest Rate

ANOVA findings (P- value of 0.00) in table 4.5 show that there is a strong significant relationship between the predictor's variables (Unemployment rate, Inflation Rate, Real GDP, Interest Rate) and response variable (Real Estate Property Prices). An F ratio is calculated which represents the variance between the groups, divided by the variance within the groups. A large F ratio indicates that there is more variability between the groups (caused by the independent variable) than there is within each group, referred to as the error term. A significant F test indicates that we can reject the null hypothesis which states that the population means are equal. The P value is 0.000 which is less than 0.05 significance level.

**Table 4.6: Distribution of Coefficients**

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	55.980	.000		.003	.000
Interest Rate	.058	.000	-.970	.017	.000

1	Inflation Rate	.061	.000	-.818	1.001	.000
	Real GDP	-.288	.000	-1.096	1.004	.000
	Unemployment	-4.826	.000	-1.401	2.011	.000
	rate					

a. Dependent Variable: Real Estate Property Prices

These are the values for the regression equation for predicting the dependent variable from the independent variables. From the regression model:

$$Y_{it} = \beta_1 X1_{it} + \beta_2 X2_{it} + \beta_3 X3_{it} + \beta_4 X4_{it} + \varepsilon_{it}$$

The regression equation is presented below.

$$Y_{it} = 55.980 + 0.058X1 + 0.061X2 - 0.288X3 - 4.826X4$$

Constant of 55.980, shows that if Unemployment rate, Inflation Rate, Real GDP, Interest Rate all rated as zero, Real Estate Property Prices would be 55.980.

The regression coefficient for interest rate is 0.058. This means that the relationship between interest rate and real estate property prices is positive. This implies that an increase in interest rate results to an increase in real estate performance and vice versa.

The regression coefficient for inflation rate is 0.061. This means that the relationship between inflation rate and real estate property prices is positive. This implies that an increase in inflation rate results to an increase in real estate performance and vice versa.

The regression coefficient for real GDP is -0.288. This means that the relationship between real GDP and real estate property prices is negative. This implies that a decrease in real GDP results to a decrease in real estate performance and vice versa.

The regression coefficient for unemployment is -4.286. This means that the relationship between unemployment rate and real estate property prices is negative. This implies that an increase in unemployment rate results to a decrease in real estate performance and vice versa.

#### **4.6 Interpretation of the Findings**

The study found a positive correlation between real estate property prices and interest rate. It shows that an increase in interest rate results to an increase in real estate performance and vice versa. Ling and Naranjo (1997) examine the influence of selected macroeconomic variables on the performance of real estate returns and analyze whether variables that constantly affect asset returns bear a premium. The study concludes that the real Treasury bill rate, real per capita consumption growth rate, unexpected inflation and the term structure of interest rates have a systematic impact on real estate returns.

The study also found a positive correlation between real estate property prices and inflation rate. This implies that inflation rate leads to increase of property prices, which contribute a better performance of real estate properties. According to Brooks and Tsolacos (1999) the effects of inflation rate are examined by using different elements of inflation, namely, the actual inflation rate and unexpected inflation. Unexpected inflation is the difference between actual inflation and anticipated inflation. When inflation is anticipated, house prices would increase, *ceteris paribus*. This is so because when inflation increases, the investment market for income-generating properties recognizes the need to include an estimated growth rate in future yearly income (Wong et al, 2003).

Tsatsaronis and Zhu (2004) showed the strong and long-lasting link between inflation and house pricing. During inflation most things in the economy would increase their price as a result cost of raw materials for buildings would go up and this then drove the cost of real estate properties as well (Ong, Factors Affecting the Price of Housing in Malaysia, 2013).

However, the study found a negative correlation between real estate property prices and real GDP and a negative relationship between unemployment rate and real estate property prices. This shows that unemployment rate is affecting real estate property prices negatively lowering performance of real estate properties. Vermeulen and Ommeren (2005) found that house prices decrease as the unemployment rate increases, *ceteris paribus*. Zenou and Smith (1995) and Brueckner and Zenou (1999) indicate that unemployment and house prices have a negative relationship. The

increase in unemployment will imply a decrease in disposable income for the affected workers and hence a fall in demand for housing. Durability of housing means that short- run supply of housing is fixed hence house prices will decrease in this case (Vermeulen and Omrneren, 2005).

A change in real GDP implies a change in real economic growth which may directly impact on the housing property market (Clarke and Daniel, 2006). In addition, economic certainty that arises from a rise in real GDP results in high business confidence. Hence, it is argued that a rise in economic growth will lead to a rise in the demand for property.

## **CHAPTER FIVE**

### **SUMMARY CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the summary of the findings presented in chapter four, according to the study objective. The main purpose of this study was to find out to establish the relationship between selected macroeconomic variables on the performance of real estate properties in Nairobi County.

#### **5.2 Summary**

The study sought to find out to establish the relationship between selected macroeconomic variables on the performance of real estate properties in Nairobi County. The study targeted real estate property prices<sup>5</sup> inflation rates, unemployment rates and population data for a period of 5 years (2011 — 2015) in Nairobi County. Data was collected from the Kenya National Bureau of Statistics for all the variables for the period of 5 years.

The study found that there was a positive correlation between real estate property prices and interest rate with a correlation coefficient of 0.051. This implies that the interest rate can increase real estate property prices, hence improving its performance. An increase in interest rate results to an increase in real estate performance and vice versa, The findings also show a positive correlation between real estate property prices and inflation rate with a correlation coefficient of 0.051. This implies that inflation rate leads to increase of property prices, which contribute a better

performance of real estate properties. This means that an increase in inflation rate results to an increase in real estate performance and vice versa.

However, the findings are showing a negative correlation between real estate property prices and real GDP with a correlation coefficient of -0.205. This implies that a decrease in real GDP results in a decrease in real estate performance and vice versa. The findings also show a negative relationship between the unemployment rate and real estate property prices. This shows that the unemployment rate is affecting real estate property prices negatively lowering the performance of real estate properties. This implies that a decrease an increase in unemployment rate results in a decrease in real estate performance and vice versa.

### **5.3 Conclusion**

The study concluded that there was a positive correlation between real estate property prices and interest rate as well as between real estate property prices and inflation rate. It concluded that the interest rate can increase real estate property prices, hence improving its performance. An increase in interest rate results to an increase in real estate performance and vice versa. This implied that inflation rate leads to increase of property prices, which contribute a better performance of real estate properties. This means that an increase in inflation rate results to an increase in real estate performance and vice versa. The study concluded that there exists a negative correlation between real estate property prices and real GDP with a correlation. It also concluded that there exists a negative relationship between the unemployment rate and real estate property prices. A decrease in real GDP results in a decrease in real estate performance and vice versa. The unemployment rate is affecting real estate

property prices negatively lowering the performance of real estate properties. A decrease in unemployment rate results to a decrease in real estate performance and vice versa.

#### **5.4 Recommendations for Policy**

Some of the recommendations that the study came up with were; real estate property owners should carefully consider the main factors that affect the prices of such properties so as to be able to properly value or set up correct prices that do not over or under value the properties.

In addition the government should support the real estate business since it contributes a key percentage towards the GDP of the country and affects various other industries in the market, which contribute to the GDP, either directly or indirectly. The government should also make an effort in the maximization of tax collection in the real estate business so as to get funds to be used in the development and growth of the economy.

#### **5.5 Limitations of the Study**

The main limitations of this study was that there was no enough time and resources to collect the right amount of data that would better enhance the study being carried out. This is because there are very many sources one has to properly look at and also acquire using a good amount of funds.

## **5.6 Areas of Further Studies**

The coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables)  $R^2$  equals 0.658 that is, Interest Rate, Inflation Rate, Real GDP and Unemployment rate explains 65.8% only of real estate performance leaving 34.2 percent unexplained. There is need for another study which will investigate other variables which explain the remaining 34.2 percent.

Further study should be done on the application of these factors in the various counties so as to ascertain which factors are normally used in a particular county to determine the prices of real estate properties. This will help in proper investments by investors in the area.



## REFERENCES

- Bonbright, J. (1937). *The Valuation of Property*. New York: MC Graw Hill.
- Boye, P. (2012). The Use of Multiple Linear Regressions in Determining the Relationship between Housing Unit Price and Some Major Components in a Real Estate Building. *Scottish Journal of Arts, Social Sciences And Scientific Studies*, vol 7 pp. 1-160.
- Chau, K., & Lam, H. (2001). Speculation and property Prices - Empirical evidence from historical price trends in Hong Kong. Tokyo Japan: In: the Asian Real Estate Society (AsRES) 6th Annual Conference.
- Chui, L., & Chau, K. (2005). An Empirical Study of the Relationship between Economic Growth, Real Estate Prices and Real Estate Investments in Hong Kong. *Surveying and Built Environment*, Vol 16(2), pp. 19-32.
- Coulson, N., & Kim, M. (2000). Residential investment, non-residential investment and GDP. *Real Estate Economics*, 28(2), pp. 233-247.
- Debelle, G. (2004). House hold debt and the macroeconomy. *BIS quarterly review*.
- Ferrer, R, Gonzalez, C., & Soto, G. (2010). Linear and nonlinear interest rate exposure in Spain. *Managerial Finance*, Vol. 36 No. 5, pp. 431-451.
- Fujita, M., & Thisse, J. F. (2002). *Economics of agglomeration: cities, industrial location, and regional growth*. Cambridge: Cambridge University Press.
- Gallin, J. (2003). *The Long-Run Relationship between House Prices and Income: Evidence from Local Housing Markets*. U.S.: Federal Reserve Board.
- Ge, X., Poon, K., & Boon, J. (2004). *Factors Associated with the Recovery of Housing Prices in Hong Kong*. Hong Kong: City University of Hong Kong.
- Glaeser, E., Gourko, J., & Saks, R. (2005). Why Have Housing Prices Gone Up? The American. *Economic Review*, Vol.95, No.2, pp.329-333.
- Hui, E., & Yiu , C. (2003). Market dynamics of private residential real estate price - an empirical test in Hong Kong. *Journal of Financial Management of Property and Construction*, 8(3), pp. 155-165.
- Joe, W., Eddie, H., & Seabrook, W. (2003). The impact of interest rates upon housing prices: an empirical study of Hong Kong's market. *Journal of property management*, Vol.21, No. 2, pp.153-170.
- Knight Frank. (2012). 3rd Quarter 2012 Kenya Market update. Nairobi: Knight Frank.
- Lahoz, A. E. (2007). *An analysis of how geographical factors affect real estate prices*. Stockhlom, Sweden: Royal Institute of Technology (KTH).
- Leung, C. (2003). *Economic Growth and Increasing Housing Price*. Pacific Economic Review.

- Liu , H., Park, Y., & Zheng, S. (2002). The Interaction between Housing Investment and Economic Growth in China. *International Real Estate Review*, Vol. 5 No. 1, pp. 40 - 60.
- Mackmin, D. (1999). Valuation of real estate in global markets. *Property Management*, pp 353- 367.
- Magne, F., & Rady, S. (2002). Housing Market Dynamics: On the contribution of Income Shocks and Credit Constraints. *Review of Economic Studies*, Vol.73, No.2, pp.459-485.
- McCann, P. (2001). Urban and regional economics. Oxford: Oxford University Press.
- Messah, O. B., & Kigige, A. M. (2011). Factors Influencing Real Estate Property Prices A Survey of Real Estates in Meru Municipality, Kenya. *Journal of Economics and Sustainable Development*.
- Mudida, R. (2009). Modern Economics. Nairobi: Focus Publishers Ltd.
- Mulupi, D. (2012, June 20). Venture Africa. Retrieved August Friday, 2013, from Investing, Marketing, Real estate: <http://www.ventures-africa.com/2012/06/kenyas-real-estate-sector-boom-or-doom/>
- Ong, T. S. (2013). Factors Affecting the Price of Housing in Malaysia. *Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB)*, vol 1.
- Ong, T. S. (2013). Factors Affecting the Price of Housing in Malaysia. *Journal of Emerging Issues in Economics, Finance and Banking*, Volume: 1 No.5, pp. 414-429.
- Otto, G. (2006). The Growth of House Prices in Australian Capital Cities: What can Economic Fundamentals Explain? Australia: The University Of New South Wales.
- Robert, P. W., & Johnson, A. C. (1996). Dallas Business Journal. *Journal of Small Business Management*, Vol.32; PP.27-35.
- Sirikolkam, P. (2008). The Effect of Mass Transit Systems on Price of Condominium in Bangkok. California: Department of Economics University of California Berkeley.
- Taltavull de, P., & Paz, L. (2003). Determinants of housing prices in Spanish cities. *Journal of Property Investment & Finance*, Vol.21, No.2, pp. 109-13 5.
- TD Economics. (2013). Long-Run Rate Of Return For Canadian Home Prices. Canada: TD Economics.
- Tibaijuka, A. (2007). Nairobi and its Environment. Kenya Atlas, Seel: 146-160.
- Tsatsaronis, K., & Zhu, H. (2004). What drives housing price dynamics: cross-country evidence? Sweden: *BIS Quarterly Review*.

- Tse, R., Ho, C., & Gansesan, S. (1999). Matching housing supply and demand: an empirical study of Hong Kong's market. *Construction management and Economics*, Vol. 17, pp. 625-633.
- Vermeulen, W., & Van Ommeran, J. (2006). Housing supply and the interaction of regional population and employment. The Hague: CPB (Netherlands Bureau for Economic Policy Analysis).
- Waithaka, J. (2011, July, 6 Wednesday). The Star. Retrieved August Friday, 2013, from The Star: <http://www.the-star.co.ke/news/article-58189/construction-top-performing-industry-kenyas-economy#sthash.yloikATs.dpuf>
- Wolff, E. N. (2010). Recent Trends in Household Wealth in the United States: Rising Debt and the Middle-Class Squeeze—an Update to 2007, New York: Levy Economics Institute.

## APPENDICES

### APPENDIX 1: DATA

Period	Real Estate	Interest Rate	Inflation Rate	Real GDP	Unemployment rate
2011	Property Prices	4.62	9.23	2.74	9.40
2012	9.00	11.86	3.96	5.80	9.30
2013	8.50	1.33	14.02	4.42	9.30
2014	8.90	12.08	9.38	4.55	9.20
2015	9.00	10.06	5.72	4.69	9.20