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Real estate prices in Kenya: is there a bubble?

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REAL ESTATE PRICES IN KENYA: IS THERE A BUBBLE?

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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Approval

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ABSTRACT

This study focuses on the determinants of the prices of residential houses in Nairobi City County, Kenya. It uses correlation analysis to determine relationships that exist between the prices and selected independent variables. Cointegration tests are used to further analyse the long term relationships between the prices and the independent variables with a view to concluding on the existence of a house price bubble. Granger causality tests are performed to triangulate the results as the causal relationships are examined. The study finds the housing prices to have strong positive relationships with GDP, diaspora remittances, lending rates, loans to real estate sector and cost of construction. A weak negative relationship exists between the house prices and inflation. Further, results of the cointegration tests indicate the existence of stable long run relationships between house prices and each of GDP and NSE Index while unstable long run relationships are reported for diaspora remittances and building costs. This means the study is indifferent about the existence of a house price bubble. Granger causality tests indicate there are no causal relationships between house prices and diaspora remittances. However, there are two way causalities between house prices and each of GDP, building costs and NSE Index. This negates the existence of a house price bubble.

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LIST OF ACCRONYMS

ACCRONYM	MEANING
MPC	Monetary Policy Committee
CBK	Central Bank of Kenya
CBR	Central Bank Rate
OECD	Organization for Economic Co-operation and Development
CEE	Central and Eastern Europe
GDP	Gross Domestic Product
CAHF	Centre for Affordable Housing Finance
RBCI	Residential Building Cost Index
VECM	Vector Error Correction Model

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DEDICATION

For the love of my dear wife Ruth and our dear children John and Joan as I pray that God will guide them through and bless the works of their hands to surpass my achievements.

CHAPTER ONE

1. INTRODUCTION

This chapter in the study will give the background information of the study, the statement of the problem, the research objective, significance, scope and the limitations of the study.

1.1 Background of the Study

Generally, in a liberalized market where there is free flow of information available to both buyers and sellers of commodities, the price setting mechanism rests on the forces of demand and supply. On the one hand is demand considerations based on marginal utility while on the other hand supply considerations based on marginal cost (Kigige, 2011). According to the 2012 year book published by Centre for Affordable Housing Finance in Africa, the urban population in Kenya is estimated to increase at 4.2% per annum which increases pressure on the demand for housing. As at 2010, it was estimated that 120,000 units were required every year in Kenya with only 35,000 units delivered (CAHF, 2012) .This interplay of the forces of demand and supply assumes that there are no other factors affecting the price taking and price fixing. In a real world, this is usually not the case.

Residential housing is a subset of the real estate industry. Real estate refers to immovable things like land and improvements permanently attached to land (Brueggeman& Fisher, 2005). In Kenya, the real estate sector has over the years registered substantial growth in terms of its contribution to the Gross Domestic Product. In 2013, its contribution to sources of growth for GDP was standing at 4.8% up from 2.8% 6 years earlier. In terms of GDP growth rate, real estate contributed 4.3% in 2013 rising from 3.5% in 2007(KNBS, 2014).Real estate has therefore become a centre of focus for many investors, both local and foreign.

Like many sectors of any economy, the real estate sector has its own price setting mechanism which differs from the conventional theoretical demand and supply framework. Although this basic rule still applies, it is tempered with many other factors that are specific to real estate like age of property, location, availability of infrastructure among others. In an emerging economy like Kenya, several demand and supply side factors determine housing prices. These factors could be quantitative as

well as qualitative in nature and include among others the size of population, its composition, urbanization, economic prosperity, role of speculative investors, government policy intervention and monetary policy etc that play a dynamic role in the housing markets. It is difficult to capture all of these factors in the macro modeling of housing prices. Therefore, studies differ in modeling the factors influencing housing prices(Mahalik & Mallick, 2011). Like any other business, real estate has to make business sense to the different players- both buyers and sellers. It is therefore imperative for these players to have a good understanding of the drivers of the prices as they make decisions to either invest in or divest from real estate.

The last decade has seen real estate prices increase significantly tempered with occasional slowdowns albeit not drastic across various cities in Kenya. The Hass Property Index developed by HassConsult Limited, a leading real estate agent in Kenya, shows that as at the close of 2013, property values had increased 3.37 times since 2000(HassConsult, 2014). A study carried out by Knight Frank Limited ranked Nairobi as the fastest growing in real estate prices in 2012. Various studies have been carried out in several parts of the world, mostly in the large economies, to draw a relationship between the prices of real estate and their determinants. These studies have produced different models many of which incorporate the economic fundamentals among other factors.

1.2 Statement of the Problem

Over the last decade or so, the real estate sector in Kenya has experienced an upsurge in prices raising concerns about the sustainability of this upward spiral. Investment advisers and other analysts have given their opinions keeping both the print and electronic media robust with discussions on this scenario. Studies carried out in various parts of the world where such phenomenon has been witnessed have indicated mixed results explaining the possible causes. Such reasons range from structural problems that could lead to artificially high house prices that are out of line with the fundamentals(Stohldreier, 2012),substantial overshooting of prices can occur in high real construction cost areas, which have high serial correlation and low mean reversion(Capozza, Hendershoft, Mack, & Mayer, 2002),co-integration of both

income and interest rates in the long run with house prices(Vizek, 2010),while some markets could be reasonably efficient meaning that market imperfections are corrected within reasonable time(Knight, Herrin, &Balihuta, 2004). These results of studies in various markets show that each market is unique and the drivers of house prices in one might not necessarily replicate in another market. For instance, the intensity of speculation in housing market is not the same across the economies with the same being so significant in the developed economies such that it could cause business cycles (Leamer, 2007) as was the resulting recent recession in US, an outcome of the subprime crisis while this is a rare instance in emerging economies.

For this reason, many analysts opine that Kenya's real estate sector is staring at a bubble. But what really constitutes a bubble? Does the real estate sector in Kenya exhibit the characteristics of a bubble? Is the steady upsurge in prices supported by economic fundamentals?

This would be best understood by identifying the key drivers of the soaring real estate prices in Kenya. Limited studies have been carried out to determine what influences the prices for real estate in Kenya. A study carried out in Meru Municipality determined that expected incomes from real estate are key in influencing their prices accounting for more than 70% of the changes in real estate property prices, ceteris paribus(Kigige, 2011). Another study carried out in Nairobi City recorded as a key finding that "house prices in Nairobi City are not supported by the gross domestic product, interest rate and the costs of construction". However, "there is a positive relationship between population growth, level of money supply, the rate of inflation and the residential house prices"(Ouma, 2011). Further, Ouma's study suggested that the residential prices are not adequately justified by money supply and inflation levels. This goes against economic logic that the more the money available to the investors, the higher the demand and, the forces of demand and supply taking effect, this would push up the prices. This suggests that more studies need to be carried out in this area with focus on specific sources of money that are more likely to fund investments in real estate. The researcher has identified Diaspora remittances and loans to real estate from banking institutions as such specific sources to assess whether they influence the residential prices.

1.3 Research Objectives

The broad objective of this study was to determine whether the property prices in Kenya are indicative of a bubble.

The specific objectives were:

1. To determine whether the property prices in Kenya are driven by the economic fundamentals.
2. To determine whether Diaspora remittances affect the property prices in Kenya.
3. To determine whether loans to real estate affect the prices of residential real estate.
4. To determine whether the increasing market prices of residential properties in Kenya are reminiscent of a bubble.

1.4 Research Questions

The study was guided by the following research questions:

1. Are the property prices in Kenya driven by the economic fundamentals?
2. Do remittances from the Diaspora have an effect on the property prices in Kenya?
3. Do loans to real estate have an effect on the residential property prices in Kenya?
4. Are the increasing market prices of residential properties in Kenya reminiscent of a bubble?

1.5 Justification of the Study

Without adequate and correct information, investment decisions may be impaired which means investors in the real estate sector may make wrong investment or divestment decisions only to realize later when such information becomes available. As it is, many local and foreign, institutional and individual investors have made small and huge investments in real estate in various parts of the country and continue to do so at every opportunity. Presumably, many of these investments have been made on the basis of certain available information at the time of such investment. Some investors however have a higher risk appetite and could still have made investments in real estate without adequate information. In the process, opportunists

may have arisen to take advantage of their ignorance thus driving up the prices and the upward trend continues. As a result, speculation may have taken root and the rise in prices may have given expectations of further rises in future thereby causing a bubble. Limited studies have been carried out in the past with the main objective of finding out the possibility of a price bubble in Nairobi. This study therefore serves to collect and make available information about the possibility of a bubble in the residential property prices in Nairobi.

1.6 Significance of the Study

Rampant rapid increase in prices of goods and services in any country results in increased cost of living and more often than not widens the gap between the rich and the poor. With a growing middle class population in Kenya, the demand for housing has been steadily increasing and this has increased pressure on the housing sector. Production of housing units is planned based on forecast demand. Demand itself is driven by population growth and the ability to purchase. This ability to purchase is dependent on the level of prices. Understanding what drives housing prices therefore is important in forecasting demand. A significant portion of Kenya's GDP rests in the construction sector with the real estate, renting and business sub-sector ranking 9th overall contributor to GDP growth rate in 2011 contributing 3.6% before adjusting for financial services indirectly measured(KNBS, 2012). This underscores the importance of a clear understanding of the drivers of the real estate prices. More particularly, the study would be significant to the following stakeholders:

Investors

Investment or divestment decisions would be better informed if correct information is accessible. Devoid of such information, such decisions would be impaired. More specifically, speculators would know what factors to account for in housing investment decision(Ong, 2013).

Construction companies

Companies delivering an array of products in real estate would have better information that would enable them to plan more timely and prudently since they can use the model to estimate future prices thereby assessing the feasibility of any

undertaking. Moreover, they can determine whether to increase production or decrease depending on whether there is possibility of a bubble or not. The presence of a bubble would mean that as and when the bubble collapses, there would be a huge stock of real estate products in stock which would subsequently take long to dispose which is a loss to them in terms of profits and cash flows.

Financial Institutions

Better assessment of the mortgage linked collaterals would be possible and, although standard valuation techniques would be applied by the appointed valuation experts, the model could be used to triangulate the resultant values.

Government Departments

Departments charged with housing would understand the housing market better and therefore guide delivery of the right products to the right people at the correct timing. If housing bubbles exist, relevant Government departments would put together intervention measures to stabilise the market and avoid or control the bubble altogether.

Researchers

The report will contribute to the wealth of knowledge for Researchers in the field of real estate in their future studies. Not much study has been carried out in Kenya to determine the existence or lack thereof of real estate house price bubbles. This will add to the literature on house bubbles and broaden opportunities for further research.

1.7 Scope of the study

The study will cover the housing sub-sector of real estate sector in Kenya. Focus will be on residential housing for the middle income group. Most of the middle income earners are urbanites who have the purchasing power to afford the residential housing targeted. Most of these homes have been developed in and around Nairobi Metropolitan. For this reason, Nairobi city has been chosen as the political and administrative centre with a population of over three million residents.

1.8 Limitations of the Study

The study depended on secondary data mainly from government agencies compiled over many years. The study restricts itself to the period within which such data is available.

CHAPTER TWO

2 LITERATURE REVIEW

This chapter reviews and analyses previous studies on real estate pricing and other related literature. It opens with an attempt to define some facets of real estate and discusses the major theories that have been applied in the study of the real estate prices. These theories include 1) the Economic Theory of Demand and Supply and 2) the Agency Theory. The various methods of detecting a price bubble are also discussed under theoretical literature review. Empirical literature review follows after which the variables used are then discussed building into the conceptual framework and thereafter a conclusion of the chapter.

2.1 Real Estate definition and types

According to Brueggeman & Fisher (2005), real estate refers to things that are not movable such as land and improvements permanently attached to the land. From this definition, several types of real estate can be inferred namely; residential property and non-residential property which includes agricultural land, industrial land, office buildings and retail centres.

2.1.1 Residential Properties

Residential properties provide shelter to individuals and families. These could be single family or multi-family houses. The former are usually individually developed detached units on sub-divided plots while the latter are usually blocks of income generating houses (Brueggeman & Fisher, 2005).This study focuses on residential property as a continuation of previous studies where much of the attention has been focused.

2.1.2 Non-Residential Properties

These are properties other than those used for habitation. Usually, there is some productivity behind these properties like agricultural production, industrial production and rendering of services which more often than not have a business angle. Public offices also fall into this broad category of non-residential property.

2.2 Theoretical Literature Review

In ordinary usage, price is the quantity of payment or compensation given by one party to another in return for goods or services. Alternatively, price can sometimes refer to the quantity of payment requested by a seller of goods or services, rather than the eventual payment amount. This requested amount is often called the asking price or selling price, while the actual payment may be called the transaction price or traded price(Nappo, 2012). The traded price of any good or service is arrived at as an equilibrium position between the seller and the buyer. Such equilibrium is informed by various factors that the participants consider. This does not however mean that this price does not favour one party and not the other. Depending on the circumstances prevailing at the time of the transaction, the price may be skewed toward one party. In a situation where the price is consistently skewed toward the seller constituting a bullish run, the prices may soar to unsustainable levels causing a slump and thereby a reversal of the price gains. The real estate sector has experienced such phenomenon at different times in various parts of the world. This has triggered several studies which attempt to explain the causes of the price trends. Two theoretical approaches have mainly been applied in these studies namely the Economic Theory of Demand and Supply and the Agency Theory. The theoretical framework adopted in this paper is The Economic Theory of Demand and Supply.

2.2.1 Theoretical approaches

2.2.1.1 The Economic Theory of Demand and Supply

Several studies have been carried out based on the premise that in an uncontrolled economy, the interaction of the market forces of demand and supply determines the price at which properties should be exchanged(Tsatsaronis& Zhu, 2004), (Girouard, Kennedy, Noord, & Andre, 2006), (Hou, 2010).On the one hand of the housing price divide are the demand factors which include population growth, household formations, employment, household income, interest rates, income tax policy and the cost of renting housing(Brueggeman& Fisher, 2005). On the other hand are the supply factors mainly construction costs which include availability and cost of land, labour, materials and investments in the improvement of the existing housing stock(Tsatsaronis& Zhu, 2004).

According to Tsatsaronis& Zhu(2004), the demand and supply factors that drive real housing prices either have a longer term or a shorter term influence. Factors that influence the demand for housing over long horizons include growth in household disposable income, gradual shifts in demographics, permanent features of the tax system that might encourage home ownership as opposed to other forms of wealth accumulation and the average level of interest rates. The growth of the housing stock can be constrained in the short-run as a result of a number of factors that include the length of planning and construction phases and the inertia of existing land planning schemes.

House prices can also be affected by restrictions on the availability of land for residential housing development that can constrain the responsiveness of supply. These would include tough zoning rules, cumbersome building regulations, slow administrative procedures, all of which would restrict the amount of developable land(Girouard et al., 2006). This affects the speed of delivery of the housing units thus affecting the supply side. Moreover, an unexpected rise in real interest rates that raises housing costs, or a negative shock to a local economy, would lower housing demand, slowing the growth of house prices, and possibly even leading to a house price decline(Himmelberg, Mayer, & Sinai, 2005b)

The interplay between these fundamental factors of demand and supply settle at an equilibrium price.

2.2.1.2 The Agency Theory

The Agency Theory explains the relationship between the Principal and the Agent. It is a contract under which one or more persons engage another person to perform some service on their behalf, the former being the Principal and the latter the Agent. This relationship also involves delegating some decision making authority to the Agent(Jensen &Meckling, 1976).

Real estate agents are licensed experts specializing in real estate transactions. They sell this knowledge about local real estate markets and provide services associated with the purchase and sale of properties on a commission basis. For home sellers, agents are typically involved in advertising the house, suggesting listing prices, conducting open houses, and negotiating with buyers. For home buyers, agents search for houses that match their client's preferences, arrange visits to the listings, and negotiate with sellers. In

addition, they frequently provide suggestions on a host of issues related to changes in property ownership, such as home inspections, obtaining mortgage loans, and finding real estate lawyers(Barwik& Pathak, 2011).

Due to the fact that most of their compensation is based on the sale value as a percentage, there is the irresistible temptation to keep the prices high to increase their earnings. It is in the Agent's benefit for the prices to continue rising. Agents can therefore keep the property prices rising.

The introduction of aggressive lending instruments like sub-prime lending advances the operationalization of this theory as agents seek to create more mortgages and subsequently pass over the risk. The supply of aggressive lending instruments temporarily increases the asset prices in the underlying market because agents find it more attractive to own or because their borrowing constraint is relaxed, or both. This result implies that the availability of aggressive mortgage lending instruments magnifies the real estate cycle and the effects of fundamental demand shocks(Pavlov &Wachter, 2011).

2.2.2 Methods of detecting bubble

In an article about housing bubbles, (Smith & Smith, 2006) quoted the definition of a bubble by Charles Kindleberger as a 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 attracting new buyers—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 decline in price often resulting in financial crisis.

Further, Stiglitz(1990) portends that if the reason that the price is high today is only because investors believe that the selling price will be high tomorrow—when "fundamental" factors do not seem to justify such a price—then a bubble exists. At least in the short run, the high price of the asset is merited, because it yields a return (capital gain plus dividend) equal to that on alternative assets.

When defining bubbles different scholars emphasize specific aspects of bubble. Baker(2002), focuses on rapidly rising prices while Siegel(2003), refers to simply intensively sudden drop in prices after a period of roaring.

The above definitions lead to the conclusion that prices of houses go through cycles with highs and lows. Periods of boom when the prices are on an upward spiral constitute the

highs and at the point such prices are not supported by the economic fundamentals, a house bubble is said to exist. The lows are characterized by a rapid decline in the prices and can result in many owners holding negative equity at which point the mortgage debt used to finance the house acquisition is more than the value of the house(Ouma, 2011).

In the detection of bubbles in the housing market, a fundamental value is developed first and then compared with the market values. Previous studies on house price dynamics present various approaches to fundamental values with which house price is compared to verify bubble in housing market. As summary, there are mainly four methods to develop fundamental values: spatial no arbitrage condition, financial no arbitrage condition, no arbitrage between renting and owning and econometric models with relevant factors pooled(Xu, 2014)

2.2.2.1 No Arbitrage Conditions for Fundamental Value

There are three arguments under no arbitrage conditions for fundamental value. Firstly, the argument in spatial no arbitrage condition is that home buyers get equal net benefits by living in different locations. This is based on the precinct that house price would be higher in more popular locations like coastal areas or good neighbourhoods. Early researchers like Muth (1969) boosted this method when he asserted that house price declines with distance to CBD (Central Business District) and factors affecting house value like income differences, population density, neighbourhoods quality and dwelling unit condition which are all more or less related to residence location. Further work by Roback(1982) suggested a model to demonstrate that locations with higher amenity attract more workers and firms which increases demand and therefore rents in these locations are higher than in other places. Although there was this support by early scholars, Glaeser&Gyourko(2007) concluded that housing cannot be understood with a narrowly financial approach that ignores space any more than it can be understood with a narrowly spatial approach that ignores asset markets. This means that equilibrium on spatial no arbitrage only explains price distribution across different locations but it is weak to answer whether house price is too high especially in national magnitude.

Secondly, Case & Shiller (1987) suggested the financial no arbitrage condition which advocates that investors should earn equal risk-adjusted returns from investing in house and in other assets. In this no arbitrage condition house is regarded as an asset that brings

returns or services to owners. House value is therefore derived from the discounted cash flows in form of rent and future appreciation. This method therefore offers more precision on house bubbles than the spatial no arbitrage condition. However, its empirical implication is weaker than envisioned as house is very different from other assets in terms of high cost and immobility. Furthermore, this financial no arbitrage approach is sensitive to variation in factors that are difficult to measure such as maintenance costs, risk aversion, future price growth and expected tenure (Glaeser&Gyourko, 2007)

Thirdly, another ideology on which most studies of housing market are based is no arbitrage between owning and renting, a condition that initially comes from the usually-seen mismatch between house prices and rents. Poterba (1984) described it as some relationship between house price and rent that focuses on trade-off between owning and renting. Based on Poterba's work, McCarthy & Peach (2004)developed it further and presented a way to show expectation on house price appreciation and gave a direct answer to doubt of bubble in housing market. Further, based on Poterba's formula Himmelberg, Mayer, & Sinai (2005a) developed imputed rent for equilibrium market with which actual rent is compared to tell whether there is a bubble. But even with these developments, some scholars still contend whether owning units and renting units are comparable with some proposing that units for owning and renting should be analysed as two different commodities. Studying the US housing market, Goodman (1988) observed that is was easier to purchase large amounts of housing by renting at least for US housing market in 1980s. Glaeser & Gyourko (2007) similarly rebut no arbitrage condition between owning and renting by stating that the two kinds of units are quite different in their attributes such as size, layout, location and neighbourhood and in behaviours of owners and renters so that comparison between owning price and rental might not be conceivable. Contributing to the argument, Smith & Smith (2006) contended that it is difficult to gauge unobserved factors such as preference between fixed-rate mortgage and volatile rent, namely buying and renting.

It is worth noting that the financial no arbitrage and no arbitrage between owing and renting are quite similar in that they both use rent as a key factor to develop fundamental value for house prices. Glaeser and Gyourko presented a compound approach to fundamental value, under which discount rate is replaced with user cost rate in the financial no arbitrage equation for fundamental value which in effect combines the two no arbitrage conditions to present another perspective of fundamental value.

2.2.2.2 Models for Fundamental Value

Given the difficulties in calculating the fundamental value of an asset, researchers have been looking for indirect evidence of bubbles, which leads to another kind of fundamentals interpreted as exogenous macroeconomic variables fundamental to the market. In other words, the existence of price bubbles can be implied by the relationship between real estate prices and macroeconomic variables. If real estate prices are in line with variations of macroeconomic variables, or a price change can be explained by both fundamentals and reasonable shifts, the assumption of a price bubble can be rejected (Hui & Yue, 2006).

Apart from the no arbitrage conditions above, there are other models, on which a number of studies of house prices are based on, which utilise a series of economic variables that are likely to have impacts on house prices. These models are used by researchers to derive expected house prices which are then compared with current house prices to assess the presence of house price bubbles.

One widely used method is cointegration model which was introduced by Granger and Engle in 1987. This model is used to test whether house prices or growth of house prices share common stochastic trend with economic forces and if house prices do not deviate from fundamental economic variables there is no evidence for bubble. Kim & Lee (2000) used this model to examine the existence of real estate price bubbles in Korea. More recently, Hui & Yue(2006)used the same cointegration tests to carry out a comparative study of house price bubbles in Beijing, Hong Kong and Shanghai.

This is the method adopted in this paper to test the existence of a house price bubble in Nairobi.

2.3 Empirical Literature Review

2.3.1 Determinants of House Prices

A rich history exists of studies that have been carried out in various parts of the world to understand the relationships between real estate prices and the economic fundamentals. Such studies extend to make tabulations suggesting the way in which long swings in construction and price development were synchronized with long swings in aggregate

economic activity(Gottlieb, 1976). Although such studies have generally tended to conclude that economic fundamentals play a somewhat major role in influencing the house prices, other factors specific to the particular geographies come into play. This is because housing markets are intrinsically local in character. As such, the growth of the housing stock can be constrained in the short run as a result of a number of factors which suggests that idiosyncratic, national factors can lead to significant differences in the dynamics of prices across countries. One set of such factors relates to the prevailing conditions in the provision of financing for the purchase of housing. Another factor affecting the liquidity of the housing market is the specific transaction cost framework such as the level of VAT, stamp and registration duties and inheritance taxes. Additionally, the uncertainty about future prospects that follows periods of heightened volatility in housing prices tends to lead to a more cautious response of housing construction to shifts in demand because of the inherent irreversibility of this type of investment (Tsatsaronis & Zhu, 2004).

Glindro, Subhanji, Szeto, & Zhu (2008) carried out a study of nine Asia-Pacific Economies to investigate the characteristics of house price dynamics and the role of institutional features during the period 1993 to 2006. The study concluded that the current run-up in house prices reflects mainly an adjustment to more buoyant fundamentals than speculative housing bubbles. On average, house prices tend to be more volatile in markets with lower supply elasticity and a more flexible business environment.

In a study of the Swiss economy, Borowiecki(2009) concluded that real house prices and construction activity are shown to be most sensitive to changes in population and construction costs. Contrary to recent empirical findings from other countries, real GDP turns out to have only limited explanatory power. However, the study cautions that the real estate economy is a very local issue and each empirical study with a national approach may be biased because of the remarkably heterogeneous nature of real estate.

In a study of the determinants of house prices in Eastern and Central Europe, Egert&Mihaljek(2007) concluded that the fundamentals have played an important role in explaining house prices in both OECD and CEE countries. Further the study established a strong positive relationship between per capita GDP and house prices. In addition, robust relationships were established between real interest rates and house prices, as well as between housing (or private sector) credit and house prices, in both transition economies and OECD countries.

This conclusion is challenged by Ouma (2011) who suggests that residential house prices are not supported by economic fundamentals other than population growth, rate of

inflation and level of money supply in Nairobi Metropolitan. GDP and rate of interest were found to have no role to play in their relationship with the residential house prices and so does construction costs. Ouma's conclusion seems to be out of sync with others since the expansion of the real estate sector itself contributes to GDP and therefore a positive correlation is expected. Moreover, the basic pricing method involves cost of production plus markup, such cost being affected by changes in inflation. It is therefore expected that if inflation and house prices have a positive relationship, so should costs and house prices. The conclusion that construction costs do not affect housing price is contrary to empirical research and therefore needs further investigation.

Making a contribution to understanding the factors affecting the property values in Nairobi, Kariuki(2012)identified possible factors as political stability which attracts foreign investment, diaspora remittances, increased credit, infrastructure development and new land laws. However, her study did not employ any statistical methods to quantify the extent of the effect of these factors on the development of residential property prices.

2.3.2 House Bubbles

Various studies have recorded the existence of bubbles in various parts of the world.

In a study by Case & Shiller(2003), it was argued that the mere fact of rapid price increases is not in itself conclusive evidence of a bubble. The basic questions that still must be answered are whether expectations of large future price increases are sustaining the market, whether these expectations are salient enough to generate anxieties among potential homebuyers, and whether there is sufficient confidence in such expectations to motivate action.

Smith & Smith(2006) carried out a study in the USA to understand where the much touted housing bubble by previous researchers was. Their results indicated that, even though prices have risen rapidly and some buyers have unrealistic expectations of continuing price increases, the bubble is not, in fact, a bubble in most of these areas: under a variety of plausible assumptions about fundamentals, buying a home at current market prices still appears to be an attractive long-term investment.

Using UK data and a time varying present value approach, Black, Fraser, &Hoesli(2006) precluded the existence of an explosive rational bubble due to non-fundamental factors. They discussed the three main characterizations of bubbles being momentum, explosive and intrinsic. Investors who buy after price increases and sell after price decreases are said

to exhibit momentum investor behavior which is primarily driven by price alone. Such momentum is brought about by expectations of further rise or fall in price and is usually taken as irrational exuberance. The two other bubbles constitute evidence of rationality with the explosive having prices deviating from the fundamentals due to factors extraneous to the asset value while the intrinsic bubbles derive all of their variability from exogenous fundamentals. Black et al.(2006) further argued that intrinsic bubbles have an important role to play in determining actual house prices although price dynamics, which are found to be driven by momentum behavior, appear to impact particularly in periods of strong deviation from fundamental value.

In a study to investigate whether there was a housing price bubble in Shanghai and Beijing, Hui & Yue(2006) used granger causality tests and generalized impulse response analysis and the reduced form of house determinants. Their findings suggested that there appeared a bubble in Shanghai in 2003 accounting for 22% of the housing price. Beijing however did not exhibit any signs of a housing bubble in the same year. Results of a later study of the same two cities by Hou (2010) suggested Beijing housing market appeared to have been on the way of forming a bubble since 2005, a bubble that gained strength in 2007.

Ouma(2011) attempted to understand the interaction between real estate prices and market fundamentals for Nairobi. Results of his study suggested the possibility of a bubble due to the abnormal interplay between the residential property prices and the costs of construction. This however was not enough evidence to justify the existence of a bubble and further research needed to be carried out to ascertain whether indeed it exists.

Housing bubbles have been reported in the past in various parts of the world. In the USA for instance, a real estate bubble was recorded in the period 2008-2009 due to sub-prime lending in the mortgage market. Year 2005 recorded the highest house prices but these started dropping in 2006 with the ultimate crush in 2008. The triggers for this bubble were recorded as historically low interest rates, lax lending standards and speculation (Shiller, 2005).

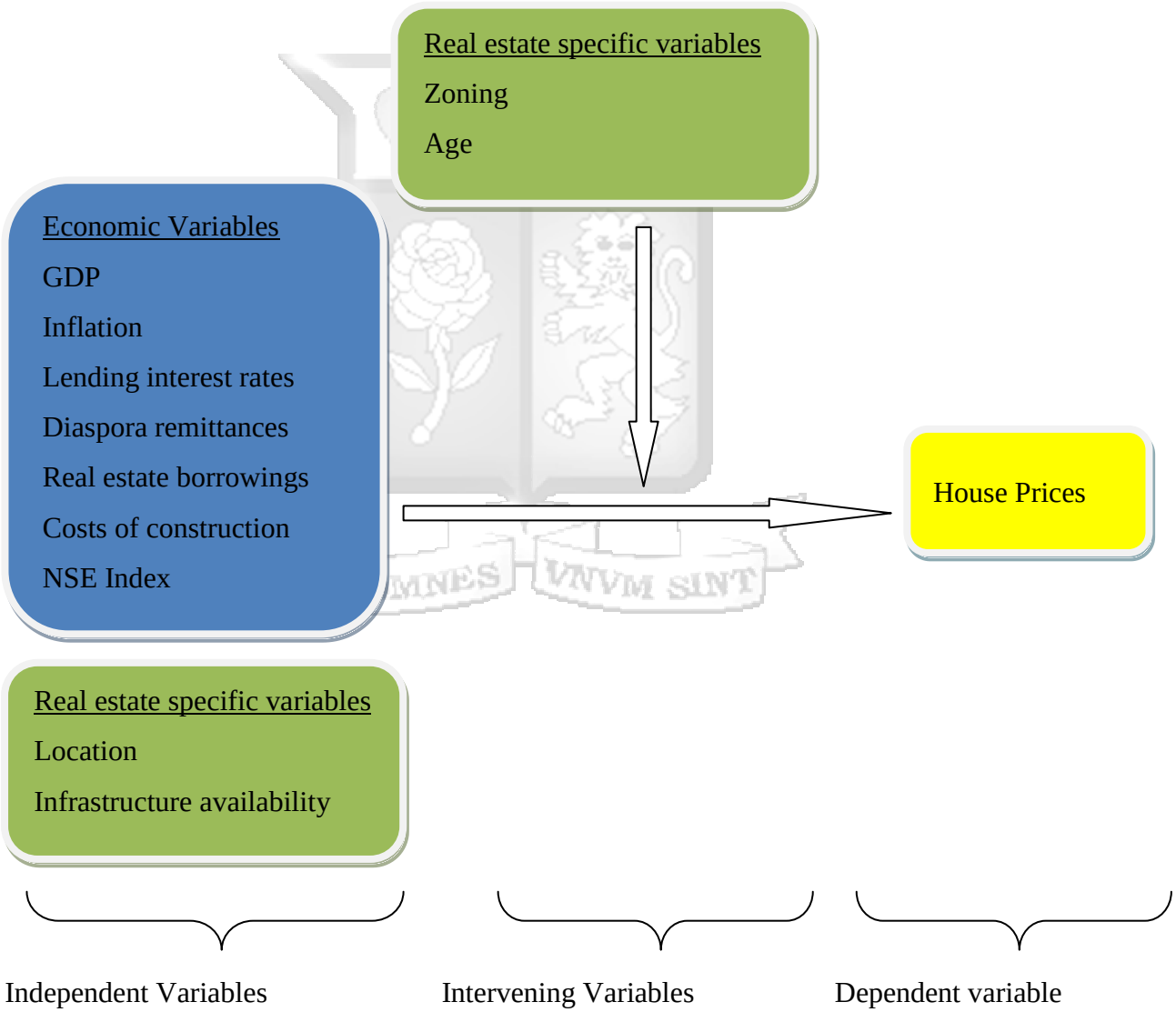
2.3.3 Variables used

From the literature review, the independent variables identified are GDP, inflation rate, interest rate, NSE Index and costs of construction. In addition Diaspora remittances and real estate sector borrowings from banking institutions will be included. Interest rate is a

proxy for availability of credit which spurs demand. Low interest rates mean more loans available which somewhat matches the risk appetite in the short run.

Further, existing literature also shows real estate specific variables such as location and infrastructure availability could also have a bearing on price. Some intervening variables have also been identified thus zoning and age. However, this study has focused on the economic variables and their interaction with the house prices.

2.4 The Conceptual Framework



2.4.1 Operationalization of the variables

2.4.1.1 Gross Domestic Product (GDP)

GDP refers to the total value of goods and services produced within a country over a specific period, usually annually. In most cases, GDP changes from one period to the next. The rate at which this change in GDP happens reflects how healthy the economy of that country is.

Positive relationships between house prices and GDP have been observed in several studies (Egert & Mihaljek, 2007), (Borowiecki, 2009), (Hou, 2010), (Ong, 2013).

The data on GDP was obtained from The Kenya National Bureau of Statistics.

2.4.1.2 Inflation rate

Inflation refers to a sustained rise in the general level of prices thus eroding the purchasing power of money over time. Inflation rate is therefore the rate at which the price level increases. A negative inflation rate is referred to as deflation(Blanchard & Johnson, 2013)

Cross country evidence presented in a study for 17 industrialized economies showed that house prices generally depend on inflation among other factors (Tsatsaronis & Zhu, 2004). Girouard et al.(2006) made a similar observation in their research on 18 OECD countries.

The data on inflation was obtained from The Kenya National Bureau of Statistics.

2.4.1.3 Lending interest rates

Interest rate refers to the rate of return required by the financiers. This is money paid over and above the principal by the borrowers. In other words, it is the cost of borrowing funds. When the interest rate is low, borrowers consider it less risky to borrow and therefore their borrowing appetite is increased. Borrowings can therefore spur demand due to the availability of money. Low interest rates on mortgages have been recorded to increase the uptake of housing in several countries thus increasing the demand which in return prompts an increase in the prices.

A declining interest rate environment, which keeps servicing costs of ever larger mortgages within the household budget limits imposed by current income, typically boosts the demand for residential real estate (Tsatsaronis & Zhu, 2004).

Data on the commercial banks weighted average lending interest rates was obtained from the Central Bank of Kenya(CBK). The construction of the weighted average lending rates

from commercial banks takes into account each banks market share and excludes overdrafts. This rate was found to be the most realistic as compared to the Treasury bill rate used by Ouma (2011). The Central Bank of Kenya introduced the Central Bank Rate (CBR) in 2011 which is the rate at which the CBK lends to the commercial banks. Banks use this rate to peg their lending rates. This would also have been a good rate to use but the rate does not cover the entire period of the study.

2.4.1.4 Diaspora Remittances

This refers to funds remitted by nationals of a country but generated in other countries. In most cases, such funds are generated in stronger economies with stronger currencies. The purchasing power of such funds is therefore more often than not greater when the inflows get into the local economy. Given that real estate is viewed by many as a sure illiquid investment, the repatriation of such funds might be directed to such investments. Therefore, the higher the Diaspora inflows, the higher the investment in real estate thus increased housing demand.

Over the last few years, there have been increased Diaspora inflows in Kenya. No significant studies have been carried out on the effect of such inflows on the real estate. This study attempts to fill that gap.

The data for Diaspora inflows was obtained from the Central Bank of Kenya.

2.4.1.5 Real estate borrowings

Borrowings directed towards real estate development or acquisition affect the availability of money specifically to the real estate sector which affects both demand and supply. Mortgage financing in particular directly affects the demand for housing. Real estate developers who wish to construct rental housing also obtain financing with the borrowing costs being passed on to their customers. Commercial banks in Kenya have over the last several years been aggressively promoting mortgage finance with some financing up to 100% of the value of the house. The researcher aims to study the relationship between the level of real estate borrowings and the house prices.

Data for real estate borrowings was obtained from Central Bank of Kenya.

2.4.1.6 Costs of construction

Every product has its cost of production and houses are no exception. The costs of production for houses include cost of land, materials and labour incurred to build the

houses. Like in any other business, real estate developers need to make a level of profit that makes business sense. When the costs of construction increase, ceteris paribus, it is expected that the selling prices of the houses should increase.

The importance of the supply factors- variations in materials, labour and capital costs which affect decisions to increase the supply was evidenced by Hwang & Quigley (2006). Data for this variable was obtained from Kenya National Bureau of Statistics. For lack of absolute data on costs of construction, the Building Cost Index (BCI) was used as a proxy for this purpose.

2.4.1.7 Nairobi Stock Exchange (NSE) Index

In any economy, the activity of the local stock exchange is indicative of the performance of that economy. Investors choose between various investments options depending on their risk appetite measured against returns on investments. The stock exchange is classified as liquid since the financial assets traded therein can be converted into liquid cash by offloading the investments within a short time. On the contrary, investments in real estate are illiquid more so when one considers a residential house. Generally, investors lean towards balancing their investments between short term and long term. In such a scenario, the two types of investments may follow the same trend depending on the performance of the economy. One could also argue that the stock exchange and real estate are substitute investments where investors offload in one and invest in the other depending on the level of risk and return. In such a case, the trends are expected to move in opposite directions. In using the stock exchange in their study Hui & Yue(2006) argued that the boom of housing prices sometimes accompanies the boom of stock market and vice versa. Data for this variable was obtained from the Nairobi Stock Exchange.

2.4.1.8 House Price Index

The house price index is developed using either the hedonic regression, simple moving average or repeated sales regression to measure the price changes of residential housing. It is used to provide investors, home owners, financial sector and other consumers with the right information about house price inflation thus allowing them to make informed decisions in the housing market with the aim of enjoying the best possible returns. The construction of the house price index must take into account all the possible influences on price based on certain weights. These dynamics include but not limited to location, road, development, number of beds, number of bedrooms, number of bathrooms, swimming

pool, gym, jacuzzi, elevator, gated community, garage parking, balcony, backyard, floors, age, type of house, social amenities, zoning among others. This paper has adopted the Hass Price Index which is developed using the repeated sales regression method as a mix adjusted average for 3 types of homes- town houses, apartments and villas. The purpose of the mix adjustment is to simply isolate pure price changes. According to HassConsult Real Estate, the majority of the house price information is derived from sold data as at transaction date, properties sold at true prices. This information is triangulated using other sources in the public domain and drawn from more than 20 real estate agencies in Nairobi and the *propertyleo* database. The data is usually cleaned to remove items that may cause distortion for example properties where prices contain a development potential premium especially where the properties are old with land of more than half an acre and zoning permits further development.

Data for this variable is obtained from Hass Consult Limited as this is the only available property price index covering the period of the study. It is imperative to note that the Kenya Bankers Association has also developed one with effect from Q4 2014 which is expected to be used as a risk management tool for banks providing mortgages and those using property as collateral for issuing loans. During the launch of the index, the then governor of the Central Bank of Kenya Prof. Njuguna Ndung'u said that the house price index is used by financial policy makers as a measure of price stability. He further noted that fears of a property market bubble may be misplaced because a large number of Kenyans buying houses were doing so to generate income and bequeath them as inheritance rather than for speculative purposes. This emphasizes the relevance of the price index in this study.

CHAPTER THREE

3 RESEARCH METHODOLOGY

This chapter discusses the overall design and methodology used to address the questions being posed in the study. It explains the study design, data sources and collection, study area, study population, sample size and sampling techniques, research instruments used, the validity of the instruments, methods of data analysis and presentation of results and the limitation of administration of research tools.

3.1 Research Design

The design for this study is descriptive-exploratory and its major purpose is to explain the relationship existing between the prices of real estate and the various variables examined. The study applies the statistical technique of correlation to establish the relationship between the dependent and independent variables and cointegration in conjunction with Granger causality to substantiate the presence of a housing bubble. Secondary data sources are used with the main data being quantitative. Archival research is used since this data is gathered over a period of 10 years on a quarterly basis from the year 2004 Q1 to 2014Q1 thus making the study longitudinal.

3.2 Data and data Collection

The study uses secondary data which is discrete and is collected at quarterly intervals over a period of 41 successive quarters from January 2004 to March 2014. The data are collected from Central Bank of Kenya(CBK), Kenya National Bureau of Statistics(KNBS), Nairobi Stock Exchange(NSE) and Hass Consult Limited. The main data collected are as follows:

1. Gross Domestic Product- KNBS
2. Commercial banks weighted average lending interest rate -CBK
3. Nominal inflation rate-KNBS
4. Diaspora remittances-CBK
5. Real Estate sector borrowings from commercial banks-CBK
6. Residential house construction costs-KNBS
7. NSE Index-NSE
8. Residential house prices- HassConsult Ltd

9. House Price Index- HassConsult Ltd

An introductory letter from Strathmore Business School was provided for ease of access to the institutions that own the data some of which required formal request for data to be collected from their official websites or publications.

3.3 Population and Sampling

The study focuses on the period for which data is available for Nairobi City. The data is time series in nature and all the data gathered is used. Data collection is on quarterly/monthly frequency depending on the format of the reports from where it is gathered. For data collected monthly, arithmetic mean is then taken to convert it to quarterly.

3.4 Data Analysis Techniques and Presentation

Borrowing from Hui & Yue(2006) the quantitative data collected are analysed using a number of statistical tests and procedures in the following order: Pearsons correlational tests, Phillips Perron (PP) tests, Johansen & Juselius (JJ) tests and Granger causality tests. Correlational tests have been used in performing *p*-value tests to establish the significance of the independent variables. In addition, the model is used to show the nature and extent of the existing relationship between the dependent variable and the independent variables. The PP tests have been employed to test for unit root while JJ tests test for cointegration. Granger causality tests have been used to establish the causality relationships between the dependent and selected independent macroeconomic variables. For each of the PP, JJ and Granger causality tests, a hypothesis and its alternative is formulated thus:

1. PP Tests

   H_0 There is a unit root (data is non stationary); Reject if test statistic is greater than the critical value (c.v)

   H_1 There is no unit root (data is stationary)

2. JJ tests

   H_0 There is no cointegration among variables- Reject null if trace statistic is more than the critical value.

H_1 There is cointegration among variables

3. Granger causality tests (for two variables x and y)

   H_0 x does not granger cause y; Reject if p-value is not greater than 5%

   H_1 x granger causes y

Data presentation is by use of descriptive statistics using tables as appropriate as summarized and/or quoted from the various reports reviewed. The observations from the review of the various reports and results of the data analysis are presented in chapter 4.

CHAPTER FOUR

4 RESEARCH FINDINGS

This chapter presents the results of the study according to the data analysis. Descriptive statistics of the variables examined to indicate their properties is presented first. Multi-collinearity tests is also presented, followed by the results of cointegration tests which include Phillips Perron(PP) tests for unit root and Johansen (JJ) tests for cointegration. Lastly, Granger causality tests are presented which examine the causal relationships among the variables. The chapter also presents interpretation of the results.

4.1 The Data

The data was collected monthly then converted to quarterly by taking the arithmetic mean for house prices, Hass Property Sales Index, Diaspora remittances, Lending rates and bank loans to real estate sector. Data for GDP, Building Cost Index and NSE Index were collected quarterly. The descriptive statistics of the variables are reported in Table 4.1.

Table 4.1 Descriptive statistics of the variables in Nairobi, January 2004–March 2014

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
HPRICE	House price (Shillings)	41	16,900,000	5,283,146	10,000,000	24,600,000
HSPINDEX	House price index	41	236.0661	73.70061	140	343.37
DIASPREM	Diaspora remittances (US$ 000's)	41	59,005.15	27,542.65	26,608.67	113,658.3
LENDRATES	Lending rates(%)	41	14.81146	2.196623	12.2	20.21
RELOANS	Loans to real estate (Sh million)	41	71,623.72	61,476.44	19,739.35	20,5868.7
INFRATE	Inflation rate(%)	41	9.08122	4.957368	2.71	19.19
GDP	Gross Domestic Product(Sh million)	41	349,824.6	48,101.68	272,661	444,840
BCINDEX	Building cost index	41	5556.971	922.3433	4123.06	7395.49
NSEINDEX	Nairobi Stock Exchange Index	41	4066.049	848.4757	2370	5646

4.2 Interactions between Housing Prices and Market Fundamentals

The interactions between housing prices and market fundamentals are examined through Pearson's correlation tests. Generally speaking on the one hand, there should be strong positive correlations between housing prices and variables such as GDP, loans to real estate sector and diaspora remittances. On the other hand, strong negative correlations are expected between housing prices versus lending rates and inflation rates. Tables 4.2.1 and 4.2.2 provide a concise view of the interactions between housing prices and market fundamentals. While this holds true for most of the variables, an anomaly is reported for lending rates which exhibit a strong positive relationship with house prices. Therefore, there exists circumstantial evidence of housing price bubbles in Nairobi. This evidence is however not strong enough to justify the existence of bubbles more so given that most of the other variables have exhibited the generally expected results. A pertinent question that needs to be answered to give clearer insights into the interactions between market prices and market fundamentals is: What are the causal relationships between housing prices and market fundamentals? To answer this question Granger causality test is employed.

Table 4.2.1Correlations among variables in Nairobi

	HSPINDEX	DIASPREM	LENDRATES	RELOANS	INFRATE	GDP	BCINDEX	NSEINDEX
HSPINDEX	1.0000							
DIASPREM	0.9132	1.0000						
	0.0000							
LENDRATES	0.8028	0.8656	1.0000					
	0.0000	*0.0000*						
RELOANS	0.9109	0.9598	0.8183	1.0000				
	0.0000	*0.0000*	*0.0000*					
INFRATE	-0.0706	-0.0619	0.0047	-0.0957	1.0000			
	0.6610	*0.7007*	*0.9767*	*0.5515*				
GDP	0.9433	0.9108	0.7751	0.8953	-0.1339	1.0000		
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.4039*			
BCINDEX	0.9796	0.9443	0.8161	0.9104	-0.0873	0.9548	1.0000	
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.5873*	*0.0000*		
NSEINDEX	0.1154	0.2345	0.0635	0.1559	-0.5075	0.2844	0.2454	1.0000
	0.4726	*0.1400*	*0.6934*	*0.3303*	*0.0007*	*0.0715*	*0.1219*	

For each interaction, the first value represents the correlation coefficient. The figures in italics are the p-values and denote significance if below 5%.

To further assess the relationship between the house prices and the economic fundamentals, regression analysis is carried out. The results of regression analysis are presented in Table 4.2.2 below.

Table 4.2.2 Regression analysis results with N=41

hspindex	Coef.	Std. Err.	t	P>|t|
diasprem	-0.00081	0.00031	-2.61	0.013
lendrates	0.06453	1.50284	0.04	0.966
reloans	0.00025	0.00010	2.43	0.021
infrate	-0.59150	0.38396	-1.54	0.133
gdp	0.00018	0.00011	1.61	0.117
bcindex	0.07916	0.00719	11.00	0.000
nseindex	-0.01250	0.00253	-4.95	0.000
_cons	-183.1732	29.9524	-6.12	0.000
F(7,33)=	319.89			
Prob>F=	0.0000			
R-Squared=	0.9855			
Adj R-Squared=	0.9824			
Root MSE=	9.7786			

Diaspora remittances, inflation rates and NSE Index seem to affect the house prices negatively. The coefficient for diaspora remittances is however quite low meaning the effect in magnitude is also low. However, the *p-value* returned indicates significance at 5% significance level. Inflation rate on the other hand has a high coefficient but it is dropped at the 5% and 10% significance levels. Consistent with Ouma's study, gdp is also dropped at the 10% and 5% significance levels. Lending rates returned a *p-value* of 96.6% which makes it not significant at either10%, 5% or 1% significance levels and therefore it is also dropped.

The results of the *F-statistic* show that all the independent variables are jointly significant at the 1% significance level. With the adjusted r squared at 0.9824, the model can explain approximately 98.24% of the variations in house prices. Additionally, 4 out of 7 independent variables return significance in the model which makes it a strong model.

4.3 Granger Causalities

Granger, (1969)defined causality based entirely on the predictability of some series, say x. He argued that if a series y contains information in past terms that helps in the prediction of x and if this information is contained in no other series used in the predictor, then y is said to cause x. Now, if x and y are stationary series, Granger causality test is assumed to be implemented by unrestricted Vector Autoregressive (VAR) models in which case Wald Chi-square tests and F tests are employed to test the null hypothesis of no Granger causality. This is however not the case for cointegrated variables. Here, the bivariate dynamic relation between them would be mis-specified if the researcher simply uses traditional Vector Autoregressive (VAR) model to test the existence of Granger causality. Therefore, this kind of test should be carried out with Vector Error Correction (VEC) Models(Engle & Granger, 1987).

The first step in test of cointegration is to test, the order of integration of the variables. To do this, the Phillips-Perron (PP) integration test is employed with respective variables in log form. If the levels of time series are non-stationary, but stationary after first differencing, they are defined as being integrated of order one(1). The results of the PP test indicate that the variables are stationary after first differencing, as shown on Table 4.3.

Table 4.3 PP tests of the variables of Nairobi for Q1 2004–Q1 2014

	Variable level		First Difference	
	Model specification (lags)	PP Test Statistic (1%, 5% c.v)	Model specification (lags)	PP Test Statistic (1%, 5% c.v)
lnhspindex	Intercept and trend(10)	1.680(4.24,3.54)	None(10)	2.293(2.638, 1.950)
lndisprem	Intercept and trend(10)	3.075(4.24,3.54)	Intercept and trend(10)	8.807(4.251, 3.544)
lnreloans	Intercept and trend(10)	1.798(4.24,3.54)	Intercept and trend(10)	6.719(4.251, 3.544)
lngdp	Intercept and trend(10)	5.141(4.24,3.54)	Intercept and trend(10)	9.033(4.251, 3.544)
lnbcindex	Intercept and trend(10)	2.816(4.24,3.54)	Intercept and trend(10)	5.768(4.251, 3.344)
lnnseindex	Intercept and trend(10)	1.804(4.24,3.54)	Intercept and trend(10)	5.646(4.251, 3.544)

Generally three kinds of model specification exist in the PP test: no intercept and no trend; only intercept; intercept and trend
PP Tests are the unit root test

H_0 There is a unit root (data is non-stationary); Reject if test statistic is greater than the critical value (c.v)

H_1 There is no unit root (data is stationary)

Lag selection- Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC) and Schwarz Bayesian Information Criterion (SBIC) all suggest lags 10. Final Prediction Error (FPE) criterion suggests 4 lags while Likelihood Ratio (LR) criterion suggests 9 lags. Majority of the criteria suggest 10 lags. So lags 10 have been used.

Since the variables are integrated of order 1, Johansen test of cointegration, which is a VEC Model, is therefore applied to test the long term relationship of the variables. Five different model specifications have been analysed:

Model	
M1 trend(constant)	include an unrestricted constant in model; the default
M2 trend(rconstant)	include a restricted constant in model
M3trend(trend)	include a linear trend in the cointegrating equations and a quadratic trend in the undifferenced data
M4 trend(rtrend)	include a restricted trend in model
M5 trend(none)	do not include a trend or a constant

Rank 0:

H_0 There is no cointegration among variables- Reject null if trace statistic is more than the critical value.

H_1 There is cointegration among variables

Rank 1:

H_0 There is 1 cointegration equation among variables- Reject null if trace statistic is more than the critical value.

H_1 There is no cointegration among variables

Rank 2:

H_0 There are 2 cointegration equations among variables- Reject null if trace statistic is more than the critical value.

H_1 There is no cointegration among variables

If two variables are cointegrated in the model without trend in the cointegration equation (M1,M2 or M5), certain linear combinations of the variables would make them deviate not too far from each other, although the individual economic variables would fluctuate considerably. In this paper cointegration test is employed to test whether a stable and long-run equilibrium relationship exist between housing prices and key macroeconomic variables. If equilibrium relationship exists between the variables and there is no trend in the model specification, the possibility of a price bubble can be excluded. Although this approach is not entirely free of the problem of misspecification, the procedure is much simpler because the bubble term does not have to be estimated(Kim & Lee, 2000).
Cointegration tests have been performed using Johansen and Juselius procedure between house price index and other economic variables. The results are presented in Table 4.4.

Table 4.4 JJ tests of the variables of Nairobi for January 2004– March 2014

Variables	Lagged diff	Model Spec	Trace test r=(0,1)	Trace test c.v at r=(0,1)	Max-eigenvalue test r=(0,1)	Max-eigenvalue test c.v at r=(0,1)	Results
LnHSPINDEX& lnGDP	10	M5	48.69, 3.16	12.53, 3.84	45.53, 3.16	11.44, 3.84	1
lnHSPINDEX&l nNSEINDEX	10	M5	33.06, 1.76	12.53, 3.84	31.31, 1.76	11.44, 3.84	1
lnHSPINDEX&l nDIASPREM	10	M3	27.29, 1.34	18.17, 3.74	25.95, 1.34	16.87, 3.74	1
lnHSPINDEX&l nBCINDEX	10	M4	46.33, 10.70	25.32, 12.25	35.63, 10.70	18.96, 12.52	1

Granger Causality tests are employed to examine the causality relationships between housing prices and the fundamental variables. The results are shown in Table 4.5.

Table 4.5 Summary of Granger causality test

	chi-square	p-value	DF	Result
D.HSPINDEX→D.DIASPREM	2.8453	0.200	4	N
D.DIASPREM→D.HSPINDEX	9.3094	0.054	4	N
D.HSPINDEX→D.GDP	12.052	0.017	4	Y
D.GDP→D.HSPINDEX	33.714	0.000	4	Y

D.HSPINDEX→D.BCINDEX	12.211	0.000	4	Y
D.BCINDEX→D.HSPINDEX	91.321	0.000	4	Y
D.HSPINDEX→D.NSEINDEX	15.783	0.003	4	Y
D.NSEINDEX→D.HSPINDEX	21.312	0.000	4	Y

x→y means the null hypothesis that x does not Granger cause y
Y means the rejection of the null hypothesis and N means the acceptance of the null hypothesis

On the one hand, the results indicate that house price does not granger cause diaspora remittance and no feedback is discernible either. This means that although it is generally expected that the diaspora inflows which have been on the upward trend might end up being invested in the residential real estate, the proportion may not be that significant or the effect is felt in the supply side where more units are put up for sale or direct habitation by the investors. Another possibility is that the remittances might have been invested in the rental side of real estate. On the other hand however, the results show that house price granger causes all other economic variables- GDP, BCINDEX and NSEINDEX and there is a feedback causality relationship for all of them. High growth rate of GDP usually generates expectations of future economic growth and usually will induce a market boom especially in the developing countries(Hui & Yue, 2006). The feedback causality between housing prices and GDP indicates that the growth in GDP depends to a great extent on the housing sector which therefore seems to play a major role in the Kenyan economy. This relationship is the same one observed between the house prices and the building costs which are represented by the building cost index, BCINDEX. As the building costs rise, the house prices are also expected to rise as the developers seek to retain their margins. The feedback causality between the housing prices and the building costs may be as a result of speculative behaviour which the other players in the construction industry may have in a bid to cash in on the vibrant real estate industry. For many investors especially in urban settings, the housing market and the stock market could be taken as substitutes which means since the investors are indifferent in where to invest, a boom in housing prices may sometimes accompany the boom of stock market and vice versa. This is attested to by the two way causality relationship between HSPINDEX and NSEINDEX.

CHAPTER FIVE

5 DISCUSSION

This chapter discusses 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 to determine the extent the property prices in Kenya are driven by the economic fundamentals; to determine the extent Diaspora remittances affect the property prices in Kenya; to determine the extent loans to real estate affect the prices of real estate; and to determine whether the soaring market prices in Kenya are reminiscent of a bubble.

The main objective of the study is to find out if there is a bubble in the residential property prices. This is done by examining the long run cointegration and causal relationship between house prices and economic variables.

5.1 The relationship between residential house prices and economic fundamentals

5.1.1 The correlation between residential house prices and independent variables

Results of Pearson correlation tests in Table 4.2.1 show that there is very strong positive correlation between the house prices on the one hand and on the other hand diaspora remittances, lending rates, loans to real estate sector, gross domestic product, and building cost index. The level of significance is also high. These results show that as the dependent variables increase, the house prices follow closely in the same direction.

5.1.1.1 The correlation between residential house prices and diaspora remittances

The correlation coefficient of 0.913 between diaspora remittances and house price seems to suggest that as the level of diaspora remittances continues to rise, a significant portion is invested in the residential housing thus pushing up the prices due to the increased demand.

This is consistent with findings of empirical literature (Egert & Mihaljek, 2007), with regard to amount of money available for investment in the housing sector which in this study is specifically represented by diaspora remittances, loans to real estate and lending rates. In their study of CEE and OECD countries, Egert & Mihaljek(2007) established robust relationship between housing (or private sector) credit and house prices in both transition economies. However, results of the regression show a coefficient of -0.00081 with a p-value of 0.013 which could mean a significant portion of the diaspora remittances goes to the supply side of the residential real estate thus boosting supply which in effect slows down prices.

5.1.1.2 The correlation between residential house prices and lending rates

The demand side of the housing price equation is also affected by the availability of cheap credit. The result obtained between the house prices and lending rates at a correlation coefficient of 0.802 shows that the house prices increase as the lending rates increase. This goes against conventional logic as it is expected that as the lending rates increase, the level of borrowing would slow down and this would decrease the demand for housing. Himmelberg et al.(2005a)observed that the easy availability of credit for the housing sector at cheaper rates can push up prices. However, this study seems to negate that. One possible explanation is that this could be an indicator of a house price bubble if the home buyers are not deterred by the rising cost of credit in which case their appetite to borrow to buy homes continues to increase with increasing lending rates. Another possible explanation is that the lending rates could be affecting the supply side more than the demand side. As developers borrow to finance their activities, they could be passing on the cost of credit to the buyers which could explain the increase in prices as the lending rates increase. This is consistent with the findings of a study carried out by Mahalik&Mallick(2011)who observed that credit has more of supply force than its demand force thus giving rise to increased supply of houses as credit gets utilized in the construction process than utilization of bank credit just in buying of new houses. Results of regression analysis show a p-value of 0.966 which suggests the lending rates should be dropped from the analysis as the level of significance is very low.

5.1.1.3 The correlation between residential house prices and loans to real estate

The second possible explanation above for the correlation result observed for lending rates is supported by the strong positive correlation between the house price and the level of loans to real estate which returned a coefficient of 0.911. Loans to real estate are measured for developers as opposed to mortgage which are recorded separately by the Central Bank of Kenya. It would be interesting to see how the level of mortgage and the mortgage rates correlate with house prices. This scenario could be indicative of the increased pressure the supply side is facing from the demand side as more and more units are demanded. Developers therefore have to seek more financing from the financial institutions to meet the growing demand. And with the demand continuing to outstrip supply, the prices are bound to continue rising. Regression results indicate a positive coefficient at 0.00025 and *p-value* of 0.021 which is consistent with the correlation results.

5.1.1.4 The correlation between residential house prices and GDP

Gross domestic product is an overall indicator of the performance of the whole economy and the strong positive correlation, standing at 0.943, is expected. It is also an indication that residential real estate is also a strong player in the Nairobi economy as its activity also affects GDP significantly. However, regression results suggest that gdp should be dropped from the regression model since it is not significant at *p-value* of 11.7%. This is consistent with Ouma's earlier study on the determinants of residential property prices in Nairobi.

5.1.1.5 The correlation between residential house prices and building cost

The cost of building also indicates a strong significant correlation of 0.979 with house prices. As the cost of building rises, the developers continue to pass the same cost to the buyers, all other factors remaining constant. This is consistent with the results of a study carried out by Borowiecki (2009) in the Swiss Economy which recorded costs of construction as the second most important driver of the house prices after population. In particular, the study notes that an increase of the construction costs leads to almost an equal increase in prices of residential units. This is consistent with results of regression analysis which returned a coefficient of 0.07916 with a *p-value* of 0.000 which makes cost of construction significant in the variation of property prices in Nairobi.

5.1.1.6 The correlation between residential house prices and stock index

While the stock exchange generally is an indicator of the investment climate in any economy, it is observed for Nairobi that NSE index displays a weak positive correlation at 0.115 of no significance ($p>0.4726$) with house prices. The explanation for this could possibly be the stock exchange and the real estate are substitutes in terms of investment and they are therefore unlikely to be moving in the same direction. When the stock exchange is performing well, majority of the investors would prefer to put their money in such investments as the return is expected to be decent and have the added advantage of being more liquid than the real estate, should they require the cash flows within a short time. On the other hand, as the performance of the Stock Exchange slows down, more and more investors prefer the more stable investment in real estate which in turn pushes up demand and in effect the house prices. Results of regression analysis show a regression coefficient of -0.0125 with a *p-value* of 0.000 which somewhat negates the correlation results. This is explained by the fact that to a great extent the investment in the stock market and that of real estate go in opposite directions with an increase in activity in one leading to a decrease in the other and vice versa.

5.1.1.7 The correlation between residential house prices and inflation

Inflation rate correlates negatively with house price at -0.0706 which means as inflation increases, the purchasing power of the buyers is eroded, the disposable incomes therefore decrease and this in turn slows demand for new housing. This is consistent with regression results which give a coefficient of -0.5915. As the law of supply and demand takes effect, this is bound to slow down prices unless there is a house price bubble. This relationship is however quite weak and is not significant ($p<0.6610$).This result contradicts that of Tsatsaronis& Zhu(2004), which concluded that there existed a positive relation between house prices and inflation for the 17 industrialized economies examined. Inflation was therefore found to be an important driver of the prices since it accounted for more than half of the total variation in the house prices. Going by the definition of inflation, the general expectation would be that the increase in house prices is also inflationary and therefore should have a positive relationship with inflation rate. This lack of positive correlation is possibly explained by the fact that in Kenya, the categories of expenditures included in the computation of the inflation rate exclude the house prices. These categories

include Food and Non-Alcoholic Beverages (36 percent of total weight); Housing, Water, Electricity, Gas and other Fuels (18.3 percent) and Transport (8.7 percent). Clothing and Footwear account for 7.4 percent of total index and Furnishings, Household Equipment and Routine Household Maintenance for 6.2 percent. Restaurants and Hotels represent 4.5 percent as well as Miscellaneous Goods and Services (4.5 percent). Communication accounts for 3.8 percent of total weight, Health for 3.1 percent and Education for 3.1 percent. Recreation and Culture represent 2.3 percent and Alcoholic Beverages, Tobacco and Narcotics the remaining 2.1 percent. Therefore the effect of the increase in house prices does not directly feed into the inflation rate.

It is imperative to note that the correlation among the independent variables also displays the same trend with most of the variables returning positive correlations as with the house price save for inflation rate. It is interesting to note that inflation rate and lending rate correlate positively which is expected since lending rates generally follow the inflation patterns as lenders seek to get a decent return for their investment which should withstand inflationary pressure.

5.1.2 The cointegration between residential house prices and economic variables

The results of cointegration tests between house prices and economic variables presented in table 4.4show that housing prices are all cointegrated with economic variables with at least one cointegration equation. These tests are used to explore the existence of a housing bubble by examining the stability of the underlying relationship between the house prices and the economic forces that drive them. A relationship that suddenly becomes unstable during a period of rising home prices is consistent with the presence of a bubble. Cointegration tests are well suited to test this on the basis that two variables that are cointegrated share a common stochastic trend which means that the variables may share both prolonged upward and prolonged downward movements(Arshanapalli& Nelson, 2008).

The cointegration relationship between house prices and GDP is based on Model M5 which does not include a trend or constant term meaning that there exists a stable and

long-run equilibrium relationship between the house prices and GDP. This same relationship based on the same model is observed for NSE index. This means that certain linear combinations of these variables make them not deviate too much from each other and therefore the possibility of a price bubble can be excluded.

The cointegration equation between house prices and diaspora remittances is based on model M3 which includes a linear trend in the cointegration equation and a quadratic trend in the undifferenced data. This means that with the trend term specified, the housing prices would move far from the fundamentals and this illustrates some evidence of price bubble in Nairobi.

Housing price and building costs cointegrate based on model M4 which includes a restricted trend in the cointegration equation. This again illustrates some evidence of a price bubble since specification of the trend term would make the dependent variable deviate far from the independent variables.

The results of cointegration tests are therefore indifferent about the existence of a price bubble in Nairobi. This is further examined using Granger causality tests.

5.1.3 Granger causality between residential house prices and economic variables

The results in Table 5 indicate that diaspora remittances do not granger cause house prices and vice versa which means that recent house prices have soared much faster than the growth in diaspora remittances.

GDP and Housing prices have a causal relationship with feedback. This is because high growth rate of GDP usually generates expectations of future economic growth and usually will induce a market boom especially in the developing countries(Hui & Yue, 2006). This means the real estate sector plays a crucial role in the economy of Nairobi which is consistent with the results of cointegration.

There is a causal relationship with feedback between cost of building and house prices which means as the costs of putting up the houses rise the cost is passed to the buyers and this is consistent with expectations in a normal arms' length transaction. As the houses continue being acquired even at the higher prices, there is an incentive for the developers

to put up more houses which puts pressure on the suppliers of raw materials and labour. This in turn leads to further escalation of the cost of building materials and thus the feedback relationship.

For urban households, the housing market could be taken as a substitute for the stock market. The boom of housing prices sometimes accompanies the boom of stock market and vice versa(Hui & Yue, 2006). The findings suggest a two way granger causality relationship between the house prices and the NSE Index which shows that the course of the housing prices is closely related to the stock prices. This is consistent with the results of cointegration discussed under section 5.1.2.

5.2 Conclusion and implications of the study

The findings of the study lead to several conclusions.

Firstly, the housing prices in Nairobi have a relationship with the economic variables examined. More specifically, a very strong positive correlation was observed between house prices and diaspora remittances, lending rates, loans to real estate sector, GDP and the cost of building. This means that house prices move in the same direction as the economic variables. In other words, as the economic variables increase, the house prices also increase. This is confirmed by the regression results which suggest that more than 98.24% of the variables in house prices can be explained by the independent variables considered.

The positive relationship between house prices and lending rates is seen as abnormal but it is then explained as the economic variable having a more profound effect on the supply side rather than the demand side of the housing price equation. This is however dropped from the results of the regression analysis as its effect is found not to be significant.

A negative relationship exists between the house prices and rate of inflation. This suggests that inflation affects the demand side more than the supply side as the purchasing power of consumers is eroded. The strength of this relationship is observed to be weak and therefore not significant. This is further confirmed by the results of the regression tests which show a negative coefficient which is not significant given the *p-value* of 13.3%.

It is imperative to note that the regression results suggest that gdp is also not significant which is consistent with the results of a previous study (Ouma, 2011).

Secondly, the housing prices have been observed to be cointegrated with all the economic variables examined with at least one cointegration equation each. This suggests that long run relationships between the housing prices and the economic variables exist. On one hand stable long run relationships were observed between house prices and GDP and NSE index which lead to the exclusion of a house bubble. On the other hand, unstable long run relationships were observed between house prices and diaspora remittances and building costs which suggest the existence of a house bubble. The cointegration results are therefore indifferent about the existence of a house bubble in Nairobi.

Thirdly, there is no granger causality relationship between diaspora remittances and house prices. However, there are causal relationships with feedback between all other economic variables examined- GDP, Building cost and NSE Index. This means that the movement in house prices can be explained to a large extent by the movements in GDP, building costs and the stock market in Nairobi. This negates the existence of a house bubble in Nairobi.

5.3 Recommendations and areas for further research

Based on the findings of the study, the following recommendations have been made:

The conclusion that there is no house bubble in Nairobi based on the granger causality test is optimistic since the cointegration test shows, though not conclusively, there is possibility of one. Investors in real estate should therefore be cautious while making their investments as the bubble could develop with time.

The development and subsequent collapse of a house bubble could be disastrous to an economy where the real estate sector plays a pivotal role. The policy makers should therefore ensure the right structures and frameworks are put in place to prevent this from happening. The re-introduction of the Capital Gains Tax in the 2013 budget is one such policy that may help tame runaway prices in the housing sector.

Limited studies have been carried out in the Kenyan economy to assess the possibility and magnitude of a housing bubble. More studies should therefore be carried out, possibly

using other models, to determine whether there is a bubble. Comparative studies could also be carried out between different cities in Kenya and East Africa.

5.4 Limitations of the study

Data for one of the independent variables, diaspora remittances, was only available from January 2004 and therefore the period covered was 10 years. This limited the period covered by the study as this was a key variable for the study. The researcher had endeavoured to cover a period of more than 20 years.

The demand for housing for urban households, majority of whom are middle income earners, is dependent on their disposable incomes(Hui & Yue, 2006). The data for the disposable incomes for this group in Nairobi was not readily available.

5.5 Summary of the chapter

The findings of this study record positive long run relationships between lending rates, GDP, NSE index, cost of building and residential house prices which is consistent with literature. In addition, the study has examined the relationship between diaspora remittances, loans to real estate on the one hand and house prices on the other. Positive long run relationships have also been reported.

Granger causality with feedback was also found between house prices and each of the economic variables namely GDP, NSE index, building costs while no causality was found between house prices and diaspora remittances.

The results of the study are indifferent about the existence of a house price bubble in Nairobi.

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APPENDIX 1

Introduction letter for data collection

Strathmore Business School

29th May, 2014

To Whom It May Concern.

Dear Sir/Madam,

FACILITATION OF RESEARCH – KIBUNYI DUNCAN

This is to introduce Kibunyi Duncan admission number MBA/2650/12 who is an MBA student at Strathmore Business School. As part of our Masters Program, Duncan is expected to do applied research and to undertake a project. This is in partial fulfilment of the requirements of the Master of Business Administration. The outcome would be of immediate benefit to the organizations he is researching on. To this effect, he would like to request for appropriate data from your organization.

Duncan is undertaking a research paper on **'Real Estate Prices in Kenya: Is there a Bubble?'**

Information obtained from your organization shall be treated confidentially and shall be used for academic purposes only.

Our MBA seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct usefulness to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest, if not of practical value to your organization.

We very much appreciate your support and are willing to provide any further information if required.

Yours sincerely,

Eliud Njogu

Ag. Director. MBA Programs

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APPENDIX 2

Data for average residential House Prices (HPRICE) in Kenya Shillings and Hass Sales Price Index(HSPINDEX: DEC 2000=100)

Year/Quarter	HPRICE	HSPINDEX	Year/Quarter	HPRICE	HSPINDEX
2004Q1	10,180,338	142.03	2009Q2	17,557,885	244.97
2004Q2	10,328,321	144.10	2009Q3	18,202,382	253.93
2004Q3	10,232,846	142.80	2009Q4	19,161,037	267.33
2004Q4	10,034,806	140.00	2010Q1	19,207,918	267.97
2005Q1	10,327,531	144.07	2010Q2	19,237,051	268.37
2005Q2	10,679,370	149.00	2010Q3	19,624,350	273.77
2005Q3	10,810,484	150.83	2010Q4	20,621,105	287.70
2005Q4	10,842,062	151.27	2011Q1	21,637,352	301.87
2006Q1	10,973,816	153.10	2011Q2	22,217,417	309.97
2006Q2	11,200,411	156.27	2011Q3	22,249,551	310.40
2006Q3	11,819,583	164.90	2011Q4	21,954,148	306.30
2006Q4	12,282,800	171.37	2012Q1	22,025,546	307.27
2007Q1	12,564,342	175.30	2012Q2	22,483,319	313.67
2007Q2	12,764,759	178.07	2012Q3	23,554,131	328.60
2007Q3	12,940,715	180.53	2012Q4	24,026,169	335.17
2007Q4	13,230,342	184.60	2013Q1	24,216,250	337.83
2008Q1	13,487,888	188.20	2013Q2	24,612,818	343.37
2008Q2	14,246,628	198.77	2013Q3	24,551,638	342.50
2008Q3	15,353,991	214.20	2013Q4	24,224,543	337.97
2008Q4	16,479,519	229.90	2014Q1	24,511,167	341.97
2009Q1	17,093,536	238.47			

Source: Hass Consult Ltd

APPENDIX 3

Data for average monthly diaspora remittances (DIASPREM) in US dollars thousands per quarter

Year/Quarter	Diasprem	Year/Quarter	Diasprem
2004Q1	27,591.33	2009Q2	47,881.33
2004Q2	28,250.33	2009Q3	53,222.00
2004Q3	30,325.00	2009Q4	52,532.33
2004Q4	26,608.67	2010Q1	47,949.67
2005Q1	28,613.00	2010Q2	52,130.67
2005Q2	31,978.00	2010Q3	53,734.00
2005Q3	30,836.00	2010Q4	60,166.67
2005Q4	35,958.67	2011Q1	65,491.67
2006Q1	32,714.33	2011Q2	70,027.67
2006Q2	37,821.00	2011Q3	79,071.33
2006Q3	33,497.67	2011Q4	82,452.33
2006Q4	31,831.67	2012Q1	99,974.33
2007Q1	43,008.33	2012Q2	98,702.67
2007Q2	42,685.67	2012Q3	93,358.00
2007Q3	57,576.00	2012Q4	98,262.33
2007Q4	47,944.33	2013Q1	102,911.67
2008Q1	54,550.33	2013Q2	104,984.00
2008Q2	55,300.00	2013Q3	109,111.67
2008Q3	45,492.67	2013Q4	113,185.00
2008Q4	48,404.00	2014Q1	113,658.33
2009Q1	49,416.33		

Source: Central Bank of Kenya

APPENDIX 4

Data for weighted average annual lending rates % (LENDRATES) by commercial banks per quarter.

Year/Quarter	Lendrate	Year/Quarter	Lendrate
2004Q1	13.20	2009Q1	14.77
2004Q2	12.46	2009Q2	14.88
2004Q3	12.26	2009Q3	14.76
2004Q4	12.20	2009Q4	14.80
2005Q1	12.44	2010Q1	14.92
2005Q2	13.11	2010Q2	14.48
2005Q3	12.98	2010Q3	14.15
2005Q4	13.02	2010Q4	13.89
2006Q1	13.27	2011Q1	13.96
2006Q2	13.75	2011Q2	13.90
2006Q3	13.63	2011Q3	14.42
2006Q4	13.89	2011Q4	17.92
2007Q1	13.66	2012Q1	20.05
2007Q2	13.28	2012Q2	20.21
2007Q3	13.07	2012Q3	20.00
2007Q4	13.32	2012Q4	18.32
2008Q1	13.89	2013Q1	17.90
2008Q2	13.99	2013Q2	17.43
2008Q3	13.74	2013Q3	16.95
2008Q4	14.44	2013Q4	16.96
		2014Q1	17.00

The weights correspond to each bank's market share in loans and advances excluding overdrafts which are classified separately since they are more short term and the risk profile is different.

Source: Central Bank of Kenya

APPENDIX 5

Data for average loans to real estate (RELOANS) in Kenya Shillings Millions by commercial banks per quarter

Year/Quarter	RELoans	Year/Quarter	RELoans
2004Q1	19,739.35	2009Q2	40,908.33
2004Q2	20,013.63	2009Q3	44,444.00
2004Q3	19,804.84	2009Q4	46,401.00
2004Q4	20,063.94	2010Q1	46,733.00
2005Q1	21,354.67	2010Q2	52,925.00
2005Q2	22,954.00	2010Q3	87,835.67
2005Q3	23,320.67	2010Q4	97,634.67
2005Q4	23,933.67	2011Q1	102,036.33
2006Q1	26,457.33	2011Q2	114,814.67
2006Q2	25,565.00	2011Q3	124,727.00
2006Q3	24,001.67	2011Q4	134,162.33
2006Q4	24,227.67	2012Q1	141,043.00
2007Q1	24,848.33	2012Q2	138,949.67
2007Q2	25,285.33	2012Q3	157,203.67
2007Q3	26,630.67	2012Q4	161,660.33
2007Q4	24,578.33	2013Q1	164,396.67
2008Q1	22,987.00	2013Q2	170,319.67
2008Q2	25,471.33	2013Q3	194,025.67
2008Q3	28,781.67	2013Q4	192,602.33
2008Q4	29,901.67	2014Q1	205,868.67
2009Q1	37,960.00		

Source: Central Bank of Kenya

APPENDIX 6

Data for average nominal inflation rate % (INFRATE) per quarter

Year/Quarter	Infrate	Year/Quarter	Infrate
2004Q1	9.10		10.60
2004Q2	6.03	2009Q3	9.76
2004Q3	14.39	2009Q4	7.98
2004Q4	17.59	2010Q1	5.54
2005Q1	14.32	2010Q2	3.67
2005Q2	14.21	2010Q3	3.33
2005Q3	7.55	2010Q4	3.84
2005Q4	4.43	2011Q1	7.05
2006Q1	8.43	2011Q2	13.16
2006Q2	4.33	2011Q3	16.51
2006Q3	4.88	2011Q4	19.19
2006Q4	6.59	2012Q1	16.86
2007Q1	3.35	2012Q2	11.77
2007Q2	2.71	2012Q3	6.37
2007Q3	5.34	2012Q4	3.53
2007Q4	5.63	2013Q1	4.08
2008Q1	10.49	2013Q2	4.37
2008Q2	17.44	2013Q3	7.00
2008Q3	15.88	2013Q4	7.42
2008Q4	16.57	2014Q1	6.90
2009Q1	14.14		
2009Q2			

Source: Kenya National Bureau of statistics

APPENDIX 7

Data for Gross Domestic Product (GDP) per quarter in KSh millions

Year/Quarter	GDP	Year/Quarter	GDP
2004Q1	277,501.00	2009Q2	330,849.00
2004Q2	272,661.00	2009Q3	358,979.00
2004Q3	274,553.00	2009Q4	361,459.00
2004Q4	283,723.00	2010Q1	347,709.00
2005Q1	283,778.00	2010Q2	352,952.00
2005Q2	292,324.00	2010Q3	390,826.00
2005Q3	296,007.00	2010Q4	383,817.00
2005Q4	300,621.00	2011Q1	365,155.00
2006Q1	301,305.00	2011Q2	365,093.00
2006Q2	309,749.00	2011Q3	406,477.00
2006Q3	319,585.00	2011Q4	403,791.00
2006Q4	317,315.00	2012Q1	378,894.00
2007Q1	324,771.00	2012Q2	381,487.00
2007Q2	336,840.00	2012Q3	425,312.00
2007Q3	339,355.00	2012Q4	424,960.00
2007Q4	334,659.00	2013Q1	400,439.00
2008Q1	323,215.00	2013Q2	399,235.00
2008Q2	326,978.00	2013Q3	444,840.00
2008Q3	357,776.00	2013Q4	441,635.00
2008Q4	349,670.00	2014Q1	414,971.00
2009Q1	341,544.00		

Source: Kenya National Bureau of Statistics

APPENDIX 8

Data for Average Building Cost Index (BCINDEX: 1972=100)

Year/Quarter	BCINDEX	Year/Quarter	BCINDEX
2004Q1	4123.06	2009Q2	5587.84
2004Q2	4244.45	2009Q3	5619.99
2004Q3	4274.84	2009Q4	5651.42
2004Q4	4275.19	2010Q1	5883.35
2005Q1	4279.63	2010Q2	5897.71
2005Q2	4365.25	2010Q3	5950.29
2005Q3	4365.25	2010Q4	5945.45
2005Q4	4435.98	2011Q1	6163.05
2006Q1	4615.89	2011Q2	6282.87
2006Q2	4718.31	2011Q3	6329.35
2006Q3	4765.75	2011Q4	6264.95
2006Q4	4797.44	2012Q1	6531.60
2007Q1	4980.31	2012Q2	6608.41
2007Q2	5096.93	2012Q3	6696.23
2007Q3	5096.93	2012Q4	6709.36
2007Q4	5163.17	2013Q1	6749.01
2008Q1	5367.49	2013Q2	6821.06
2008Q2	5397.98	2013Q3	6902.53
2008Q3	5461.67	2013Q4	6982.93
2008Q4	5514.51	2014Q1	7395.49
2009Q1	5522.90		

Source: Kenya National Bureau of Statistics

APPENDIX 9

Data for Nairobi Stock Exchange Index (NSEINDEX)

Year/Quarter	NSEINDEX	Year/Quarter	NSEINDEX
2004Q1	2771	2009Q2	3295
2004Q2	2370	2009Q3	3006
2004Q3	2671	2009Q4	3247
2004Q4	2946	2010Q1	4073
2005Q1	3209	2010Q2	4339
2005Q2	3972	2010Q3	4630
2005Q3	3833	2010Q4	4433
2005Q4	3973	2011Q1	3887
2006Q1	4102	2011Q2	3968
2006Q2	4260	2011Q3	3284
2006Q3	4880	2011Q4	3205
2006Q4	5646	2012Q1	3367
2007Q1	5134	2012Q2	3704
2007Q2	5147	2012Q3	3972
2007Q3	5146	2012Q4	4133
2007Q4	5445	2013Q1	4861
2008Q1	4843	2013Q2	4598
2008Q2	5186	2013Q3	4793
2008Q3	4180	2013Q4	4927
2008Q4	3521	2014Q1	4946
2009Q1	2805		

Source: Nairobi Stock Exchange