

Real Estate Prices and Economic Fundamentals: An Empirical Investigation of the
Residential Housing Market
in Nairobi City

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21st June, 2011

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ABSTRACT

The purpose of this research is to establish if the residential property prices in Nairobi, the capital city of the Republic of Kenya, are consistent with the economic fundamentals of the national economy. The study uses stepwise regression modelling to establish the relationship between house prices and the identified economic fundamentals. The findings of the study indicate that there is a positive relationship between house prices and economic fundamentals including population growth, rate of inflation and the level of money supply. A negative relationship is found to exist between the costs of construction and the residential house prices. Other variables, which are the gross domestic product and rate of interest, are removed from the regression during analysis, an indication that they do not have any influence on the residential house prices. Further, the study finds that with exception of population growth, house prices are less responsive to the variations in the rate of inflation and the level of money supply in the economy. A key finding in this study is that the house prices in Nairobi city are not supported by the gross domestic product, interest rate and the costs of construction. Moreover, the results also suggest the possible existence of a bubble and that money laundering does have a role to play in the Nairobi city residential housing sector.

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DEDICATION

This research is dedicated to James Thompson who has always been there for my sake and for his all-round support.

I also dedicate this study to our family, K' Adika who have been very helpful in the pursuit of education in the family. Great thanks to my Mum, Everlyne Akinyi and Wendy Atieno for their extra-ordinary support. I also thank my late father, Ochuodho Adika, for his constant encouragement to do better in school at all time ("Ouma, som! Mzungu nowacho ni ibiro chanda").

May the Almighty Father bless you all!

CHAPTER ONE

INTRODUCTION

1.1 Background information

Studies done in a number of countries indicate that a relationship exists between residential real estate prices and economic fundamentals (Terrones & Otrok, 2004; Himmelberg, Mayer & Sinai, 2005; Allen & Gale, 2000; Tsatsaronis & Zhu, 2004; Quigley, 1999; Black, Fraser, & Hoesli, 2006; Hou, 2010; Shen, Hui & Liu, 2005 and Egert & Mihaljek, 2007).

According to Brueggeman & Fisher (2005) and Pagourtzi, Assimakopoulos, Hatzichristos, & French (2003) real estate refers to land and anything fixed, immovable, or permanently attached to it such as buildings and fences. Title to real estate normally includes title to air rights, mineral rights, and surface rights which can be bought, leased, sold, or transferred together or separately.

In addition, real estate is categorised into residential and non-residential properties. The nonresidential properties encompass commercial, industrial, hotel/motel, institutional and recreational buildings. Residential real estate, which is the focus of this study, refers to houses that are specifically used for the purpose of living, whether owner occupied or on a rental basis (Brueggeman & Fisher, 2005; Anders, Richard & Michael, 2010 and Pagourtzi et al., 2003).

Despite initiatives by the Government of Kenya (GOK) to ensure that Kenyans have access to basic housing requirements, many still live in the slums in Nairobi. Sanitation has been an issue in these areas as well. Statistics indicate that the demand for housing, which has possibly led to increase in residential house prices, has been on the rise at a faster rate than the numbers of houses available or under construction (National Housing Corporation (NHC), 2009). Even though plans are underway to ensure adequate dwelling units for the city's residents are in place, the GOK and the private sector entities have both been unable to meet the shortfall in housing demand, which currently stand at 120,000 units annually.

In order to meet the annual demand for houses (which is 150,000 units), the government has been inviting private investors for partnerships (NHC, 2009). The envisaged areas for the partnerships included land, finance, skills and technology. In addition, the corporation intended

to raise about five billion shillings from corporate bond floatation by the end of the year 2010 in order to build more houses. The floatation was successful (there was over-subscription by 47%) and, the move is intended to lower the urban cost of housing.

In addition, The Hass Property and Composite Indices show that property prices have generally been on the rise since the year 2005, although they are only developed in favour of both the middle and the upper section of the real estate market in Kenya (HassConsultLtd, 2010).

The foregoing information regarding real property price increases leads to the question of whether there is a possibility that prices could be out of line with their fundamental values.

Except for the year 2008, Kenya has been recording a positive economic growth rate since the year 2005. Contributions of the real estate sector to the Gross Domestic Product (GDP) also followed the same trend as the rate of economic growth while the rates of inflation took the opposite direction. Moreover, other economic indicators such as population growth, money supply (M2), and personal disposable income have been rising while interest rates on commercial bank loans had been declining (Kenya National Bureau of Statistics (KNBS), 2010).

According to previous studies, economic fundamentals refer to factors such as the rate of interest, population growth, disposable income and inflation rate (Catté, Girouard, Price & Andre, 2004; Ten-ones & Otrok, 2004; Case & Shiller, 1996 and Case & Shiller, 2003). These fundamentals affect residential property prices. Brueggeman & Fisher (2005), Tsatsaronis & Zhu (2004) and Kennedy (2006) also indicated that demand and supply factors in the real estate sector affect housing prices. The fundamental value of a house is the present discounted value of the future housing service flows (rent) plus the present discounted value of the price at which the owner will be able to sell the property in the future (Shen et al., 2005).

Studies (Case & Shiller, 1996; Pagourtzi et al., 2003 and Brueggeman & Fisher, 2005) have documented the importance of appraisal of real estate for purposes of purchase and sale, taxation assessment, transfer, inheritance, checking whether the prices are justified by the economic fundamentals and for the determination of the amount of mortgage to be advanced to borrowers. In order to meet these requirements, it needs to be determined when the house prices were justified by the fundamental factors of supply and demand and when it was a bubble. A bubble is said to exist when the rapid growth in price today is only because investors believe that the selling price will be high tomorrow, and when the fundamental factors do not seem to support

such a price (Stiglitz, 1990). Kindleberger (1987) defined a bubble as a sharp increase in price of an asset(s) in a continuous process, with the initial rise generating expectations of further increases and attracting new buyers who were generally speculators interested in profits from trading in the asset rather than its use or earning capacity. The rise is usually followed by a reversal of expectations and a sharp decrease in price, which often results in financial crisis. The study also noted that if the prices contained bubbles, policies that were misguided could be made as a result. Another study (Shen et al., 2005) also showed that a bubble existed when house prices behaved abnormally when correlated with economic fundamentals.

Research conducted in developed countries indicate that house prices are not supported by the fundamentals (Shiller, 2005; Case & Shiller, 2004; Shen et al., 2005; Hou, 2010; Girouard, Kennedy, van & Andre, 2006; Annett, 2005 and Terrones & Otrok, 2004). In particular, the studies identify low interest rates, population growth, gross domestic product, credit expansion, growth of the economy and disposable income, inflation and money laundering as the drivers for house price increases. In the opinion of the researcher, money laundering can raise the level of liquidity (when people involved engage in converting dirty money to make it clean) in the economy, thus beating the policies of the central bank with regard to keeping money supply in check.

In the estimation of the value of residential property, three approaches are used (Brueggeman & Fisher, 2005). These are the sales comparison approach, the cost approach and the income approach. The sales comparison approach is based on the premise that a buyer should be willing to pay the same price for a comparable property after adjustments for dissimilarities are made. The cost approach entails estimating the cost to reproduce the residential property while the income approach is the process in which comparable residences that are renting for income are used making an estimate of the subject property. The question to ask is whether the estimated residential property values from these approaches reflect the economic outlook that prevails at a given time period.

In Kenya, it is argued that the real estate sector has remained vibrant and grown tremendously. Recently, the President of the Republic of Kenya encouraged foreign investments into the sector, though this could bring about the problem of money laundering (Mwongela, 2009).

1.2 Problem statement

Price of houses in many industrialised countries increased unusually in recent years and in some cases these increases did not seem to be fully explained by economic fundamentals (Hou, 2010; Shen et al., 2005; Black et al., 2006 and Terrones & Otrok, 2004). In developed countries such as Japan and the United States of America (USA), studies show the existence of real property bubbles (Kindleberger, 1987). According to Anders et al., (2010) and Hou, (2010), real estate bubbles which result from asset mispricing are cited as the trigger for banking crises and have been identified as an important element that led to the Global Financial Crisis (GFC) that started in 2008. In addition, Hou, (2010) points that if the housing prices deviate too much from their fundamental value, then problems such as financial crises could be experienced.

In Nairobi, the demand for housing has been growing (NHC, 2009). In the opinion of the Central Bank Governor, the rising demand for the residential houses reflects a boom in the country (Michira, 2010). Further, in response to the lack of construction funds required to support the demand, the Governor also advised the private property developers to get ready for the roll out of the housing bonds. The bond was intended to offer a cheaper cost of financing house construction (Michira, 2010). It is also said that Kenya is a money laundering hub and that dirty money gets converted into clean money through the real estate sector (Jamah, 2009). This raises the question of whether the injection of funds derived from money laundering could be among the reasons for the rise in purchase prices of residential properties in Nairobi. In Kenya, little has been done to check if the house prices are in line with their fundamental values. This study therefore seeks to fill in the void by establishing whether the price of houses are in line with the economic fundamentals such as the rate of interest, rate of inflation, gross domestic product, population growth, costs of construction and the level of money supply in the economy.

1.3 Objectives of the study

The study attempts to find out whether residential property prices in Nairobi City are consistent with the economic fundamentals.

In addition, the specific objectives include;

1. To determine whether there is a relationship between house prices and economic fundamentals.

2. To establish the most used method of residential real estate appraisal.
3. To identify other determinants of residential house prices.

1.4 Research questions

This study is guided by the following research questions;

1. What is the nature and extent of the relationship between house prices and economic fundamentals in the city of Nairobi, the Republic of Kenya?
2. Which real estate appraisal method is most applied in the Republic of Kenya?
3. What other factors affected house prices in the city of Nairobi?

1.5 Scope of the study

The study is going to determine if residential house prices are supported by the economic fundamentals in the city of Nairobi.

1.6 Justification for the study

House prices, if out of line with fundamentals, could be a threat to economic and financial stability. Therefore, a better understanding of the processes that determine house prices will allow a more informed assessment to be made of potential overvaluation in the market, which could become a source of economic and financial instability (Shen et al., 2005; Hou, 2010 and Carte, Girouard, Price & Andre, 2004). The study is also justified on grounds that even though much has been said with regard to the demand and supply for residential housing market in Nairobi and the rise in prices for the residential units, few empirical studies have been carried out to determine whether prices are in line with the economic fundamentals. Thus, the findings for the study come to fill in this knowledge gap.

The findings of the research should be useful to the following stakeholders:

Researchers

They should assist researchers by acting as a springboard to further their studies that are similar or in line with real estate valuation topics.

Real estate investors

They will also be helpful to residential property investors by indicating some important variables to consider when making their investment choices.

Policy makers

The economic policy makers, especially those in the central and local government, will also find it useful to adjust their future policy issues with regard to residential real estate sector of the economy.

Lenders

Lenders, especially those who advance mortgages, should also find it useful to assist in finetuning their residential property loan advancement decisions.

Suppliers

They are those who manufacture and/or supply building and construction material to real estate developers. The outcome of this study may assist in revising their pricing policies.

1.7 Summary of the chapter

The focus of this study is on residential houses. Although much emphasis is being placed to ensure that every citizen has access to decent housing in the city of Nairobi, the demand for houses has exceeded the units supplied on annual basis. This study, therefore, seeks to establish, among other objectives, whether the house prices in the city of Nairobi are consistent with the economic fundamentals. The findings of the study could be useful in informing the decision making process of the policy makers and the other stakeholders.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter focuses on previous studies carried on residential property valuation. It discusses the types of real estate properties in brief and the valuation approaches. Further, previous studies and the theories supporting this study are documented, followed by a review of variables used, the conceptual framework, previous models used, effects of residential properties mispricing and a summary of the chapter.

2.1.1 Types of real estate properties

As indicated in Chapter one, real estate is divided into two major categories, which include residential and non-residential. Much of the attention of previous studies has been given to residential property (Himmelberg et al., 2005; Tsatsaronis & Zhu, 2004; Quigley, 1999; (Black et al., 2006); Kennedy, 2006; Goyal & Yamada, 2001; Borowiecki, 2009 and Pagourtzi et al., 2003) rather than non-residential property (Case, Glaeser & Parker 2000 and Case & Quigley, 1991).

Further, the residential properties are categorised into single family and multifamily houses. These are properties that provide residences to individuals and families. The single family houses are usually individual, detached units developed in sub-divided tracts, while the second category of houses are usually income producing (Brueggeman & Fisher 2005; Anders et al., 2010 and Pagourtzi et al., 2003).

2.1.2 Real estate valuation approaches

Real estate appraisers rely on three major approaches: the sales comparison, the cost and the income approaches, when estimating the value of property. This process is called real estate appraisal. In most cases, the objective for appraisal is to establish the market value. The market value is the most probable price that the property would exchange for under competitive market conditions in which the forces of demand and supply are left to operate freely, (Williams,

1961 and Herzog, 1963). According to Brueggeman & Fisher (2005) and Pagourtzi et al., (2003) the cost and sales approaches are the most reliable methods used in the residential property valuation.

When applying the sales comparison approach, the value of a property is estimated by making a comparison of the selling prices of properties that are similar to or near the one being appraised, followed by adjustments for dissimilarities. The adjustments to the value are made since no properties can be exactly the same. Using their own judgment and knowledge of the current market conditions, valuers establish what the market value is for each major attribute of a comparable that is different from the subject property.

Lastly, the price of the comparable property is then approximated to equal that of the subject property after the necessary adjustments for the differences have been made. We need to note that this approach may not be useful if there were a limited number recent sale of comparable houses or when it is difficult to obtain information about the circumstances surrounding the transaction.

The choice for the cost method entails estimating the value for the site on which the property is situated, then finding the cost of reproducing the property and adding the two. Depreciation amount, if any, should then be removed from the total. The main types of depreciation to consider include physical, functional obsolescence and external obsolescence. Available literature indicates that the process of determining depreciation could be difficult in case the property is old. The disadvantage of this approach is that it is only useful where the comparable houses are new and hence requiring limited adjustments to depreciation (Pagourtzi et al., 2003).

However, in as much as above valuation approaches may be useful to appraisers in estimating prices, investigation is warranted to determine whether other factors (such population growth, money supply and gross domestic product) that drive the economy can simply be overlooked given the possible weaknesses of the methods.

2.1.3 Previous studies

2.1.3.1 Real estate bubbles

According to Kindleberger (1987) a bubble is the sharp rise in price of an asset or a range of assets in a continuous process, with the initial rise generating expectations of further rises and 8

attracting new buyers. These buyers are generally speculators interested in profits from trading in the asset rather than its use or earning capacity. The price rise is usually followed by a reversal of expectations and a sharp decline in price often resulting in financial crisis. Smith & Smith (2006) also define a bubble as a situation in which the market prices of real estate assets rise far above the present value of the anticipated cash flow from the assets.

In summary, a real estate bubble is a type of economic bubble that takes place periodically in either local or global real estate markets. It is manifested by rapid increases in the valuations of real property such as housing till they reach unsustainable levels relative to incomes of the people and other economic indicators. This is then followed by decreases that can result in many owners holding negative equity the situation in which a mortgage debt is more than the current value of the property held. It is in this situation when the bubble is said to have burst.

These definitions suggest the features of a bubble such as prices rising rapidly and a speculative focus on future price increases rather than the asset's cash flow and an eventual drop in prices, (Case et al., 2003). However, (Smith et al., 2006) argued that these features are only suggestive because market prices can rise rapidly if fundamental values are increasing rapidly or if prices are far below fundamental values. Market prices could as well drop (for example, in a financial crisis) even when a bubble has not existed in the market. Therefore, as a matter of fact, what truly defines a bubble is that market prices are not justified by the asset's anticipated cash flow.

Available literature (Terrones & Otrok, 2004; Black et al., 2006; Case et al., 2000, 2003; Goyal et al., 1999, 2001; Himmelberg et al., 2005; Allen & Gale, 2000; Tsatsaronis & Zhu, 2004; Shen et al., 2005 and Hou, 2010) shows that real estate property bubbles have been experienced in the developed world, in countries including the United States of America, Australia, Japan, Britain, Ireland, China and Poland, and some developing nations like India and Lebanon.

2.1.3.2 The Chinese property bubble

The objectives of the study carried out by Shen et al., (2005) were to establish the link between housing prices and market fundamentals in Beijing and Shanghai (China) and to identify whether there were housing price bubbles in the two cities.

The independent variables used in the research (Shen et al., 2005) included a monthly housing price index of new dwellings and stock of vacant new dwellings. Further, variables on the part of

the economic fundamentals were those of disposable income of urban households (INC), local Gross Domestic Product (GDP) and the Shanghai stock price index (SHANG). It was postulated that the market displayed abnormal interactions between housing prices and market fundamentals, if a housing price bubble exists. The findings indicated that housing prices seemed to have interacted in an abnormal way with the fundamentals.

The results of another study conducted by Hou (2010) in the same two leading housing markets in cities of China (Beijing and Shanghai) show that in Beijing it appeared that the formation of a housing price bubble may have been occurring between the years 2005 and 2008, and that perhaps there existed a housing bubble in Shanghai from the years 2003 to 2004.

The variables used in the study (Hou, 2010) included fundamentals such as interest rates, rent, population growth, disposable income and GDP. The aim of the research was to determine whether there existed housing price bubbles in the two cities.

2.1.3.3 The U.S.A property bubble

The recent bubble in the USA during the period 2008-2009 in the real estate property market was due to the unregulated lending in the sub-prime mortgage market. This period was preceded by a rapid rise in housing prices which peaked in the year 2005. The prices started to decline in the year 2006 and by the end of the year 2008, the Case & Shiller home price index (2008) reported the largest price drop in history. The increased rates of foreclosure in 2006-2007 among USA homeowners led to a crisis in 2008 for the subprime, mortgage, hedge fund, and foreign bank markets.

Studies (Shiller, 2005) indicate that the underlying causes of the housing bubble are complex but factors, which include historically low interest rates, lax lending standards, and what has been referred to as price speculative fever, were among the triggers.

The USA housing bubble had a direct negative impact not only on housing valuations, but also to the nation's mortgage markets, home builders, Wall Street hedge funds held by large institutional investors and foreign banks. This increased the risk of a nationwide recession, which led to a limited bailout of the USA housing market (by the government) for homeowners who were unable to service their mortgage obligations.

2.1.3.4 The Japanese property bubble

In Japan (Saxonhouse, & Stern, 2004) the asset price bubble occurred between the years 1986 to 1991. During this period, which came to be known as "The Bubble Period", the real estate and stock prices were greatly inflated. The onset of the rise in prices was after the World War II, in which Japan implemented stringent tariffs and policies in order to encourage the people to save their income. As a result, more money in banks meant that loans and credit became easier to obtain.

Moreover, as Japan benefited from large trade surpluses, the value of the national currency, the Yen, appreciated against foreign currencies. This allowed local companies to invest in capital resources much more easily than their overseas competitors, which reduced the price of Japanese made goods and increased the trade surplus further. The conclusion for the foregoing is that loose monetary policy, tax distortions and financial deregulation caused the bubble.

2.1.3.5 The Australian property bubble

The Australian residential property prices rose between the years 1997 and 2004. The prices then fell slightly between the years 2004 and 2008. From the beginning of the year 2009, the property prices rose sharply, which continued into the year 2010. It is reported (Hendershott, 2000 & Potts, 2004) that a number of factors contributed to the rise in Australian house prices above their fundamental values. One major factor was that historically low interest rates led to decreased loan repayment costs thus increasing mortgage borrowing capacity.

Secondly, high immigration from 2007 onwards led to increased residential house demand. Thirdly, government grants and incentives associated with mortgage borrowing, also increased house demand (Abelson, Joyeux, Milunovich, & Chung, 2005; Abelson, Joyeux, Milunovich, & Chung, 2004; Hendershott, 2000 & Potts, 2004).

2.1.3.6 Housing price determinants

Further, findings (Borowiecki, 2009) still pointed out that Consumer Price Index, Gross Domestic product, interest rates, population growth, housing construction & construction prices are important variables for determining house prices.

Research conducted by Borowiecki (2009) to identify housing price determinants in the real estate market in Switzerland revealed that real house price growth is highly sensitive to changes in population and construction costs. Unlike common empirical findings in other nations (Hou, 2010 and Shen et al., 2005) the real GDP turned out to have only a small effect in the short term.

In addition, the research paper (Egert & Mihaljek, 2007) which studied the determinants of house prices in eight transition economies of Central and Eastern Europe (CEE) and nineteen OECD countries documented a strong positive relationship between per capita GDP, real interest rates as well as between housing (or private sector) credit and house prices. In particular, house prices in OECD countries seemed to respond roughly two times more strongly to credit expansion when compared with CEE economies.

2.1.4 Theoretical frameworks

In the attempt to estimate the residential house values, studies have used different theoretical approaches: the economic theory of demand and supply (Brueggeman & Fisher 2005; Egert & Mihaljek, 2007; Himmelberg et al., 2005; Tsatsaronis & Zhu, 2004; Quigley, 1999; Black et al., 2006; Kennedy, 2006 and Borowiecki, 2009) and the agency theory (Allen & Gale, 2000).

2.1.4.1 The Economic Theory of Demand and Supply

The economic theory of demand and supply shows that in an uncontrolled economy, the interaction of the market forces of demand and supply determines the price at which residential properties should be exchanged (Tsatsaronis & Zhu, 2004; Kennedy, 2006; Shen et al., 2005; Hou, 2010 and Himmelberg et al., 2005). According to Brueggeman & Fisher (2005) and Borowiecki (2009) the growth in house prices is influenced by population growth, household formations, employment, household income, interest rates, federal income tax policy and the cost of renting housing versus house prices (which are basically the factors that determine the demand for housing).

On the other hand, the supply of housing is determined by the construction costs, which include the costs of land, labour and materials (Tsatsaronis & Zhu, 2004; Borowiecki, 2009; Black et al., 2006 and Quigley, 1999). It therefore means that residential house prices should therefore be the equilibrium price attained when we equate the outlined fundamental factors of demand and supply in the housing market.

2.1.4.2 The Agency Theory

The Agency Theory explains the relationship between the principal and the agent. It is defined as a contract under which one or more persons (the principals) engage another person (the agent) to perform some service on their behalf. This principal-agent relationship also involves delegating some decision making authority to the agent (Jensen and Meckling 1976).

In the recent financial crises, a bubble (in which asset prices rose) was followed by a collapse and widespread default. Allen & Gale (2000) documented that bubbles are caused by agency linkages in the banking sector. This is because investors use money borrowed from banks to invest in risky assets, which are relatively attractive because investors can avoid losses in low payoff states by defaulting on the loan. This risk shifting therefore led the investors to bid up the asset prices. The risks can originate in both the real and financial sectors. Financial fragility occurs when positive credit expansion is insufficient to prevent a crisis, when it becomes clear that the high asset prices are a result of asset mispricing.

2.1.5 The variables used

Studies document that the determinants of demand (such as personal disposable income, population, interest rate trends and gross domestic product) and supply (such as costs of construction, which include the price of land, wages of construction workers and material cost, and credit availability) are critical factors in estimating the residential house prices (Shiller, 2005; Case et al., 2004; Girouard et al., 2006; Terrones & Otrok, 2004; Himmelberg et al., 2005; Allen & Gale, 2000; Tsatsaronis & Zhu, 2004; Quigley, 1999; Brueggeman & Fisher 2005; Black et al., 2006; Hou, 2010; Shen et al., 2005 and Egert & Mihaljek, 2007).

Other factors that are considered to influence the value of property include age and state of the property, locational attributes, size, composition of rentable space, construction, zoning, future redevelopment opportunities, adjacent land use and transport links (Egert & Mihaljek, 2007 and Brueggeman & Fisher, 2005).

The study focused on the following variables; residential house price (which was the dependent variable), rate of interest, rate of inflation, population growth rate, gross domestic product, costs of construction and the level of money supply.

2.1.5.1 The residential house price

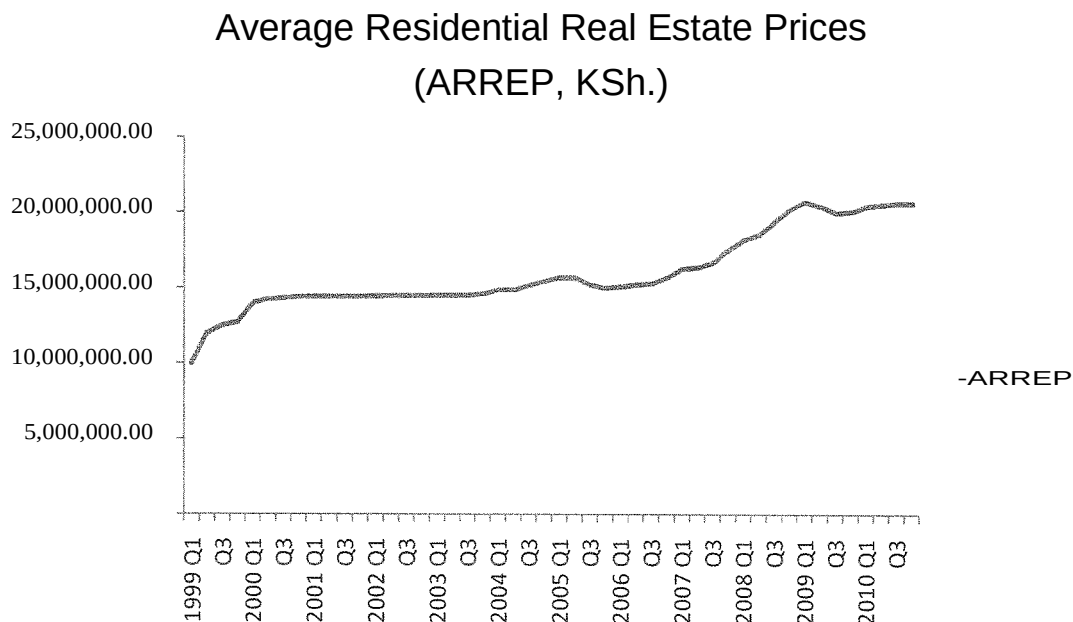
The residential house price refers to the average nominal selling price of a new housing (Hou, 2010). In the attempt to explain the relationship between residential house price and economic fundamentals, researchers have used different measures to represent (proxy) this dependent variable. For instance, Shen et al., (2005) and Smith & Smith (2006) used housing price indices in their study. In another approach, Quigley (1999), Hou (2010) and Tsatsaronis & Zhu (2004) used average house prices.

This study has adopted the measure used by Quigley (1999), Hou (2010) and Tsatsaronis & Zhu (2004) in order to establish if the residential house prices were consistent with the economic fundamentals.

In this research, residential house prices, house prices, residential property prices and residential real estate prices are used interchangeably to refer to the dependent variable.

The figure 2.1 indicates that average residential house prices have been steadily increasing since the year 2005.

Figure 2.1: Graph of average house prices in Nairobi City



Source: Author's computation (Data used provided in Appendix 3)

2.1.5.2 The rate of interest

The rate of interest refers to the rate of return to the lenders of funds or the cost of borrowing. According to Himmelberg et al., (2005), Hou (2010) and Shen et al., (2005) the sensitivity of residential house prices to changes in fundamentals was higher during the times when real, longterm interest rates are low. It is also noted that the deterioration in the underlying economic fundamentals, such as an unexpected future rise in real long term interest rates or a decline in economic growth could cause a decline in house prices. The argument for lower real interest rates was that reductions in user cost resulted from the decrease in the cost of debt financing, as was the opportunity cost of investing equity in a house. In practical terms, when the real interest rate is low, residential home ownership is relatively attractive since mortgage payments are also low.

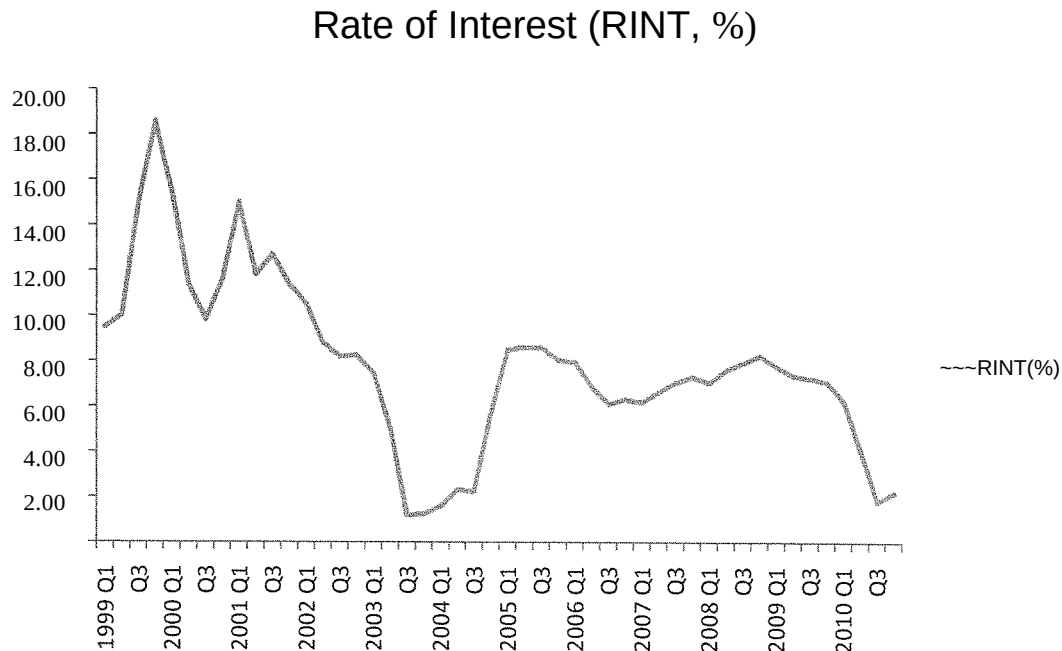
Similarly, the study done by Tsatsaronis & Zhu (2004) indicate that a declining real short-term interest rate environment, which kept servicing costs of ever larger mortgages within the household budget limits imposed by current income, typically boost the demand for residential real estate. They cited low interest rates to have been the major contributor to the booming housing markets in most industrialized countries such as Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. Furthermore, Case et al., (2003) also noted that lower rates of interest are among other fundamentals that pushed Boston (USA) housing prices up by about 15 percent. in a period of

Egert & Mihaljek (2007) also found that real interest rate (which represent a weighted average of domestic and foreign currency long-term rates on household loans, deflated by the CPI) was an important determinant of house price in Central and Eastern Europe. Borowiecki (2009) also notes that house prices tend to drop with rises in interest rates (which were adjusted by CPI).

The research therefore used the 91-day treasury bills rate that is provided by the Central Bank of Kenya. This is because the mortgage lending rates, which vary across banks, are based on the treasury bills rate plus other factors that could be specific to the banks.

Figure 2.2 shows that interest rates have generally been declining. The highest level of the rate is experienced between the years 1999 and 2000 while lowest level seen between the years 2003 and 2004.

Figure 2.2: Graph of the rate of interest



Source: Author's computation (Data used provided in Appendix 4)

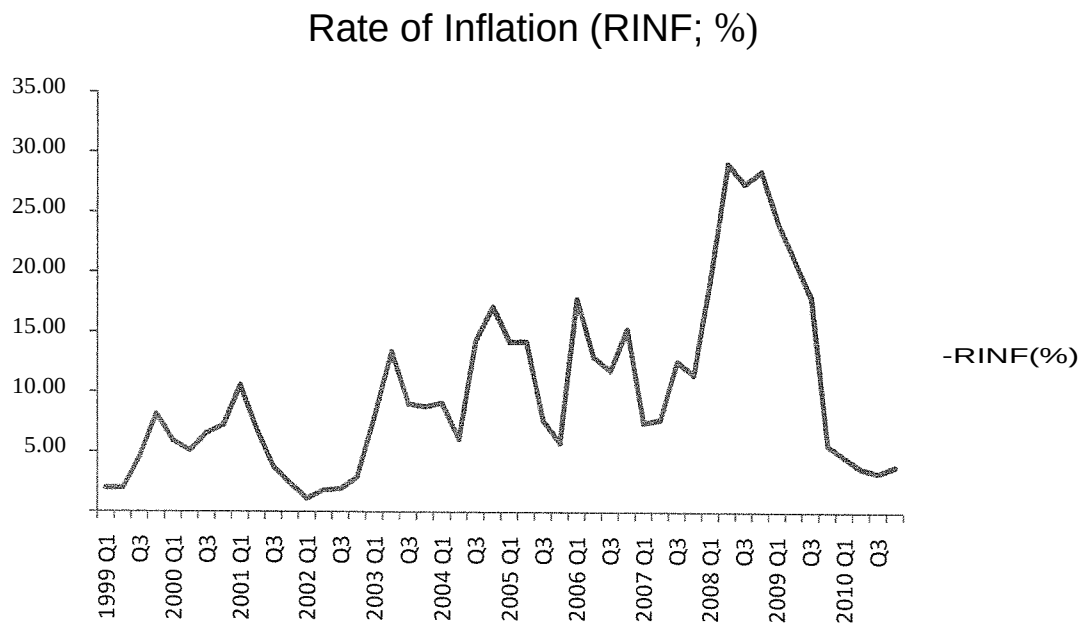
2.1.5.3 The rate of inflation

Inflation affects the purchasing power of money. The research conducted by Tsatsaronis & Zhu (2004) showed that residential house prices in the most industrialized countries were affected by inflation (nominal). The study noted that a generally higher inflation could have a negative impact on house prices. In these countries, inflation explained about 25% (the highest figure among other variables) of the overall variance of house prices. A similar study by Kennedy, (2006) also found that high house prices are associated with high rates of inflation.

This research used nominal rate of inflation that is be obtained from the Central Bank of Kenya and Kenya National Bureau of Statistics data sources.

Figure 2.3 shows that the rate of inflation has generally been on the rise. The graph indicates that the lowest level of inflation is realised in the year 2002 while the highest levels realised between the years 2008 and 2009.

Figure 2.3: Graph of the rate of inflation



Source: Author's computation (Data used provided in Appendix 5)

2.1.5.4 The population growth

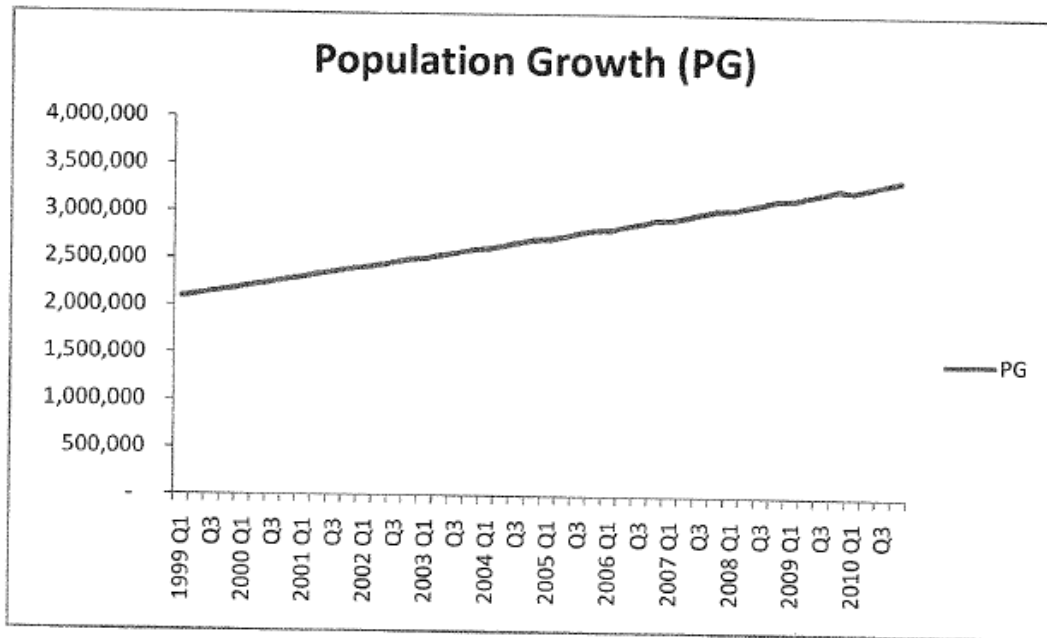
Increases in population boost housing demand, thereby increasing price levels of residential units, when all other factors are held constant (Kennedy, 2006; Hou, 2010 and Shen et al., 2005). In addition, the finding of the study conducted by Dennis, Patrie, Charlotte & Christopher (2002) in USA shows that higher house prices are a result of population growth over years, even though the correlation was found to be moderate.

Other research conducted by Borowiecki (2009) in the housing economy in Switzerland indicated that residential house price changes were most sensitive to population growth. The study conducted by Egert & Mihaljek (2007) also documented the existence of a clear and robust relationship between population and house prices.

This study also found it useful to include this variable (population growth) in the price estimation model and the data for it was collected from the Kenya National Bureau of Statistics. The population figures that were used were those of Nairobi city.

As indicated in the Figure 2.4, population growth has gently been rising between the years 1999 and 2010. The population figure for Nairobi city has hit the three million mark in 2010.

Figure 2.4: Graph of population growth



Source: Author's computation (Data used provided in Appendix 8)

2.1.5.5 Gross domestic product (GDP)

GDP is the value of total production of goods and services in a country over a given period. The rate by which GDP grows from one specified time period to the other is an indicator of the economic health of a country. Documented findings by Borowiecki, (2009) and Egert & Mihaljek, (2007) indicated a positive relationship between house prices and GDP.

As a macro-economic indicator, the main argument (Borowiecki, 2009) and Egert & Mihaljek, 2007) behind the use of the variable was that the size and growth of the economy in a country were the important determinants of the evolution of its housing market over time.

Findings by Shen et al., (2005) and Hou, (2010) from studies conducted in Beijing and Shanghai pointed out the existence of strong positive correlations between housing prices and variables like GDP.

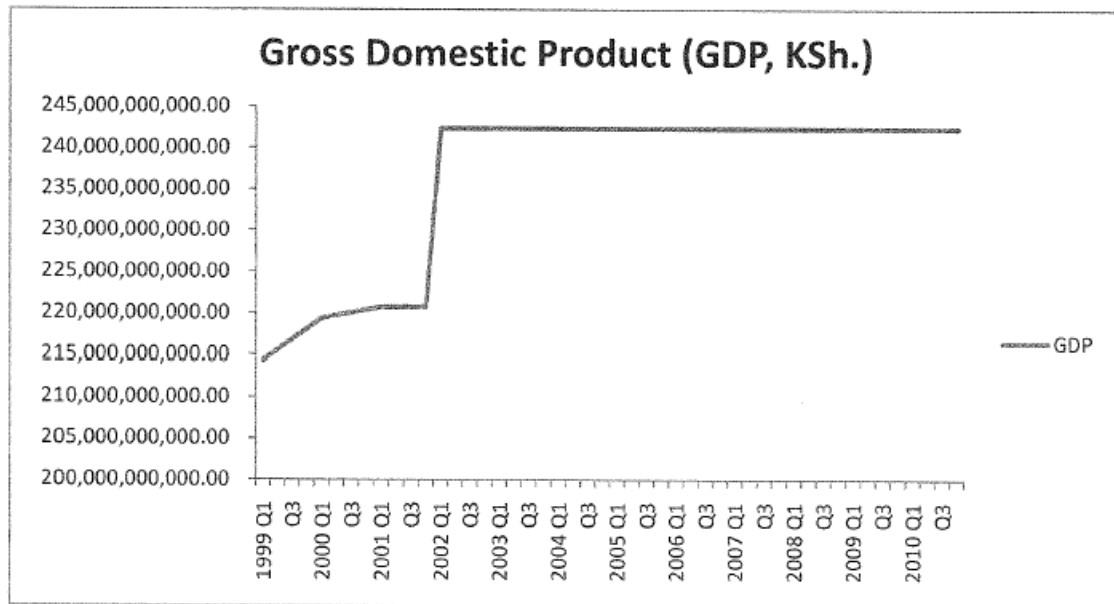
Similarly, in the attempt to identify the important determinants of housing prices in Central and Eastern Europe, Egert & Mihaljek (2007) showed that GDP (per capita) is among the variables that had driven the observed house prices.

However, the research carried out to identify the determinants of house prices of the housing economy of Switzerland, Borowiecki (2009) found that real GDP had only a minor effect in house price growth.

In line with other studies (Egert & Mihaljek, 2007; Shen et al., 2005 and Hou, 2010) this research uses GDP data obtained from the Kenya National Bureau of Statistics.

Figure 2.5 shows that the gross domestic product rose sharply in between the last quarter of the year 2001 and the year 2002. The growth has henceforth been fairly constant from the year 2003 to 2010.

Figure 2.5: Graph of gross domestic product



Source: Author's computation (Data used provided in Appendix 6)

2.1.5.6 The costs of construction

These refer to expenditures such as cost of land, materials and labour to be incurred in order to build the houses (Brueggeman & Fisher 2005). Higher house prices are associated with an increase in these costs (Kennedy, 2006 and Goyal & Yamada, 1999).

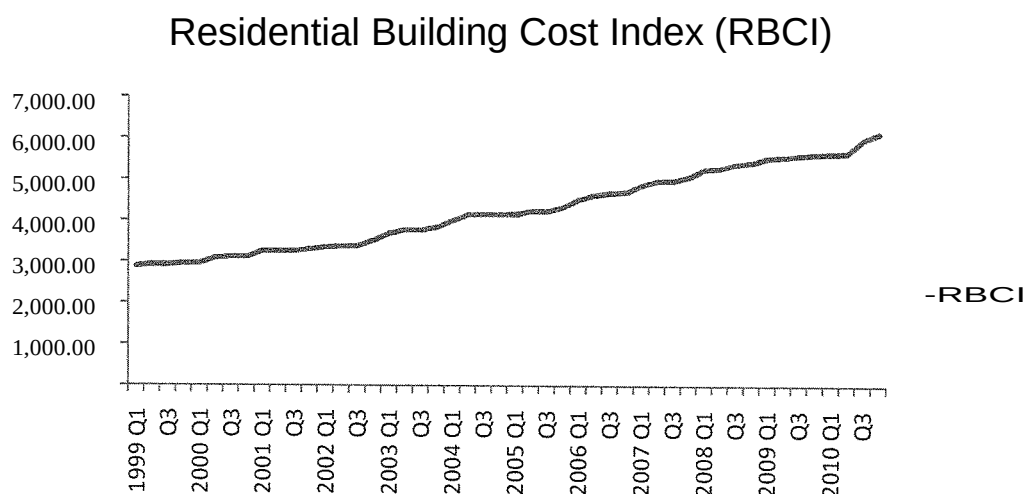
Tsatsaronis & Zhu, (2004) documented that the availability and cost of land, the cost of construction and investments in the improvement of the quality of the existing housing stock are some of the long-term determinants of residential housing supply. Research carried out by Kennedy (2006) in a number of industrialised countries also revealed that land costs are an important factor in the recent rise in new house prices.

Similarly, research carried out by Himmelberg et al., (2005) points out that house prices grew relative to construction costs in most of the metropolitan areas. Moreover, the results of the study done by Borowiecki (2009) in the Switzerland housing market depict construction costs as another most important house price driver. The study showed that an appreciation of construction costs roughly led to equal increases in prices of dwelling units, which was an indication that increases in construction price are fully transferred to the buyers. Case, et al., (2003) also notes that construction costs was one of a number of fundamentals that pushed Boston housing prices up by approximately 15 percent.

Data for this variable to be used in this research is obtained from the Kenya National Bureau of Statistics. Specifically, the Residential Building Cost Index (RBCI) data which tracks the development in house prices over time was collected and used as a proxy for the costs of construction variable (Borowiecki, 2009).

Figure 2.6 indicates that the costs of construction have steadily been rising between 1999 and 2010, as proxied by the RBCI data. The index tracks the development in the costs of putting up residential houses.

Figure 2.6: Graph of the residential building cost index



Source: Author's computation (Data used provided in Appendix 9)

2.1.5.7 The level of money supply

According to Allen & Gale (2000), Annett (2005) and Egert & Mihaljek, (2007) increased money supply (or credit expansion) in the economy raised the property prices. Borowiecki, (2009) also confirmed the study (that was conducted by Allen & Gale (2000)) by showing that the historical Swiss construction boom of the early 1980s was propelled in 1987 by a substantial extension of money supply.

Allen & Gale (2000) documents that the period of financial liberalisation contributed to the Japanese bubble in the real estate and stock markets (that occurred in the 1980s and 1990s) through the expansion of credit. Even though increased money supply could have a positive correlation with the property prices, the rise in the prices could be due to dirty financing.

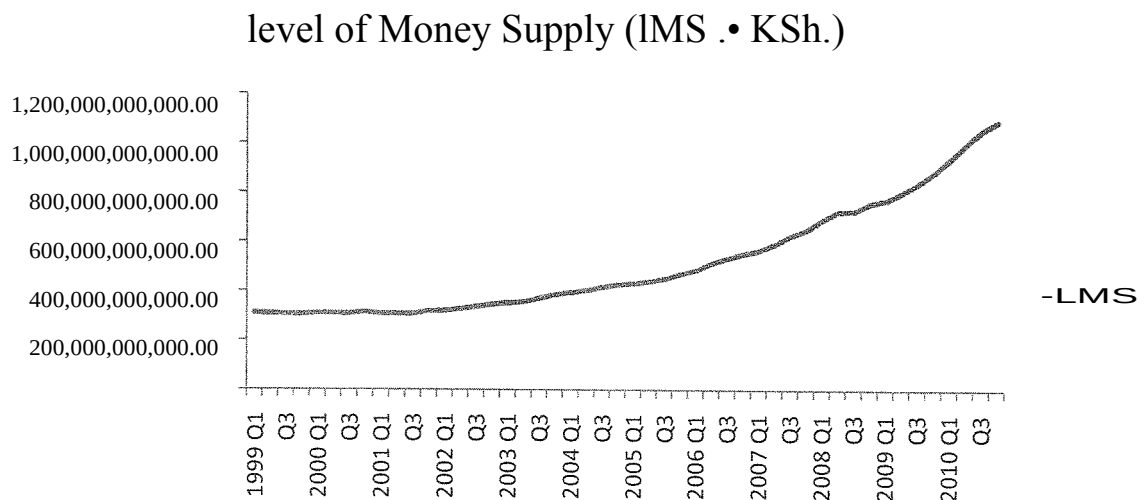
According to the Commonwealth Secretariat, (2006) the real estate sector was fully within the sphere of money laundering activities. In Kenya, especially in Eastleigh estate, it is alleged that some of the piracy proceeds from Indian Ocean are being cleaned through the real estate market. The proceeds are said to have increased the level of liquidity in the economy that resulted in residential properties selling for twice or thrice their real market worth (Mwathane, 2010).

This research therefore includes the variable (level of money supply) in order to determine if the level of credit in the Kenyan economy support the house prices in the residential real estate sector.

This research postulates that it would be difficult to collect the absolute amount of house loans from the mortgage providers. It therefore intends to use data on money supply that is provided by the Central Bank of Kenya. The measure of money supply used is =M2 since it is a broader classification of money and that it was among the leading economic indicators (KNBS, 2010).

As presented in the Figure 2.7 the level of money supply in the economy has steadily been rising, with the year 2010 showing the highest level of money supply in the kenyan economy.

Figure 2.7: Graph of the level of money supply



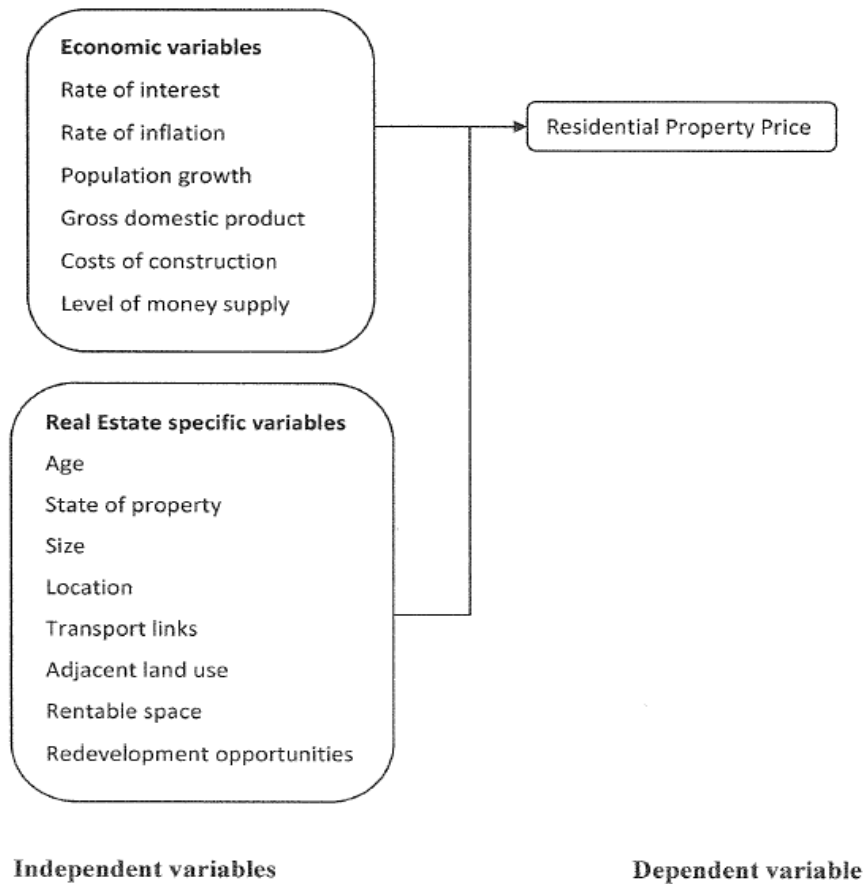
Source: Author's computation (Data used provided in Appendix 7)

Other particular factors affecting house prices

House prices are affected by other factors that are specific to the housing market. These factors include age and state of the property, locational attributes, size, composition of rentable space, construction, zoning, future redevelopment opportunities, adjacent land use and access to transport links (Egert & Mihaljek, 2007; Brueggeman & Fisher, 2005 and Kennedy, 2006).

2.1.6 The Conceptual framework

The framework is partly derived from the studies done by Borowiecki (2009), Case & Shiller (2003), Quigley (1999), Hou (2010), Shen et al., (2005) and Tsatsaronis & Zhu (2004).



2.1.6.1 Operationalisation of the variables

2.1.6.1.1 Interest rate

Interest rate refers to the price that has to be paid for the use of borrowed funds expressed as a percentage. It is the payment for the sacrifice of the current spending power and the risks involved in lending (Mudida, 2009). Himmelberg et al., (2005) and Tsatsaronis & Zhu (2004) noted that the reduction in real estate assets price are associated with low interest rates since lower rates increased households' capacity to borrow.

2.1.6.1.2 Inflation rate

Inflation rate is the persistent rise in the general price level of goods and services, expressed as a percentage. Inflation majorly arise as a result of cost-push, when the rising production costs cause the general price level to increase, and demand-pull, which takes place when the aggregate supply is persistently exceeded by aggregate demand at current prices (Mudida, 2009). Increases in the rates of inflation generally lead to a rise in the property prices, (Goyal & Yamada, 2001 and Tsatsaronis & Zhu, 2004).

2.1.6.1.3 Population growth

Increases in population boosts housing demand, thereby increasing price levels of residential units when all other factors are held constant, (Kennedy, 2006).

2.1.6.1.4 Costs of construction

This refers to expenditures such as cost of land, materials and labour to be incurred in order to build the houses. Higher house prices are associated with an increase in these costs (Kennedy, 2006 and (Goyal & Yamada, 1999).

2.1.6.1.5 Level of money supply

Money supply refers to the currency in the form of notes and coins with the public, including all the deposits held by the public in deposit taking institutions (Mudida, 2009). Increased money supply in the economy raises the property prices (Allen & Gale, 2000).

2.1.6.2 Model Specification

The general functional model as per the variables under the study is;

$$RREP = f(RINT, RINF, PG, GPD, CC, LMS, S)$$

The estimable (reduced form) equation of the general model was therefore as follows:

$$RREP = \alpha_0 - \beta_1 RINT + \beta_2 RINF + \beta_3 GDP + \beta_4 CC + \beta_5 LMS + \beta_6 PG + \beta_7 S + \ell$$

Where;

<i>RREP</i> :	Residential Real Estate Price
<i>RINT</i> :	Rate of Interest
<i>RINF</i> :	Rate of Inflation
<i>GDP</i> :	Gross Domestic Product
<i>CC</i> :	Cost of Construction

<i>L1/dS:</i>	Level of Money Supply
<i>PG:</i>	Population Growth Other
<i>S:</i>	specific variables

2.1.7 Models used

Studies have used several models to explain residential properties valuation. These include timevarying present value approach (Black et al., 2006 and Hou, 2010), Vector Autoregressive model (V AR) (Black et al., 2006; Shen et al., 2005; Tsatsaronis & Zhu, 2004; Borowiecki, 2009, and Quigley, 1999), the imputed rent (Himmelberg et al., 2005), price to rent ratio and price to income ratio models, (Himmelberg et al., 2005 and Hou, 2010). The research makes use of the stepwise regression model to analyse the collected secondary data (Pagourtzi et al., 2003).

2.1.8 Effects of asset mispricing that result into bubbles

Real estate bubbles are cited as the trigger for the various national banking crises and an important element that led to the Global Financial Crisis in 2008 (Anders et al., 2010). According to Hou, (2010) if housing prices deviate too much from their fundamental value, then problems such as financial crises could be experienced.

2.1.9 Summary of the chapter

According to available literature, the most commonly used methods for residential property appraisal were the cost and the sales comparison approaches. In addition, it is documented that house prices are influenced by the fundamental factors of demand and supply and the commonly used model in determining whether residential property values are in line with fundamentals is regression that was developed from equating the housing demand and supply factors. Table 2.1 provides a summary of selected recent empirical research on the determinants of house prices.

Table 2.1 Selected recent empirical research on the house prices determinants

Authors and Country	Elasticity of real house prices relative to:			Methodology, Comments
	Disposable Income	Real Interest rate	Other factors	
Euro area Annett (2005)	0.1 to 1.4 Short-run impact	-0.01 to -0.03 Short run impact	Real credit 0.1 to 0.2 Real money 0.4 to 0.6	ECM, Institutional factors help explain the relationship credit and house prices.
Six industrial Countries Sutton (2002)	GNP 1 to 4 After 3 years	-0.5 to -1.5 Weaker for longer rates	Equity prices 1 to 5 after 3 years	VARmodel, 1970s to 2002 Q 1
17 countries Grouped by mortgage Finance structures Tsatsaronis & Zhu (2004)	Accounts for <5% of total variation in prices after 5 years	Accounts for <11% of total variation in prices after 5 years	Inflation Accounts for 50%; bank credit about 10%, term spread about 10%, after 5 years	VAR model, 1970 to 2003, Mortgage market structures matter for the sensitivity of inflation to interest rates and the strength of the bank credit channel.
18 countries Torrones & Otrók (2004)	0.5 to 1.1	-0.5 to -1.0 short-term rate	Real credit 0.1 Population Growth 1.8	Dynamic factor model 1980 to 2004 Q1, Real house prices show high persistence, long run reversion to fundamentals and dependence on economic fundamentals.
Ireland Rae & Noord (2006)	1.8	-1.9		ECM 1977 to 2004, The sharp increase in the price for existing relative to new houses since the mid 1990s partly reflects supply constraints. Short-run income elasticity's High.
Netherlands	1.9	-7.1		High growth in real house

OECD (2004)				prices mainly Attributable to real supply response.
Spain Ayuso et al. (2003, Bco. De Espana (2004)	2.8	-4.5		ECM 1989 to 2003, Estimated over-valuation increasing over time
Finland Oikarinen (2005)	0.8 to 1.3	-2.2 to -7.5	Construction costs 1.1 to 2.3	ECM 1975Q1 to 2005Q2, No over-valuation in recent years.
Australia Abelson et al. (2005)	1.7	-5.4		ECM 1984Q4 to 2005Q1

Source: Girouard et al. (2006), pg 11-15

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the procedures and methods which are employed in the study; research design, population and sampling, data collection methods and analysis.

3.1.1 Research design

The data for the study is quantitative in nature and the analytical model used is the stepwise regression model. This makes the research to be correlational in nature. The study also has some qualitative aspects since a survey is also carried out to collect data, which is useful in triangulating the regression results.

In addition, the study is longitudinal in nature since its data is gathered on quarterly basis for a period of twelve years, from the year 1999 up to December 2010. This is the period for which secondary data is available.

3.1.2 Population and Sampling

The target population for the study included all the two 234 institutions that are registered real estate companies based in Nairobi. Data is also obtained from the Kenya National Bureau of Statistics (KNBS) data source, the Central Bank of Kenya (CBK) data source, National Housing Corporation (NHC), HassConsult Limited and Lloyd Masika Limited. Due to the constraint of time and data collection costs, a convenient sampling approach is used to obtain data from the registered real estate companies. Out of the sample of 69 real estate companies for the survey, questionnaires were received back from 37 companies. This represents a response rate of fiftyfour percent.

3.1.3 Data and data collection procedures

The main data collected is as follows: data for interest rate is the 91-day treasury bills rate, nominal inflation rate, population growth, gross domestic product, residential construction costs

and money supply (M2). These data are collected from the CBK, KNBS, HassConsult limited, Lloyd Masika limited and NHC. A survey is also conducted in which self-administered questionnaires are used to gather additional corroborating data from registered real estate companies through drop and pick method. A letter of introduction from Strathmore University accompanied the questionnaires. The data collection period took one and a half months.

3.1.4 Data analysis techniques and presentation

Stepwise regression is used to analyze the quantitative data collected (Pagourtzi et al., 2003). Since the researcher suspected that there could be possibility of the existence of the multicollinearity problem (Andres & Vallelado, 2008) between every pair of the independent variables, a test (Pearson correlations) is performed and the results are presented in the next chapter.

The regression model is useful in performing the p -value tests (which assist in establishing the significance of the independent variables). In addition, the model is used to show the nature and the extent of the existing relationship between the dependent variable and the independent variables. Further, the tool is also useful for performing other test such as the coefficient of determination (which is useful in determining the significance and the strength of the model developed in this study).

Consistent with prior research (Tsatsaronis & Zhu, 2004 and Quigley, 1999), natural logarithm of the variables, with exception of that of the rates of interest and inflation, are obtained and used in the regression analysis.

Other than the regression model, percentages are as well computed for the data collected from the questionnaires, which provide useful corroborating information. Tables are used to present the analysed data from the survey.

3.1.5 Summary of the chapter

The research design is correlational in nature. In addition to using percentages for analysis, the study adopts the step wise regression modeling approach as a solution to the multi-collinearity problem documented in chapter four. A survey is also conducted in which self-administered questionnaires are issued to the sample of the institutions that are registered real estate

companies operating in Nairobi city. The study collected economic variables data that included rate of interest, population, gross domestic product and inflation rate while the housing data gathered are house prices and the residential building cost index.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presents the results of the study according to the data analysis. Multi-collinearity test is also presented, followed by the regression results output and the survey findings. The chapter also presents interpretation of the results.

4.1.1 Multi-collinearity test results

The study uses Pearson correlations to measure the degree of association between the different variables under consideration (Andres & Vallelado, 2008). This test is necessary since the researcher thought some of the independent variables are correlated. The test results for Pearson correlations are presented in the Table 4.1.

Table 4.1: Pearson correlation test for Multi-collinearity

VARIABLE	RINT	RINF	GDP	CC	LMS	PG
RINT						
	(0.000*)					
RINF	-0.134					
	(0.363**)	(0.000*)				
GDP	-0.732	0.383				
	(0.000*)	(0.007**)	(0.000*)			
CC	-0.594	0.514	0.752			
	(0.000*)	(0.000*)	(0.000*)	(0.000*)		
LMS	-0.499	0.424	0.609	0.967		
	(0.000*)	(0.003*)	(0.000*)	(0.000*)	(0.000*)	
PG	-0.598	0.490	0.785	0.995	0.954	
	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)

Note: * Indicates correlation is significant at the 1% significance level

** Indicates correlation is significant at the 5% significance level

*** Indicates correlation is significant at the 10% significance level

Source: Author's computation

As indicated in the Table 4.1, the Pearson's correlations signify that the degree of correlation between every pair of independent variables is high. The results show that gross domestic product and the rate of interest have a high negative degree of correlation as presented by -0.732. This is as opposed to the correlation by 0.785 as explained by the association between gross domestic product and population growth. The high degrees of association between the variables suggest the presence of multi-collinearity, which is also confirmed by the Durbin-Watson statistic of 0.775990. This presents a statistical problem in the sense that some independent variables may have masked others which could have made it difficult to assess their effects on the house prices. Stepwise regression model is hence selected since it provides a solution to the statistical problem (Pagourtzi et al., 2003).

4.1.2 The relationship between residential house prices and economic fundamentals

4.1.2.1 Stepwise regression results and interpretation

The stepwise regression model is used in the study to estimate the causal relationship between the economic fundamentals and the residential prices (Pagourtzi et al., 2003). The results of the regression output are presented in Table 4.2.

Table 4.2: Regression results (Response is RREP on 6 predictors, with N = 48)

Variable	Coefficient	P- Value	T- Value
PG	2.610	0.000*	4.02
CC	-1.67	0.001*	-3.48
RINF	0.41	0.008**	2.78
LMS	0.408	0.000*	4.49
Constant	-19.2012		
S	0.0560		
R- Sq	89.12		
R- Sq (Adj)	88.11		
Mallows C-p	4.8		

*Note: * Indicates significance at the 1% significance level*

*** Indicates significance at the 5% significance level*

**** Indicates significance at the 10% significance level*

Source: Author's computation

The result of the regression analysis shows a negative coefficient of -1.67 with a p- value of 0.001 between the residential real estate prices (RREP) and costs of construction (CC). This indicates a negative relationship between the two variables which is highly significant at 1 %. This means that if the cost of construction increases, it will have a negative impact of the price of residential property, which will decrease (holding all other factors constant). The study used the residential building cost index as the proxy to measure the construction costs of houses in the residential housing sector of the economy.

The finding of the regression analysis also shows a positive coefficient of 2.610 with a p- value of 0.000 between the house prices and population growth (PG). This shows a positive relationship between the variables which is highly significant at 1 %. When all other factors are held constant, it means that an increase in the population will have a positive impact on the residential real estate prices, which will also increase.

In addition, the findings also indicate a positive coefficient of 0.41 with a p - value of 0.008 between the house prices and the rate of inflation (RINF). This shows the existence of positive relationship between the variables which is highly significant at 5%. Holding all other factors constant, the results suggest that an increase in the rate of inflation will have a positive impact on the house prices, which will also increase.

Further, the regression finding presents a positive coefficient of 0.408 with a p- value of 0.000 between the residential real estate prices and the level of money supply in the economy (LMS). This indicates that a positive relationship, which is highly significant at 1 %, is present between the variables. Therefore, the results suggest that an increase in the level of money supply in the economy will have a positive impact on the house prices, when all other factors held constant.

It is important to note that other variables; gross domestic product (GDP) and rate of interest (RINT) are removed from the model, an indication that they are not among the significant economic fundamentals that support the residential house prices. It is thus difficult to estimate the nature and the significance of the relationship between these independent variables and the house prices.

dependent and the independent variables. This means that about 88.11 % of the variations in house prices can be explained by the independent variables resulting from the regression process.

4.1.2.2 Survey results and interpretation

Factors that influence the house prices

This research attempts to corroborate the regression results by conducting a survey for the factors that determine the house prices. Therefore, the survey results for the factors are presented in Table 4.3.

Table 4.3: Survey results for factors that influence the price of houses

	Response	Percentage (n=69)
Factors that influence house prices	Rate of interest	65%
	Rate of inflation	51%
	Level of disposable income	54%
	Population growth rate	68%
	Gross domestic product	30%
	Costs of construction	78%
	Level of money supply	46%
Relationship between house prices and influencing the factors	Support	95%
	No support	5%
Money laundering and Nairobi housing market?	There is money laundering	76%
	No money laundering	24%

As shown in Table 4.3, findings of the survey show that 65% of the respondents believe that rate of interest influence the house prices. In addition, 51 % and 54% say that the rate of inflation and the level of disposable income influence the residential real estate prices respectively. Again, 68% and 30% of the respondents say that population growth and gross domestic product as well influence the residential house prices respectively. Moreover, 78% and 46% indicate that house prices are also influenced by construction costs and the level of money supply in the economy respectively.

Furthermore, 95% of the respondents say that house prices in Nairobi are supported by rate of interest, rate of inflation, level of disposable income, population growth, gross domestic product, costs of construction and level of money supply while only 5% had a contrary opinion on the same. The study finds the regression model to be strong, suggesting that the results of the process have a very high level of validity. The R-Sq (adjusted), which is 88.11 % points that the regression model significantly explains the nature and the extent of the relationship that exist between the

On the other hand, 76% of the respondents indicate that money laundering has a role to play in residential housing market in Nairobi while 24% of the respondents say money laundering has no role to play in the market.

4.1.3 The most used method of residential real estate appraisal

The study sought to establish the most used method of residential real estate appraisal in Nairobi. The findings of the survey are therefore presented in Table 4.4.

Table 4.4: Survey results for the most used residential real estate appraisal methodes)

Appraisal method used	Response	Percentaze (n=69)
	Sales comparison approach	54%
	Cost approach	27%
	Income capitalization approach	38%

According to the survey findings presented in Table 4.4, 54% of the respondents indicate that sales comparison approach is the most used appraisal method of residential real estate in Nairobi, followed by income capitalization approach supported by 38% of the respondents and then the cost approach believed by 27% of the respondents.

4.1.4 Other determinants of residential real estate prices

The study is also carrying out a survey to find out the other specific determinants of the house prices besides the economic fundamentals. The survey findings are presented in Table 4.5.

Table 4.5: Survey results for specific house price determinants

Specific house price determinants	Response	Percentage (n=69)
	Age	43%
	Size	59%
	Transport links	59%
	Rentable space	57%
	State of property	59%
	Location	97%
	Adjacent land use	43%
	Redevelopment opportunities	59%
	Other(s)	32%

As per the results of the survey in the Table 4.5, the respondents say that age (43%), size (59%) and transport links (59%) are among other specific factors that determine the house prices in Nairobi.

Further, the respondents also indicate that rentable space (57%), state of property (59%) and location (97%) are also among the specific factors that determine the residential real estate prices.

The results also show that 43% and 59% of the respondents believe that adjacent land use and redevelopment opportunities respectively are also specific factors that determine the house prices in Nairobi.

According to 32% of the respondents, other specific factors that determine the prices include security, public opinion, adherence to land surveying regulation, and extra facilities (like gym, pool, lift).

4.1.5 Summary of the chapter

The results of this research show that a positive relationship exists between population growth, rate of inflation, level of money supply in the economy and the price of houses. The findings also indicate that a negative relationship is present between construction costs and the residential house prices. Further, the study finds that sales comparison approach is the most used method of appraising houses for sale and location is the most important determinant of house prices.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter will discuss the findings in relation to the objectives of the study and the linkages with other empirical findings in the literature.

The objectives of the study included finding out whether there is a relationship between residential house prices and economic fundamentals, establishing the most used method of residential real estate appraisal and identifying other determinants of real estate prices. The main objective of the study is to find out if the residential property prices are supported by the economic fundamentals.

5.1.1 The relationship between residential house prices and economic fundamentals

5.1.1.1 The correlation between residential house prices and population growth

As indicated in Table 4.2 of the regression results, the residential real estate price is noted to have a strong positive relationship with population growth. This relationship is significant ($p < 0.000$). This means that an increase in population by one unit leads to a corresponding increase in the residential house prices by 2.61 units, all other factors held constant. The house prices are found to be most sensitive to changes in population, which can be deduced from the coefficient of population growth variable.

This finding corresponds with that of Dennis et al., (2002), which found median house prices to be positively related to changes in human population in 62 metro areas of the USA.

The finding also corresponds to that of the study conducted by Borowiecki (2009), which found changes in house prices in the Swiss economy to be very sensitive to population growth. In the research study by Borowiecki (2009), the results indicate that a one percent increase in population growth led to a two percent rise in house prices. This provides another example of the existence of positive relationship between the house price and population.

Furthermore, the results of the study also confirm the research of Egert et al., (2007), into the determinants of house prices in Central and Eastern Europe. As documented by Egert et al., (2007), a clear and robust positive relationship exists between changes in human population and house prices and this relationship is significant.

This result further confirms the statistics (KNBS, 2010 and NHC, 2009) that demand for residential houses (150,000 units annually) highly exceeds supply (30,000 units annually), hence putting much pressure on the residential house prices. It is evident that population growth, being among the factors that determine the demand for the housing units (Quigley, 1999), appears to be growing at a rate that is higher than that of the housing units supply.

5.1.1.2 The correlation between residential house prices and the rate of inflation

As observed in the regression output (Table 4.2), a significant ($p < 0.008$) and strong positive relationship is present between the house prices and the rate of inflation. In fact, holding all other factors constant, the finding shows that a rise in the rate of inflation by one unit leads to a rise in the house prices by 0.41 units, meaning that residential house prices in Nairobi are not very sensitive to the variations in the rate of inflation.

This result confirms that of Tsatsaronis & Zhu (2004), which determined the driver of house price dynamics in 17 industrialized economies. There existed a positive relation between house prices and inflation. In the study (Tsatsaronis & Zhu (2004), inflation is found to be an important driver of the prices since it accounted for more than half of the total variation in the house prices.

5.1.1.3 The correlation between residential house prices and the level of money supply

The finding as per the regression output (Table 4.2) also shows that there is a significantly strong ($p < 0.000$) positive relationship between the house prices and the level of money supply in the economy. It indicates that an increase in the level of money supply by one unit, *ceteris paribus*, generally leads to the rise in house prices by 0.408 units. This also means that house prices are less responsive to the variations in the level of money supply in the economy.

The findings of this research therefore are consistent with that of empirical literature (Egert et al., 2007; Annett 2005 and Shen et al., 2005) with regard to the level of money supply.

The results of the study (Egert et al., 2007) point out that credit expansion has a strong and positive correlation with residential real estate prices in OECD nations and other economies that are in transition. In addition, the study done by Annett (2005) on house prices and the Euro area monetary policy also show that increased supply of money contributes to the growth of house prices.

5.1.1.4 The relationship between residential house prices and the costs of construction Contrary to empirical research (Borowiecki, 2009), this research finds a significantly ($p < 0.001$) negative relationship between residential house prices and construction costs. As observed in the regression output provided in Table 4.2, the findings of the study show that an increase in construction costs by a unit, all other factors held constant, leads to a decline in the price of residential houses by 1.67 units. It can therefore simply be explained that the house prices in Nairobi are not driven by the costs of construction since they are not justified by the independent variable.

Perhaps, the other factors (which include population growth, level of money supply and inflation) are pushing the prices so high to the extent that the cost of construction is actually reducing the would have been house prices. This would be because the increase in cost of construction is probably so insignificant when compared to the increase in population, level of money supply and rate of inflation. Hence, the high prices witnessed are actually discounted by the cost of construction. If the costs of construction were not there, the prices would have been so high.

Another possible explanation for this negative, unexpected and abnormal relation could be that house prices have not been increasing quite in parallel with the costs of construction (Shen et al., 2005).

The research finding by Borowiecki (2009) indicates that the second most important factor to population, which drives house prices up in the Swiss housing sector is the change in the costs of construction. In particular, the study notes that an increase of the construction costs leads to almost an equal increase in prices of residential units (positive relationship). This is an indication that a rise in construction prices is normally passed to the buyers.

5.1.1.5 The relationship between residential house prices and other variables (GDP and RINT)

Among the independent variables of interest in this research include the gross domestic product and the rate of interest. Contrary to previously documented studies (Shen et al., 2005, Hou, 2010 Borowiecki, 2009 and Egert & Mihaljek, 2007), these variables are removed during the stepwise regression process. A possible explanation could be that they do not have any significant influence on the price of houses and hence, no relationships could be revealed.

Literature documents (Shen et al., 2005, Hou, 2010) the existence of positive correlations between the gross domestic product, rate of interest and the dependent variable which is the residential house price.

5.1.1.6 The survey and regression results put together

In the survey findings presented in Table 4.3, the majority of the respondents indicate that house prices in Nairobi are supported by rate of interest, rate of inflation, population growth, residential building costs and gross domestic product, thus confirming the results from the existing literature (Borowiecki, 2009; Shen et al., 2005 and Hou, 2010). However, evidence from the survey results contradict that of the regression which shows a negative relationship between the residential house prices and the construction costs.

When linking the interplay between the variables: money supply and rate inflation from the regression and the survey findings, two things may have come into play.

One, money laundering may have driven the house prices (survey finding) given that even though the level of money supply and inflation rate are significantly positively related with the prices, the responsiveness of the prices to the independent variables is small (regression result).

Secondly, from the mortgage lending perspective, lenders may have little weight in adjusting the risk free interest rates for inflation when advancing housing loans (this is because the rates of interest are removed during the regression process, an indication that they have no correlation with the house prices).

5.1.2 The most used method of residential real estate appraisal

According to the survey results provided in Table 4.4, majority of the respondents say that the most used method of appraising residential property is the sales comparison approach, followed by the income capitalization approach while the least method used is the cost approach. This finding is consistent with literature (Pagourtzi et al., 2003) which shows that there are different types of real estate property. Therefore, residential properties could best valued using the sales comparison approach.

5.1.3 Other determinants of residential real estate prices

Consistent with other studies (Egert & Mihaljek, 2007; Brueggeman & Fisher, 2005 and Kennedy, 2006), findings in Table 4.5, show that the most specific determinant of residential house price was location. Other specific factors also include size of the property, adjacent transport links and state of the property.

5.1.4 Summary of the chapter

Consistent with literature, the results of this research finds that a positive relationship exists between population growth, rate of inflation, level of money supply in the economy and the price of houses. House prices are found to be most responsive to the changes in population growth variable only.

However, the regression output results went against previous studies by showing a negative relationship between construction costs and the residential house prices. Further, the gross domestic product and rate of interest as well as costs of construction are not found to be drivers of residential house prices.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

In this chapter, conclusions are drawn based on the research findings and the discussion. This is followed by recommendations, limitations for the study and then summary of the chapter.

6.1.1 Conclusion and the implications of the study

Based on the findings of this study, the following conclusions are made

This study finds that the house prices in Nairobi metropolitan have a relationship with economic fundamentals. In particular, findings point to the existence of a positive relationship between population growth, the level of money supply, the rate of inflation and the residential house prices. However, the results show a negative correlation to be present between the costs of construction and the prices. It is not possible to ascertain the nature and extent of the relationship that is present between the house prices and other fundamentals used in the study, which include the gross domestic product and rate of interest since they are removed from the regression during analysis.

The study concludes that the residential house prices are not supported by the economic fundamentals other than population growth, rate of interest and the level of money supply in the economy. This is because the house prices are found to interact abnormally (negative correlation) with the building costs, indicating that they have no influence on house prices. Again, gross domestic product and the rate of interest are removed from the regression process, indicating that they do not have any role to play in their relationship with the residential house prices.

Even though the research indicates that the level of money supply and rate of interest are consistent with house prices, the regression results show that they have a mild influence with regard to the responsiveness of the price of houses. This could suggest that the residential house prices are not adequately justified by money supply and inflation levels.

Money laundering (Jamah, 2009) could possibly have a role to play in the residential housing market in Nairobi (as per the survey results). This can be confirmed by the fact that although a positive relationship existed, residential property prices are found to be less responsive to the variations in the level of money supply and inflation rate (as per the regression results). There could be indications that other factors in relation to financing of the houses are not captured and accounted for in the proper monetary system of the economy.

Further, the research suggests that there could be an indication of a bubble in the residential housing sector. This is due to the abnormal interplay between the residential property prices and the costs of construction (Shen et al., 2005). This could also be due to the fact that the house prices are not fully justified by the level of money supply in the economy and the rate of inflation. Further, the existence of a bubble may also be confirmed since the house prices are not consistent with rate of interest and gross domestic product, which are among the leading economic indicators (KNBS, 2010).

The study also found that the most used real estate appraisal method is the sales comparison approach and the most specific determinant of house prices is location of the residential property.

6.1.2 Recommendations and areas for further research

Based on the conclusions, the following recommendations can be made:

Residential real estate investors, lenders (mortgage) and suppliers should conduct their transactions in the housing market with caution, given the indication of the possible existence of a bubble in the market instability (Shen et al., 2005; Hou, 2010 and Catte, Girouard, Price & Andre, 2004).

The economic policy makers, especially in the Ministry Planning, National Development and Vision 2030 and the Ministry of Housing in Kenya, should come in to establish policies which ensure that the house prices move in line with the fundamental factors of the economy in order to enhance economic stability (Shen et al., 2005; Hou, 2010 and Catte, Girouard, Price & Andre, 2004). Since the results of study (as per the survey) indicate that sales comparison approach is the most used method for appraising residential houses, the policy makers should ensure that the property prices arrived at reflect the prevailing economic outlook.

Further research needs to be carried out to confirm if a bubble really exists in the housing market. Again, other methodologies also need to be adopted in similar studies that are in line with the title of the research in order to prove whether house prices are not supported by the fundamentals.

6.1.3 Limitations of the study

The researcher recognizes the fact that data for this study, especially the dependent variable, is available for only short time period (twelve years). In addition, there is a survey response rate limitation since the study did not achieve 100% response rate from the respondents.

In another instance, an index (RBCI) is used as a proxy for the construction costs due to lack of absolute data on the independent variable. The development or computation of indices normally have some inconsistencies (Smith & Smith, 2006), which could make them weak to be used as independent research variables.

Changes in human population give rise to demand for residential houses (Egert et al., 2007; Borowiecki, 2009 and Dennis et al., 2002). This study documents that non-resident population may not be captured in the independent variable even though it (population) is found to be the most important driver for the house prices.

6.1.4 Summary of the chapter

The findings of the research indicate that the economic fundamentals; population growth, rate of inflation and the level of money supply in the economy have a positive relationship with the house prices (Borowiecki 2009; Egert et al., 2007; Shen et al., 2005 and Tsatsaronis & Zhu 2004). On the other hand, a negative relationship is found to exist between the costs of construction and the residential house prices. A major finding in this study is that the house prices in Nairobi city are not supported by the gross domestic product, interest rate and the costs of construction. Moreover, the results also suggest the possible existence of a bubble and that money laundering does have a role to play in the Nairobi city housing sector. The economic policy makers should find the findings of the study useful, for making informed housing sale decisions which ensure that house prices are in line with the fundamentals.

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APPENDIX 1

Research work plan

Research title: Real Estate Prices and Economic Fundamentals: An Empirical Investigation of the
Residential Housing Market in Nairobi City

Progre Stage	Stage Description	Proposed dates
1	Seeping of the Research study	1 st Sept, 2010 - 15 th Sept, 2010
2	Choice of Research Topic	16 th Sept, 2010 - 30 th Sept, 2010
3	Research Problem clarification, objectives, Purpose and	1 st Oct, 2010 - 25 th Oct, 2010
4	Foundation Literature survey	26 th Oct, 2010 - 26 th Nov, 2010
5	Proposal of Research	21 st Dec, 2010 - 1 st Jan, 2011
6	Advanced Literature Review (Chapter)	1 st Jan, 2011 - 15 th Jan, 2011
7	Detailed Proposal of Research	16 th Jan, 2011 - 15 th Feb, 2011
8	Data Collection	1 st Feb, 2011 - 16 th Mar, 2011
9	Data analysis and Interpretation	1 st Apr, 2011 - 4 th April, 2011
11	Research Report Assessment By	5 th April, 2011 -
12	Research "Report Correction Upon Assessment By Supervisors	

Remarks: Generally, this work guide helped to keep the researcher on track. However, some unforeseen circumstances made strict following of the time lines not possible.

APPENDIX 2

Introduction Letters

STRA THMORE UNIVERSITY

15 February 2011



To the Managing Director,
Lloyd Masika Ltd,
Norfolk Towers, P.O. Box 45733, Kijabe
Street, Nairobi (0)20 2215900, Nairobi,
Kenya.

Attention: Alice (Human Resource Manager) Re:
Ochuodho, Peter - Reg. No.: 008590

Mr. Ochuodho Peter is a postgraduate student in our Master of Commerce (MCom) programme. In partial fulfillment of the MCom degree, students are required to carry out a research project and write a thesis on a contemporary subject within their field of specialisation. Among other activities, the project involves data collection and analysis.

Peter is requesting to gather information to be used in his research. He wants to obtain data on residential house prices on quarterly basis from January 1991 to December 2010. The information he will obtain from your organization will be used for this academic purpose only and will be kept confidential. The results of the survey will be in summary form and will not disclose any individual, company name or company information in any way.

The research study is entitled "Real Estate Prices and Economic Fundamentals:
An Empirical Investigation of the Residential Housing Market in Nairobi City".

We hope that your organization can assist by providing information to the above named student. His email address: pochuodho@astrathmore.edu/ petevero@gmail.com. Cell phone: 0724211 857.

Yours faithfully,

A handwritten signature in dark ink, appearing to read "David Wangombe".

David Wangombe
Dean, School of Management and Commerce.

STRATHMORE UNIVERSITY



15 February 2011

To the Managing Director,
HassConsult Ltd,
First Floor ABC Place Waiyaki Way,
P.O. Box 14090 - 00800
Nairobi, Kenya

Dear Sir,

Re: Ochuodho, Peter - Reg. No.: 008590

Mr. Ochuodho Peter is a postgraduate student in our Master of Commerce (MCom) programme. In partial fulfilment of the MCom degree, students are required to carry out a research project and write a thesis on a contemporary subject within their field of specialisation. Among other activities, the project involves data collection and analysis.

Peter is requesting to gather information to be used in his research. He wants to obtain monthly information on residential houses and construction costs from January 1991 to December 2010. The information he will obtain from your organization will be used for this academic purpose only and will be kept confidential. The results of the survey will be in summary form and will not disclose any individual, company name or company information in any way.

The research study is entitled "Real Estate Prices and Economic Fundamentals:
An Empirical Investigation of the Residential Housing Market in Nairobi City".

We hope that your organization can assist by providing information to the above named student. His email address: pochuodho@strathmore.edu petevero@gmail.com. Cell phone: 0724211 857.

Yours faithfully,

David Wangombe
Dean, School of Management and Commerce.

STRATHMORE UNIVERSITY



15 February 2011

To the Managing Director,
National Housing Corporation,
NHC House, Aga Khan Walk,
P.O Box 30257 Nairobi 00100 GPO Kenya

Attention: Mr. John Agutu (Chief Estates Manager),

Re: Ochuodho, Peter - Reg. No.: 008590

Mr. Ochuodho Peter is a postgraduate student in our Master of Commerce (MCom) programme. In partial fulfillment of the MCom degree, students are required to carry out a research project and write a thesis on a contemporary subject within their field of specialisation. Among other activities, the project involves data collection and analysis.

Peter is requesting to gather information to be used in his research. He wants to obtain data on residential house prices on quarterly basis from January 1991 to December 2010. The information he will obtain from your organization will be used for this academic purpose only and will be kept confidential. The results of the survey will be in summary form and will not disclose any individual, company name or company information in any way.

The research study is entitled "Real Estate Prices and Economic Fundamentals:
An Empirical Investigation of the Residential Housing Market in Nairobi City".

We hope that your organization can assist by providing information to the above named student. His email address: pochuodho@strathmore.edu/ [petevero\(a\)gmail.com](mailto:petevero(a)gmail.com). Cell phone: 0724211 857.

Yours faithfully,

A handwritten signature in dark ink, appearing to read 'David Wangombe'.

David Wangombe
Dean, School of Management and Commerce.

STRATHMORE UNIVERSITY



10 March 2011

The Director,
Kenya National Bureau of Statistics,
POBox 30266-00200
Nairobi

Re: Ochuodho. Peter - Reg. No.: 008590

Mr. Ochuodho Peter is a postgraduate student in our Master of Commerce (MCom) programme. In partial fulfilment of the MCom degree, students are required to carry out a research project and write a thesis on a contemporary subject within their field of specialisation. Among other activities, the project involves data collection and analysis.

Peter is requesting to gather information to be used in his research. He wants to obtain gross domestic product, population growth, the rate of inflation and residential building cost index. The information he will obtain from your organization will be used for this academic purpose only and will be kept confidential. The results of the survey will be in summary form and will not disclose any individual, company name or company information in any way.

The research study is entitled "Real Estate Prices and Economic Fundamentals: An Empirical Investigation of the Residential Housing Market in Nairobi City".

We hope that your organization can assist by providing information to the above named student. His email address: pochuodho@ustrathmore.edu/ petevero@gmail.com. Cell phone: 0724 211 857.

Yours faithfully,

A handwritten signature in dark ink, appearing to read "David Wangombe".

David Wangombe
Dean, School of Management and Commerce.

STRATHMORE UNIVERSITY



10 March 2011

To The Bank Secretary,
Central Bank of Kenya,
Haile Selassie A venue,
POBox 60000-00200
Nairobi.

Dear Sir/Madam,

Re: Ochuodho, Peter - Reg. No.: 008590

Mr. Ochuodho Peter is a postgraduate student in our Master of Commerce (MCom) programme. In partial fulfillment of the MCom degree, students are required to carry out a research project and write a thesis on a contemporary subject within their field of specialisation. Among other activities, the project involves data collection and analysis.

Peter is requesting to gather information to be used in his research. He wants to obtain quarterly information on money supply (M2), the 91-day treasury bills rate and inflation rates from January 1991 to December 2010. The information he will obtain from your organization will be used for this academic purpose only and will be kept confidential. The results of the survey will be in summary form and will not disclose any individual, company name or company information in any way.

The research study is entitled "Real Estate Prices and Economic Fundamentals: An Empirical Investigation of the Residential Housing Market in Nairobi City".

We hope that your organization can assist by providing information to the above named student. His email address: pochuodho@V.strathmore.edu petevero@gmail.com. Cell phone: 0724211 857.

Yours faithfully,

A handwritten signature in dark ink, appearing to read 'David Wangombe'.

David Wangombe

Dean, School of Management and Commerce.

APPENDIX

Data for Average Residential Real Estate Prices (ARREP)

YEAR	QUARTER	ARREP	YEAR	QUARTER	ARREP
1999	Quarter 1	10,000,000.00	2005	Quarter 1	15,682,819.00
	Quarter 2	12,000,000.00		Quarter 2	15,672,251.00
	Quarter 3	12,500,000.00		Quarter 3	15,210,303.00
	Quarter 4	12,720,322.00		Quarter 4	15,004,467.00
2000	Quarter 1	14,000,000.00	2006	Quarter 1	15,070,019.00
	Quarter 2	14,236,200.00		Quarter 2	15,214,632.00
	Quarter 3	14,317,890.00		Quarter 3	15,284,622.00
	Quarter 4	14,398,697.00		Quarter 4	15,669,341.00
2001	Quarter 1	14,414,916.00	2007	Quarter 1	16,282,188.00
	Quarter 2	14,417,365.00		Quarter 2	16,345,741.00
	Quarter 3	14,430,216.00		Quarter 3	16,684,129.00
	Quarter 4	14,430,800.00		Quarter 4	17,527,830.00
2002	Quarter 1	14,457,772.00	2008	Quarter 1	18,201,965.00
	Quarter 2	14,463,580.00		Quarter 2	18,522,041.00
	Quarter 3	14,479,693.00		Quarter 3	19,414,782.00
	Quarter 4	14,480,514.00		Quarter 4	20,248,165.00
2003	Quarter 1	14,496,854.00	2009	Quarter 1	20,725,803.00
	Quarter 2	14,498,780.00		Quarter 2	20,433,480.00
	Quarter 3	14,501,130.00		Quarter 3	19,996,447.00
	Quarter 4	14,596,408.00		Quarter 4	20,080,317.00
2004	Quarter 1	14,860,630.00	2010	Quarter 1	20,433,762.00
	Quarter 2	14,862,271.00		Quarter 2	20,536,327.00
	Quarter 3	15,153,513.00		Quarter 3	20,635,264.00
	Quarter 4	15,422,950.00		Quarter 4	20,639,783.00

Source .. National Housing Corporation (2011), Housing Consultants Ltd (2011), Lloyd Masika Ltd (2011)

APPENDIX 4

Data for Rates of Interest (RINT)

YEAR	QUARTER	RINT(%)	YEAR	QUARTER	RINT(%)
1999	Quarter 1	9.50	2005	Quarter 1	8.49
	Quarter 2	10.03		Quarter 2	8.61
	Quarter 3	15.03		Quarter 3	8.61
	Quarter 4	18.58		Quarter 4	8.03
2000	Quarter 1	15.47	2006	Quarter 1	7.95
	Quarter 2	11.38		Quarter 2	6.88
	Quarter 3	9.84		Quarter 3	6.10
	Quarter 4	11.57		Quarter 4	6.32
2001	Quarter 1	15.01	2007	Quarter 1	6.18
	Quarter 2	11.83		Quarter 2	6.65
	Quarter 3	12.70		Quarter 3	7.06
	Quarter 4	11.38		Quarter 4	7.31
2002	Quarter 1	10.54	2008	Quarter 1	7.04
	Quarter 2	8.80		Quarter 2	7.61
	Quarter 3	8.19		Quarter 3	7.91
	Quarter 4	8.25		Quarter 4	8.24
2003	Quarter 1	7.47	2009	Quarter 1	7.77
	Quarter 2	5.03		Quarter 2	7.37
	Quarter 3	1.18		Quarter 3	7.26
	Quarter 4	1.25		Quarter 4	7.10
2004	Quarter 1	1.58	2010	Quarter 1	6.25
	Quarter 2	2.33		Quarter 2	4.12
	Quarter 3	2.24		Quarter 3	1.82
	Quarter 4	5.68		Quarter 4	2.20

Source: Central Bank of Kenya (1999- 2011)

APPENDIX 5

Data for Rates of Inflation (RINF)

YEAR	QUARTER	RINF (%)	YEAR	QUARTER	RINF (%)
1999	Quarter 1	1.95	2005	Quarter 1	14.20
	Quarter 2	1.95		Quarter 2	14.23
	Quarter 3	4.50		Quarter 3	7.67
	Quarter 4	8.17		Quarter 4	5.77
2000	Quarter 1	5.93	2006	Quarter 1	17.80
	Quarter 2	5.10		Quarter 2	12.97
	Quarter 3	6.57		Quarter 3	11.80
	Quarter 4	7.23		Quarter 4	15.30
2001	Quarter 1	10.57	2007	Quarter 1	7.47
	Quarter 2	6.83		Quarter 2	7.70
	Quarter 3	3.77		Quarter 3	12.57
	Quarter 4	2.37		Quarter 4	11.47
2002	Quarter 1	1.13	2008	Quarter 1	19.70
	Quarter 2	1.80		Quarter 2	29.13
	Quarter 3	1.90		Quarter 3	27.43
	Quarter 4	2.90		Quarter 4	28.50
2003	Quarter 1	7.97	2009	Quarter 1	24.27
	Quarter 2	13.40		Quarter 2	21.13
	Quarter 3	9.03		Quarter 3	18.03
	Quarter 4	8.80		Quarter 4	5.63
2004	Quarter 1	9.10	2010	Quarter 1	4.62
	Quarter 2	6.07		Quarter 2	3.68
	Quarter 3	14.33		Quarter 3	3.33
	Quarter 4	17.13		Quarter 4	3.84

Source: Kenya National Bureau of Statistics (1999- 2011)

APPENDIX 6

Data for seasonal Gross Domestic Product (GDP in KSh.)

YEAR	QUARTER	GDP	YEAR	QUARTER	GDP
1999	Quarter 1	214,315,088,199.98	2005	Quarter 1	242,338,500,000.00
	Quarter 2	215,565,367,330.49		Quarter 2	242,338,500,000.00
	Quarter 3	216,822,940,384.72		Quarter 3	242,338,500,000.00
	Quarter 4	218,087,849,914.23		Quarter 4	242,338,500,000.00
2000	Quarter 1	219,360,138,718.80	2006	Quarter 1	242,338,500,000.00
	Quarter 2	219,689,673,228.64		Quarter 2	242,338,500,000.00
	Quarter 3	220,019,702,782.81		Quarter 3	242,338,500,000.00
	Quarter 4	220,350,228,125.00		Quarter 4	242,338,500,000.00
2001	Quarter 1	220,681,250,000.00	2007	Quarter 1	242,338,500,000.00
	Quarter 2	220,681,250,000.00		Quarter 2	242,338,500,000.00
	Quarter 3	220,681,250,000.00		Quarter 3	242,338,500,000.00
	Quarter 4	220,681,250,000.00		Quarter 4	242,338,500,000.00
2002	Quarter 1	242,338,500,000.00	2008	Quarter 1	242,338,500,000.00
	Quarter 2	242,338,500,000.00		Quarter 2	242,338,500,000.00
	Quarter 3	242,338,500,000.00		Quarter 3	242,338,500,000.00
	Quarter 4	242,338,500,000.00		Quarter 4	242,338,500,000.00
2003	Quarter 1	242,338,500,000.00	2009	Quarter 1	242,338,500,000.00
	Quarter 2	242,338,500,000.00		Quarter 2	242,338,500,000.00
	Quarter 3	242,338,500,000.00		Quarter 3	242,338,500,000.00
	Quarter 4	242,338,500,000.00		Quarter 4	242,338,500,000.00
2004	Quarter 1	242,338,500,000.00	2010	Quarter 1	242,338,500,000.00
	Quarter 2	242,338,500,000.00		Quarter 2	242,338,500,000.00
	Quarter 3	242,338,500,000.00		Quarter 3	242,338,500,000.00
	Quarter 4	242,338,500,000.00		Quarter 4	242,338,500,000.00

Source: Kenya National Bureau of Statistics (1999- 2011)

APPENDIX 7

Data for Level of Money Supply (LMS in KSh.)

YEAR	QUARTER	LMS	YEAR	QUARTER	IMS
1999	Quarter 1	310,496,515,333.33	2005	Quarter 1	430,811,916,283.60
	Quarter 2	309,524,400,666.67		Quarter 2	438,428,305,640. n
	Quarter 3	307,150,614,000.00		Quarter 3	450,647,835,659.89
	Quarter 4	305,876,581,333.33		Quarter 4	469,715,183,571.04
2000	Quarter 1	309,355,415,666.67	2006	Quarter 1	484,956,678,011.86
	Quarter 2	310,354,548,000.00		Quarter 2	514,171,726,607.65
	Quarter 3	308,604,120,000.00		Quarter 3	533,742,990,685.35
	Quarter 4	314,686,030,000.00		Quarter 4	551,037,038,872.69
2001	Quarter 1	308,811,481,781.55	2007	Quarter 1	564,605,740,931.31
	Quarter 2	308,253,427,269.27		Quarter 2	591,195,894,389.25
	Quarter 3	307,224,461,016.52		Quarter 3	624,288,695,082.67
	Quarter 4	318,589,663,258.42		Quarter 4	649,189,315,874.20
2002	Quarter 1	319,248,702,903.85	2008	Quarter 1	690,580,459,366.01
	Quarter 2	327,608,238,687.10		Quarter 2	723,174,431,412.55
	Quarter 3	335,948,819,184.57		Quarter 3	726,331,389,042.67
	Quarter 4	344,656,291,456.47		Quarter 4	757,128,711,537.71
2003	Quarter 1	351,543,951,588.58	2009	Quarter 1	nO,784,316,217.36
	Quarter 2	355,533,466,163.6		Quarter 2	800,321,155,883.16
	Quarter 3	370,208,768,327.5		Quarter 3	836,937,195,144.70
	Quarter 4	386,623,647,683.9		Quarter 4	883,107,744,880.75
2004	Quarter 1	393,516,257,638.4	2010	Quarter 1	938,002,600,652.73
	Quarter 2	402,946,252,638.78		Quarter 2	1,000,392,412,004.41
	Quarter 3	415,522,441,440.25		Quarter 3	1,055,491,286,955.32
	Quarter 4	426,402,092,083.25		Quarter 4	1,089,780,494,989.28

Source: Central Bank of Kenya (1999- 2011)

APPENDIX 8

Data for Nairobi City Population Growth (PG)

YEAR	QUARTER	PG	YEAR	QUARTER	PG
1999	Quarter 1	2,093,349	2005	Quarter 1	2,716,139
	Quarter 2	2,118,745		Quarter 2	2,748,825
	Quarter 3	2,145,185		Quarter 3	2,781,905
	Quarter 4	2,171,954		Quarter 4	2,815,383
2000	Quarter 1	2,199,058	2006	Quarter 1	2,821,081
	Quarter 2	2,225,737		Quarter 2	2,855,079
	Quarter 3	2,252,739		Quarter 3	2,889,487
	Quarter 4	2,280,068		Quarter 4	2,924,309
2001	Quarter 1	2,307,730	2007	Quarter 1	2,928,379
	Quarter 2	2,335,501		Quarter 2	2,963,300
	Quarter 3	2,363,607		Quarter 3	2,998,638
	Quarter 4	2,392,051		Quarter 4	3,034,397
2002	Quarter 1	2,407,091	2008	Quarter 1	3,038,443
	Quarter 2	2,436,100		Quarter 2	3,073,979
	Quarter 3	2,465,458		Quarter 3	3,109,931
	Quarter 4	2,495,170		Quarter 4	3,146,303
2003	Quarter 1	2,509,049	2009	Quarter 1	3,151,115
	Quarter 2	2,539,286		Quarter 2	3,187,040
	Quarter 3	2,569,888		Quarter 3	3,223,375
	Quarter 4	2,600,859		Quarter 4	3,260,124
2004	Quarter 1	2,614,885	2010	Quarter 1	3,242,984
	Quarter 2	2,646,443		Quarter 2	3,280,804
	Quarter 3	2,678,382		Quarter 3	3,319,064
	Quarter 4	2,710,706		Quarter 4	3,357,771

Sources:

Kenya National Bureau of Statistics (1999- 2011)

World Bank Statistics (2010)

APPENDIX 9

Data for Residential BUilding Cost Index (RBCI)

YEAR	QUARTER	RBel	YEAR	QUARTER	RBel
1999	Quarter 1	2,883.90	2005	Quarter 1	4,157.63
	Quarter 2	2,923.70		Quarter 2	4,230.91
	Quarter 3	2,920.80		Quarter 3	4,230.91
	Quarter 4	2,947.60		Quarter 4	4,325.44
2000	Quarter 1	2,957.50	2006	Quarter 1	4,516.83
	Quarter 2	3,079.60		Quarter 2	4,621.66
	Quarter 3	3,109.90		Quarter 3	4,672.26
	Quarter 4	3,109.90		Quarter 4	4,699.70
2001	Quarter 1	3,251.60	2007	Quarter 1	4,867.60
	Quarter 2	3,257.50		Quarter 2	4,973.18
	Quarter 3	3,257.50		Quarter 3	4,973.18
	Quarter 4	3,301.80		Quarter 4	5,064.55
2002	Quarter 1	3,347.70	2008	Quarter 1	5,251.51
	Quarter 2	3,369.40		Quarter 2	5,283.13
	Quarter 3	3,379.80		Quarter 3	5,378.62
	Quarter 4	3,520.60		Quarter 4	5,420.86
2003	Quarter 1	3,686.20	2009	Quarter 1	5,531.45
	Quarter 2	3,765.40		Quarter 2	5,552.95
	Quarter 3	3,768.90		Quarter 3	5,592.77
	Quarter 4	3,836.90		Quarter 4	5,625.35
2004	Quarter 1	3,999.00	2010	Quarter 1	5,641.02
	Quarter 2	4,144.00		Quarter 2	5,649.61
	Quarter 3	4,153.00		Quarter 3	5,988.87
	Quarter 4	4,153.00		Quarter 4	6,132.77

Source: Kenya National Bureau of Statistics (1999- 2011)

APPENDIX 10

Sample Questionnaire

Dear Sir/ Madam

I am a student of Strathmore University, Faculty of Commerce and presently doing a study on "Real Estate Prices and Economic Fundamentals: An Empirical Investigation of Nairobi City". I request you to kindly fill the questionnaire below and assure you that the data generated shall be kept confidential.

How to complete this questionnaire

1. Most of the questions simply require you to tick the options in an appropriate space.
2. A few of the questions do, however, provide spaces to write a few words if you wish to do so.

1. Do you think house prices are influenced by the following factors? (Tick where appropriate)

- | | |
|----------------------------|--------------------------|
| Rate of interest | ☐ |
| Rate of inflation | ☐ |
| Level of disposable income | ☐ |
| Population growth rate | ☐ |
| Gross domestic product | ☐ |
| Costs of construction | ☐ |
| Level of money supply | ☐ |

2. Are house prices in Nairobi supported by the chosen factors in (1) above? (Please tick one)

Yes ☐ No ☐

3. Does money laundering have a role to play in the Nairobi housing market?

Yes ☐ No ☐

4. Which real estate appraisal method(s) is most used in Nairobi? (Tick where appropriate)

Sales comparison approach

☐

Cost approach

☐

Income capitalization approach

☐

5. Which of these other specific factors determine house prices in Nairobi? (Tick where appropriate)

Age

☐

Size

☐

Transport links

☐

Rentable space

☐

Other(s), please specify

State of property

☐

Location

☐

Adjacent land use

☐

Redevelopment opportunities

☐

Thank you

APPENDIX 11

List of Registered Real Estate Agents in Nairobi

Name	Address (P.O. Box)	Name	Address (P.O. Box)
Abdul Ramadhan	10724	Karanja Stephen M.	61168
Agili Daniel O.	66331	Kariesek S. Ole (Dr.)	73744
Bhoyyo Peter K.	52122	Karingi Ireri	56599
Bums seamus J.	14347	Karingi Nyambura	56599
Bwoyele Julius	46350-00100	Kariuki Catherine W.	17594
Chabari Francis Nyaga	16659	Karundu George K.	38715
Chemoigut Joshua K.	74845	Karundu Joseph Maine	618-00600
Cheruiyot D.	79487	Kavivya Bernard W.	59211-00200
Devgun Sadhu S.	39603	Khosia Atur K.	46995
Edwin Nyaga Gitau	47778	Khosia Pradeep K.	46995
Gachara Susan Wanjiku	68075-00200	Kiambi Richard M.	40228
Gakuru NC\10n	6296-00200	Kiarie Joseph M.	1140-00606
Gakwa Lawrence Gitau	19527-00202	Kiaric Pauline W	48025
Gamer Sharon N. H	44053-00100	Kibire Gilbert K.	17545-00100
Gathari John Macharia	61551-00200	Kibuchi Daniel M.	43848
Gitleru Erastus K.	61551	Kibui, Joseph K.	50404-00200
GatllOgo George Kingori	219-00242	Kibui Michael S.	50996
Gathumbi Julius S	53299	Kich John A.	43517-00 100
Gichira Charles P. Mwangi	15468-00100	Kilofzo Charles IVI,	7597
Gichungi Rahab W. W	1184-00600	Kimathi Francis K.	57584
Gitari Bernadette	39773-00623	Kinuthia Kenneth Miranga	2350-00100
Gitau Dal'id	46226-00100	Kiragu James	10 169-00 1 00
Gitau Edwin N	47778	Kirima Anne W,	526) 1 -00 1 00
Gitonga Geoffrey)(1	38715	Kirima Jane G.	63524
Gitonga Joseph K	9577-00100	Kithaka Jacob N,	61551-00200
Gironga Velzian G.	16525	Kiunga Peter M	30024
Harber David M.	48209	Kivunira. H. K	5841-00100
Hassanati Farhana .M.	14090-00800	Kamanda W. John	13989-00800
Hongo, Consolata A	2198J	Kowuor Collins O. N.	16274-00100
Horeria James K	43990	Lawrence Gemna Carlv	15097-00509
Jkonya John N	68075-00100	R. M	45733
Irimu David Gethingira	-40656-00 100	Lupao Edga \Vekesa	3326-00100
Irungu Absalom John	-+6459-00100	Lustman Christian	63136
Jenkins Edith M	227-00606	Machua David K	-15733
Kaaria Mary Karimi	7606-00100	Madende Luke 0	2317-00200
Kaburu Humprev Michael	37] J-00100	IHadete Eric ,\1	79780
KCBwage James K.	1071R-00100	Mahindi Louise 1\1	64497
Kagiri Catherine)(1. Wanjiru	64575-00620	Moina Wilson N	72072

Kagin Joel N.	54025	MariaBuku	73927
Kamakia Edwin W.	6840	Masfkn Dayjd W,	45733
KamauEmest	8119	Mathenge Esther M.	46849
Kamau Stanley M.	1395J-00100	Mathu Haroun M.	40228
Kanja Norma F.	48854	Matubia Anne K.	24633-00502
Kanyari Irene G.	72199	Maturmbi Paul K. M.	40769
Mbaru Jimna M.	44995	MWakungu Denis A.	40228-00100
Macharia Eunice N.	61271	Mwangi SamueJ	45733
Makathimo Mwenda	46226-001 00	Mwangi Peter Githinji	17000
Mbinda Christopher E.	56188	Mwamburi Maltijda M.	1025-00100
Mbithi Elizabeth Ngina	5814-00100	Mivangi Alfred M.	52456
Mbithi Patrick K.	5J575-00200	Mwangi Eddah M.	6155J-00200
Mbugua Nelly K.	16062-00100	Mwangi Maina	10169-00100
Mburu Fidelis K.	59J-00200	Mwangi Winfred N.	62810
Migwi Charles Kamanda	6J84-00100	Mwaniki Joseph B. K	74620
Mingala Kenneth E.	25000-00100	Ndegwa Irene W.	60520
M'Mugambi Daniel K	4685-00100	Ndegwa Irene Wanjiku	52631
Murin Lydia W.	39773	Nderitu Francis W.	10169
Malin, Margaret O. N.	41029-00100	Ndundu Julius K.	70847
Mpenda Etmice	45733	Ngung'u John G. K	60520
Muchjri Eliud W.	68075	Ng'ang'a Edwin G.	4778-00100
Mucuna Charles Muigai	4267J-00100	Ngaithe BOJliface G.	70847
,vfugambi Isaac Maretc	46459-00100	Ngila Silas Onyango	J4034-00100
MugoHarry F.	61551	Ngugi George N. (Prof)	26442
,vfuide Lilian M.	7300-00300	Ngugi Paul M.	10205
Muita Evans MUkunga	10094-00400	Ngugi Paul E. N.	70731
j1-luhoro Joseph Wangombe	693-00600	Njeru Jeremiah Kaunga	61551-00200
Muigai James	10297-00100	Njihia Catherine W	56899-00200
Muiru David N.	61551	Njihia S. M.	67959-00200
Muiruri Hezekiab G.	52553-00200	Njonde Sylvester Ngung'u	43499-00100
Muimu Simon M	J0205-00100	Njuguna Amos 1v-1	10730-00400
Mubra Edwin ,\1.	7597	Njuguna Lilian Njeri	J4903-00100
11tungai Wanjiku N.	30596	Njuguna Moses M.	67889
MUllubi, Salome	28853-00200	Njuguna Marj N	39773-00623
:1iunyoki Mwongeb	4164-00100	Nkongec Didacus N.	9577-00100
Muoka Dominic MuJwa	67959	Njorogc Racheal WanjikIJ	10205-00100
,Jurigi JO~'ce W	58624	Nyabande Gordon O.	52637
Mungu Jeniffcr 11	3557-00100	Nyabwengi Lucy M	61551-00100
Munmi Ailster M	61551	Nyal,Yaye Musa	14014-00100
Murimi Eliud Karani	3557-00100	Nyamweya Joel 0	52589-00200
11-furoki Vincent K	7073J -00400	Nyanja Enid N.	52661
musau 11'hyaka EzekicJ	~9453	Nyororo CarOline NkirOle	40228-00 1Uo
MUriuki, Mary W	55967-00200	Nzioki Nicky	30197

Muswf Peter M.	45733		
Musyoki Joseph M.	24146		
Mutisya., T.	45733	Odiembo Samuel O.	40228-00100
Mutua Timothy MUTISY<l	45733-00100	Odi"" or Charles Dennis	15858-20100
Mutuma GOfffey L.	7669-00200	Oduor Jennifer A.	50291
Murigi Wilfred Mungai	10097-00400	Oindo Joash M.	48209-00100
MUfwa Rhoda Amino	62401		
Okwirry Christine J.	66-00517	Okwiri Paul A.	45519
Olima Washington H. A. (Prof)	30197	Watahi Charles Maina	39773-00623
Olweny Tom Mbo.ya	3326-00100	Yego Joel K	69376
Omengo Stephen Odhiam bo	40228-00100	Wangai David G.	38715
Omondi Godffrer	8539	Wanjiliia Edward M.	7102
Onyango Felix	61551-00100	Warega Catherine V. A.	39773-00623
Opiyo Amuok Fredrick	60620-00200	Warui Simon M.	61551
Oriko Daniel O.	50981-00200		
Osero P. K.	62860	Waruingi Lee W.	6307
Osano Cornel O.	11646-00400	Source: The Institution of Surveyors of Kenya, 2009	
Oundo Wilberforce O.	79487-00200		
Pegrume Philippa E.	45823		
Prinja Ravi D.	49785		
Ragalo Bartholomew O	40228		
Ramadhan A.	10724		
Rihaj Baldip S.	43663		
Riungu Cyprian K	1931-00100		
Rupard Seeta L.	42882		
Sanghani Rajendra K. R.	46385		
SanmiAnneW	13538		
Simon JIugo Warigi	10205-00100		
Stephen K. Karel	1381-100100		
Syagga Paul M. (Prof)	30197		
Terer Boniface K	79487		
Thogo Rose W	30835		
Vizram Azaina A	10205-00100		
Waburi Geoffrey Gatungu	3776-00200		
Wachira Erastus N	16409		
Wachira Isaiah Munene	618-00600		
\\Vadhwa Yash Pal!	4620		
\\Vahome Peter K	60208		
\\Vahome N. Ejidio	57262-00100		
\\Valhome Kennell], \\1	57488		
\\Waganjo Geoffrc.: C.	14815		
\\Vanga D. G	J8715-00100		
\\\\ainaina Danid M	74194		