DO HOUSING PRICES REFLECT THEIR FUNDAMENTALS IN URBAN AREAS IN KENYA?

By

WEKESAH, Ruth Nafuna

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

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Committee in charge:

Professor Man CHO, Supervisor

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ABSTRACT

This research aims to empirically measure the effects of fundamental variables on housing prices in Kenya's urban areas. To that end, specific analyses performed in this study include: (1) testing the effects of mortgage lending rates, housing stock, population changes, and GDP per capita on the housing prices. Using the data obtained from four different sources (Hass Consult Kenya, the Central Bank of Kenya, Kenya National Bureau of Statistics, and the World Bank), a hedonic housing price model is estimated, to test the hypothesized effects of the market fundamentals: that is, a negative sign for the housing stock (in the housing price equation); and a positive sign for the GDP per capita, population, and bank lending rate. The results show that *the coefficients for bank lending rate, population and GDP per capita had positive signs as expected while housing stock coefficient had a negative sign as expected. Specifically, a unit increase in bank lending rate would lead to an increase in residential housing price by 0.003% in the following two quarters. On the other hand, a one percentage increase in GDP per capita would increase the residential housing prices by 0.53% in the next seven quarters. For population, a one percentage increase would lead to a 59.96% increase in residential housing prices. This is because as population increases, the demand for housing will increase with a larger proportion as compared to the supply which is inelastic in the short-run. For the housing stock, a one percentage increase in the housing stock will reduce the housing price by 0.02% in the next 5 quarters. This means that when new housing units are supplied, housing price will fall since demand will also fall. Overall, interest rate and population were not statistically significant at 95% significance level because their p values were greater than 0.05 while housing stock and GDP per capita were statistically significant at 95% significance level. The Price to Income Ratio for Kenya in 2017 was estimated at 16.62, which means that housing prices in Kenya are 16.62 times higher than average income, depicting unaffordability of housing in the country.*

The following recommendations were therefore proposed:- the government to partner with housing cooperatives and provide incentives to the private sector to increase the stock of affordable houses in the country; the government to enable GDP growth by enhancing investments, control population growth and also encourage consumer spending that can increase the country's GDP per capita giving households more income to invest in housing; the CBK to control the bank lending rates to allow potential home owners and developers borrow for housing. This will in turn reduce the cost of construction and consequently the overall cost of housing; as well as increase the housing stock which will reduce housing prices.

DEDICATION

To my family

ACKNOWLEDGMENT

I am greatly indebted to a number of people whose input in making this research project a success I cannot assume. And above all else, I thank God for the opportunity to learn from this great nation of Korea. Firstly, I appreciate the opportunity accorded to me by KDI School of Public Policy and Management to study public policy which has enabled me gain insights that will be applied in my country's case. I also thank the Government of Kenya for allowing me further my studies, were it not for my employer, I would not have had a chance to study nor write this thesis.

My sincere gratitude goes to my two supervisors, Professor Man Cho for his inspiration during the Regional Development and Public Policy class that provoked me into researching about housing which is a major issue in my country, and his guidance throughout the research period; and Professor Ju-Ho Lee, who doubled up as my course advisor and second supervisor for his wise counsel on choice of topic and throughout the project period. I also appreciate Professor Christopher Plumb for his insights during academic writing course that enhanced my writing skills.

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CHAPTER 1: INTRODUCTION

1.1 Background

Housing is important in creating the wealth of a nation; and accounts for "almost half of the household wealth in most of the developed countries (Watcher, Cho, & Tcha, 2014). It is one of the basic human needs; and more importantly, a human right. Similarly, in Kenya, housing is a human right under Article 43 (1b) of the Constitution[1] , which mandates the ministry in charge of housing to ensure "provision of adequate shelter in a clean environment" (CoK, 2010). Provision of decent and adequate housing improves social cohesion and the welfare standards of any country. However, the importance of housing stands in contrast to the current situation around the world, Kenya notwithstanding. According to a report by UN-Habitat (2011), almost all African countries are experiencing housing supply shortages with about 60 million units required between 2001 and 2011 (UN Habitat, 2011).

Of concern is the increasing trend of housing prices across the globe, which in turn reduces the ability of households to access adequate and affordable housing. This rise in housing prices is the basis of this research paper; which aims to establish whether GDP per capita, bank lending rate, population growth rate and housing stock influence housing prices in urban areas in Kenya. To develop this relationship, this paper first details the historical background of housing studies around the globe; then analyses explicitly the housing price trends in Kenya and the factors leading to such patterns.

The history of housing studies dates back to the early 1970s as asserted by Clapham et al. (2012). They maintain that housing studies only peaked from the 1970s onwards particularly in some European countries due to government interest in housing policy process. In mid-eighties,

[1] Article 43 (1b) "… every person has the right to accessible and adequate housing, and to reasonable standards of sanitation

most economies were experiencing a housing boom, which led to reduced house prices (David, Hatzius, Kashyap, & Shin, 2008). At that time, countries focused on increasing the housing stock and encouraging homeownership. Similarly, in Kenya, the government's primary focus as contained in the Kenya National Housing Policy of 2004 was to partner with relevant stakeholders in the provision of social and public housing; ensure proper estate management practices; provide affordable funding; carry out research; and land use management among others.

However, after the 2007 financial crisis that was triggered by the worrying trend of the housing boom, a number of scholars focused their attention on understanding the housing market and its implications on the economy (Egert and Mihaljek, 2007; Selim 2008; Posedel and Vizek, 2009; Mak et al., 2012). Despite the efforts made to combat the crisis, most of the policies still focused on "monetary and macroeconomic factors" (Maclennan, 2012). This means that the housing market was "misunderstood" resulting in difficulties in determining "market-relevant" house prices and even where house prices were available, they still had lags and were incomplete. As the crisis hit further, scholars began to address the issue of determining market-relevant housing prices, as this played an important role in ensuring an economy's wellbeing (Suhaida et al., 2011).

The consequences of the financial crisis were however varied across the globe due to different housing policies that each country adopted. Despite this, the consensus was that there was a need to overhaul the existing housing policies and focus on housing markets (Jones, 2012). Most of the African countries were hard hit due to rapid urbanization, population explosion, poverty, and increasing housing prices. In Kenya, from 2000 to 2014, housing values rose by 357% due to economic growth and a growing middle-class (Karoki, 2013). Considerable research has therefore been carried out (Urban Research Center, 2008; Karoki, 2013; Wanyeki, 2015; Baranoff, 2016) to underscore the importance of housing prices in the country. These studies have shed light

on the underlying factors that influence housing prices; which include geographical location, income, construction cost, real interest rate and the number of bedrooms among others. This is not to say that housing prices may not rise due to speculation or price bubble. Further, since housing is heterogeneous, housing prices are influenced by their fundamentals as well as other environmental factors.

The rise in housing prices across the globe, which has resulted in the emergence of slums and informal settlements has drawn the attention of contemporary scholars to the debate on rental housing and global securitization. Pareja & Martinez (2009) assert that governments in developed and developing countries alike, have given considerable attention on formulating policies that advocate for rental housing; as a solution to housing the low and middle-income households.

Many countries, and in particular, European countries, have now embarked on providing "subsidies to developers, fiscal incentives to owners, taxes on vacant dwellings, vouchers and market regulations" to encourage rental housing (p.153). However, some countries like Spain, who have a demand deficit due to unaffordable housing to the low-income groups, have, for a long time advocated for home ownership (Pareja-Eastaway & Sanchez-Martinez , 2009). In addition, Lowe (2011) acknowledges that the financial crisis that led to a burst in the housing bubble resulted in economies looking for other ways of financing mortgages like "global securitization" (p.5). This means that new capital was created to supplement the normal mortgage sources by putting together different mortgages and selling to investors in terms of bonds across the globe (Lowe, 2011). With increased sources of financing, many households were now able to invest in home ownership.

In Kenya, the National Housing Survey of 2011/2012 revealed that 75% of urban residents live in rental houses. This shows that majority of Kenyans are not able to afford their own homes;

mortgage financing accounts for only 3% of the country's GDP. These statistics show the need for Kenya to invest in affordable housing for her citizens to accord dignity and wellbeing as stipulated in the constitution.

1.2 Factors Affecting Housing Prices

According to Watcher et.al (2014), housing prices are affected by the following factors:-

i. **Cost of Construction:** The cost of construction largely affects the housing price of a dwelling; especially in developing countries (Business Report, 2014). To reduce the cost of construction, many countries have adopted appropriate building materials and technologies that are aimed at reducing the time of construction hence bringing down the construction cost

ii. **Land Supply and land use controls**: The availability of developable land determines how costly residential units will be. Moreover, rigid land use controls will complicate land acquisition process which eventually increase the housing price

iii. **Short run lags in Construction**: housing construction has a time lag due to the time it takes to construct a house. As a result, in the short run, supply of housing is inelastic which eventually becomes elastic in the long run. This means that in the short run, housing prices are higher than in the long run; the market automatically adjusts demand and supply leading to an equilibrium.

iv. **Interest Rates:** Jud & Winkler (2002) assert that lending interest rates affects housing prices in that when real interest rates increase, then housing price will reduce. On the other hand, when real interest rates reduce, housing price will increase.

v. **Employment Rate and Income:** when a country's employment rate increases, households will have a source of disposable income which can be used to access housing. Since

housing supply is inelastic in the short run, an increase in disposable income will increase demand as opposed to supply leading to an increase in the housing price.

vi. **GDP growth rate: -** the growth in GDP of a country depicts the wellbeing of the citizens. As such, as the GDP increases, the wealth of the people will increase meaning that they will have more disposable income that can be used to acquire housing. Therefore, as income increases, housing price will increase because the demand for housing will increase and vice versa when income falls.

vii. **Expansion of residential mortgage credit (Cho, 2011): -** If residential mortgage credit facilities are expanded, then more loans will be available to potential home owners. This will reduce the interest rate which will attract more borrowers thus bringing the demand down and housing price will reduce as well.

viii. **Locational attributes: -** Housing units built next to social amenities like schools, hospitals, roads and which have adequate supply of housing related infrastructure will cost more than those that do not have.

ix. **Real Estate Bubble (speculation):** information asymmetry where the insiders misrepresent the correct information about housing prices by creating an artificial housing shortage that drives up housing prices.

x. **Housing Stock:** If the number of units constructed are more than those demanded, housing price will fall. However, in the short-run, the elasticity of supply of housing is inelastic because housing takes long to construct. If the is more than the supply for housing, then housing prices will go up.

xi. **LTV ratio control:** A study by Inho Song (2015) revealed that the higher the LTV ratio, the stable the consumption and thus increased house prices

xii. **Housing construction technologies**: - According to Iacoviello (2010), the last decade has exhibited slow growth in technological innovations in the construction industry meaning that the use of conventional building materials and technologies tend to increase housing prices in terms of the cost of labor and construction time.

1.3 Government Interventions in the Housing Sector in Kenya: 1902 to Date

During the colonial period in Kenya that is between 1902 and 1963, there was clear segregation on the housing types and locations for the Africans and Europeans & Asians. Black Africans lived in densely populated rental housing neighborhoods while the Europeans and Asians lived in low-density areas that had “stand-alone" houses (Mitullah, 2003). During this period, public housing was discouraged to reduce the number of Africans migrating into cities. Most of the urban houses built were meant for the Europeans and Asians. However, after WWI, the colonial government decided to provide housing for Africans who worked in urban areas. This resulted in the 1921 “Official African Location," which is commonly referred to as the "Pumwani Site and Service Scheme.[2]” More schemes followed which saw the development of estates like Ziwani, Bahati, and Kaloleni in Nairobi City. In 1943, Kenya enacted the first Housing Ordinance Act whose primary focus was on improving the housing conditions of Africans in urban areas by providing low-cost houses and also affordable housing construction loans. These interventions were still not significant in providing adequate housing to the Africans who received low wages. Consequently, those who were not able to afford the housing provided ended up building informal structures with temporary materials; and this was the begging of formation of slums and informal settlements.

[2] Pumwani scheme was the first housing estate to be constructed in Nairobi

Various strategies to reduce increasing informal structures and settlements included the creation of the National Housing Corporation in 1953 to provide public housing at a lower cost. However, after independence in 1963, more Kenyans moved into urban areas because these areas already had social amenities to support decent livelihoods. With an annual urban and rural housing demand of 7,600 units and 38,000 housing units respectively, the government approved Sessional Paper No. 5 of 1965/5 which emphasized the need to provide decent housing with requirements of health, security, and privacy. Further, the policy envisaged that provision of adequate housing would eventually eradicate slums and informal settlements.

In 1967, the Housing Finance Company of Kenya (HFCK) was established to provide affordable loans for home ownership. Through these initiatives, the deficit was contained at 60,000 units up to late 1980s. However, due to financial constraints and lack of incentives from the government to provide affordable financing, HFCK focused its attention on giving loans to the high and middle-income groups, which further pushed the low-income households into slums and informal settlements. Consequently, housing demand was on a consistent upward trend while supply was slow in responding, meeting about 0.1%-2.2% in the same period (up until the late 1980s). With increased population growth and urbanization, more people moved into urban areas putting more pressure on the already existing housing and related infrastructure. As a result, between 1997 and 2001, the housing deficit was about 448,000 housing units countrywide. More interventions were put through Sessional Paper No. 3 of 2004 on National Housing Policy that established among others: the Kenya Slum Upgrading Programme (KENSUP) in 2003 to improve the physical condition of housing and related infrastructure in the slums; Civil Servants Housing Scheme Fund in 2004 that provides housing and also construction loans to civil servants at 5% interest rate on reducing balance for 25 years; and the Kenya Informal Settlements Improvement

Project (KISIP) in 2011 to improve the living conditions of slum dwellers through provision of housing-related infrastructure and security of tenure. Budgetary allocations to the Ministry of Housing were also increased from USD 5.42 million to USD 31.3 million between 2004 and 2008 (Government of Kenya, 2013).

1.4 Statement of the Problem

From the preceding section, Kenya has employed a number of interventions to deal with the ever-increasing housing deficit as well as fulfill the mandate of providing adequate and affordable housing to its citizens. However, these efforts have not borne much fruit, given the fact that the country still grapples with an even higher housing deficit. According to a 2016 report by the World Bank, the urban housing demand was about 244,000 housing units with an estimated supply of 50,000 units per annum, leaving an urban housing gap of 196,000 housing units per annum; which in turn has resulted in an accumulated deficit of 2 million housing units. Further, the rural housing demand stands at 350,000 housing units per annum. Besides, an estimated 60% of urban residents in Kenya live in slums and informal settlements (World Bank, 2016). Housing prices have also been on the rise in Kenya, and especially in urban areas, for the last 10 years. Hass Consult (2016) found that housing prices in Kenya rose by 4.42 times from 2000 to 2016. This coupled with population growth, and an urbanization rate of 26.06% has pushed the middle and low-income households to slums and informal settlements (Urban Research Centre, 2008). Given these alarming statistics, Kenya's population living in slums and informal settlements will increase if the government takes on "business as usual."

Reducing housing prices in the country will only be possible if we examine factors that have led their increase over the years. Several studies have been done in Kenya on factors that

affect housing prices (Karoki, 2013; Wanyeki, 2015). This study took a different position from the previous studies in that it focused on factors that affect housing prices in all urban areas in Kenya.

1.5 Research Objectives and Questions

The general objective of this study was to determine the factors that affect housing prices in Kenya and their resultant effects.

The specific objectives of the study were:

i. To find out the effect of bank lending rates on the housing prices in urban areas in Kenya
ii. To establish the influence of housing stock on housing prices in urban areas in Kenya
iii. To determine the effect of population on housing prices in urban areas in Kenya
iv. To establish the influence of GDP per capita on housing prices in urban areas in Kenya
v. To establish the motivation behind the government of Kenya's focus on social and rental housing
vi. To give policy recommendations on possible interventions towards affordable housing in Kenya

This research paper will attempt to answer the following research questions:

i. What is the effect of bank lending rates on the housing prices in urban areas in Kenya?
ii. What is the relationship between housing stock and housing prices in urban areas in Kenya?

iii. To what extent does population affect housing prices in urban areas in Kenya?

iv. What level of influence does GDP per capita have on housing prices in urban areas in Kenya?

v. Why has the government focused its attention on provision of social and rental housing in Kenya?

vi. What are the possible interventions towards ensuring affordable housing in Kenya?

1.6 Definition of Terms

It is necessary to define key terminologies referred to in this research paper. In particular, it is imperative to clarify what we mean when we talk about "housing prices," "fundamentals" and "urban areas." To clearly define housing prices, we first need to clarify the meaning of the word "housing." UN-Habitat (2011) defines housing as the physical dwelling and its basic supporting infrastructure. As far as more recent secondary literature is concerned, Julie (2016) conceptualizes housing as having “social, economic and cultural relationships” (p.1). For the purpose of this paper, housing prices are prices for which a residential house may be bought or rented. My definition of fundamentals is influenced by Mikhed and Zemcik (2007); who define house price fundamentals as demand and supply factors that affect the price of a house.

Conventionally, scholars have disagreed on the definition of urban areas such that some refer to it as "areas outside the rural areas." This is however controversial because Obot (1986) defined rural areas as "areas outside the urban areas." This has led to countries adopting the definition of urban areas as proposed in their legal documents. For the purpose of this paper, urban areas will be defined based on Kenya's Urban Areas and Cities Act 2012 which defines an urban area as " a municipality or town" (p.5). This means that my study area will be Nairobi’s suburbs and its satellite towns.

1.7 Limitations of the Study

The main research limitation was the unavailability of disaggregated data for different localities which would have given a clearer picture of the housing situation in Kenya. In addition, the government does not public up to date statistics on Housing making it hard for researchers to carry out studies aimed at giving relevant policy recommendations for the housing sector as a whole. This led to reliance on housing statistics provided by Hass Consult, which were only available for 18 years. Since housing development experiences lags, 18 years may not give a clear picture on the housing trends in Kenya. However, the available data was sufficient to give policy directions based on the current housing situation in the country.

1.8 Significance and Scope of the Study

This research paper contributes to the ongoing efforts by the government to "facilitate mass housing production of at least 500,000 affordable homes in 5 years" (Daily Nation, 2017). I will argue that to reduce the housing deficit; house prices should be favorable to target groups. I will, therefore, propose formulation and implementation of policies aimed at improving housing affordability for Kenyans.

This research will be of interest to government policymakers in formulating relevant housing policies that will ensure affordable housing to Kenyans. Also, it may be of importance to housing and real estate practitioners on the types of interventions required to ensure housing affordability. I will use secondary literature available at KDIS library, Kenya National Bureau of Statistics, Central Bank of Kenya, Hass Consult, and various university repositories.

The purpose of this research paper is not to focus on all housing types in urban areas in Kenya. Instead, this study is primarily focused on residential housing. Because I want to focus on residential housing prices in urban areas, I will exclude commercial houses in urban areas and also

in rural areas. This is because commercial housing is not a major issue of concern in Kenya. Furthermore, for practical considerations, I have limited this research to urban areas in Kenya. Extensive research has already been carried out on factors that affect housing prices in Nairobi, Mombasa, and Kisumu (Julius 2012; Karoki, 2013; Gachanja, 2011).

The remainder of this study is organized as follows: Chapter two gives an overview of relevant facts and trends about housing in Kenya; Chapter three highlights the theoretical and empirical literature on housing prices across the globe with a highlight on hedonic pricing model which is the model of analysis in this study. The research model and hypothesis are detailed in chapter four followed by presentation of results in Chapter five. Chapter six details the analysis of affordable housing in Kenya using the housing affordability index. The last chapter concludes the research findings and provides policy recommendations.

CHAPTER TWO: KEY FACTS/ TRENDS ABOUT THE HOUSING SECTOR IN KENYA

2.1 Introduction

This section details the housing market and trends in Kenya in terms of the housing affordability and price trends since 2007; the informal housing sector in Kenya; rental housing market in Kenya; the role of government and private sector in housing provision in Kenya among other themes.

2.2 Housing Market in Kenya

According to the World Bank (2017), housing in Kenya remains unaffordable and unavailable, which means that majority of Kenyans cannot afford to access decent housing. This is because over 80% of available housing is for the high-income groups; where almost all of the housing is provided by the private sector. Only 2% of the available housing is for the low- income segment of the market; which in most cases is located on the outskirts of the city which increases the cost of transportation. Formal housing is greatly undersupplied which makes housing very costly in Kenya. For instance, in 2017, Nairobi was ranked the most expensive city in Africa. Housing prices in 2013 were thrice as much as those in 2000. In addition, there is almost no supply of housing units that cost less than $43,956, especially in Nairobi (World Bank, 2017).

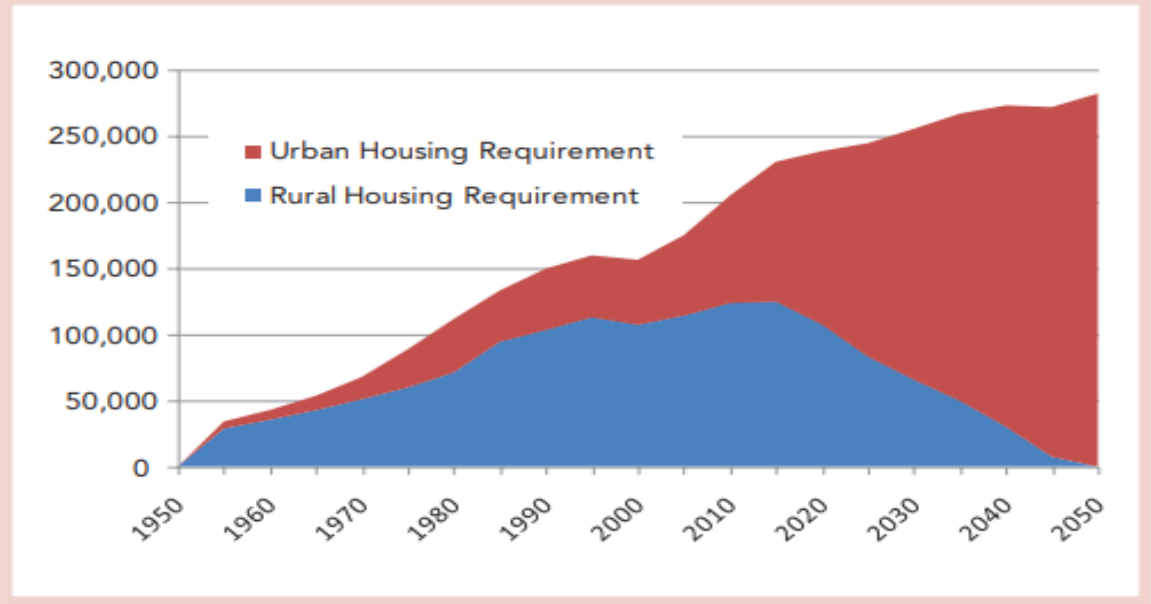
Urban housing demand in Kenya far outstrips supply by about 196,000[3] housing units per annum; which in turn led to an accumulated housing deficit of about 2 million housing units by 2017. The annual urban housing deficit has also been rising since 2004[4] when the National Housing Policy was launched; which means that the government has not done much, both as a direct supplier and facilitator, to provide housing for its people. Consequently, 60% of urban

[3] Housing demand is about 244,000 units while supply is about 50,000 units per annum in urban areas
[4] The National Housing Policy of 2004 estimated an urban annual housing deficit of about 150,000 housing units.

residents in Kenya now live in slums and informal settlements (World Bank, 2017). By 2016, the country had an estimated 498 informal settlements spread across the country; which is alarming, to say the least (National Slum Upgrading and Prevention Policy, 2016). These statistics indicate the failure of the government to fulfill its mandate of providing housing to its citizens. With the rising urban housing need and a further rise in housing prices[5]; the government must not "carry on business as usual."

As illustrated in Figure 2.1, the total urban housing need shows an upward trend and is expected to reach about 300,000 units per annum by 2050. However, for rural housing needs, the trend has started to decline from a high of about 130,000 housing units per annum in 2015. This is as a result of rapid urbanization which is estimated to reach 100% by 2050 (World Bank, 2017). This shows the importance of government intervention in the provision of affordable housing in urban areas to reduce the number of people moving to slums and informal settlements.

Figure 2.1 Total housing needs (000s)



Source: Walley calculations (2016) using Kenya Census data and UNDP data

[5] Hass Consult (2016) asserts that housing prices in Kenya rose by 4.42 times from 2000 to 2016.

Lack of adequate and affordable housing in Kenya has mostly been caused by the following:- high population growth rate of 2.7% coupled with a high urbanization rate of 4.2% per annum (World Bank, 2017) that has put more pressure on the already existing housing and related infrastructure; high poverty levels where about 33.6% of Kenyans live below the poverty line making this population vulnerable to accessing adequate housing; high cost of land, building materials, finance (project finance and end user financing) with interest rates at 17.9%, delays in issuance of titles, speculation that has led to increased land prices, lack of an enabling environment, low government funding, lack of serviced land, limited research on Appropriate Building Materials and Technologies, high cost of infrastructure, construction permit rates remains unaffordable to many Kenyans; high cost of land and infrastructure services; low investment in housing by government as well as minimal investment by private sector in low income housing because returns are not as high as in the high-income bracket; shortage of planned and serviced land for housing making developers factor in cost of services to the price of housing thereby increasing the price; lack of a planning culture in Kenya leading to conflicting land users mainly in the urban areas; inadequate market data; and rigid building laws and regulations.

2.3 Housing Price Trends in Kenya's Urban Centers from 2007 to date

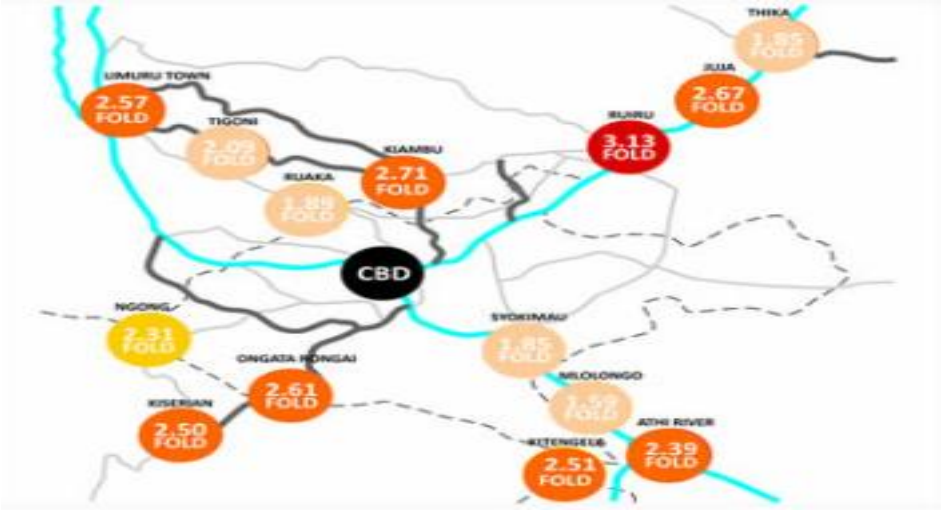
Housing prices have also been on the rise in Kenya, and especially in urban areas, for the last 10 years. Hass Consult (2016) indicated that housing prices in Kenya rose by 4.42 times from 2000 to 2016. With the increasing urban housing deficit, it means the country will face much higher housing prices going forward.

This coupled with population growth, and an urbanization rate of 26.06% has pushed the middle and low-income households to slums and informal settlements (Urban Research Centre, 2008).

In Nairobi, the average price of an apartment is $ 200,000. These houses are in the high-end markets where supply has far outstripped demand given that the country's median income is $800 per month (GoK, 2017). On the other hand, on average, the least priced housing delivered to the market cost between $50,000 and $70,000 in 2013. The repayment for a mortgage to purchase such a unit would cost a buyer between $700 and $1,000 per month. Applying the one-third rule as per the Housing Policy of Kenya, this can only be affordable to persons earning between $2100 and $3,000 per month. However, less than 5 percent of the workers in urban areas earn this amount.

By 2016, the average cost of housing had increased to $75,000 with average mortgage interest rate of 15.8% (Centre for Affordable Housing Finance, 2016). This makes affordable housing challenging to achieve. Other challenges include an underdeveloped mortgage market that only contributes 3% of GDP (26,000 mortgages as at 2016). Figures 2.2 and 2.3, and Tables 2.1 and 2.2 show the growth of housing prices in Nairobi's suburbs and satellite towns in the last ten years.

Figure 2.2 House Price Growth in Nairobi's Satellite Towns since 2007



Source: Hass Consult (2017)

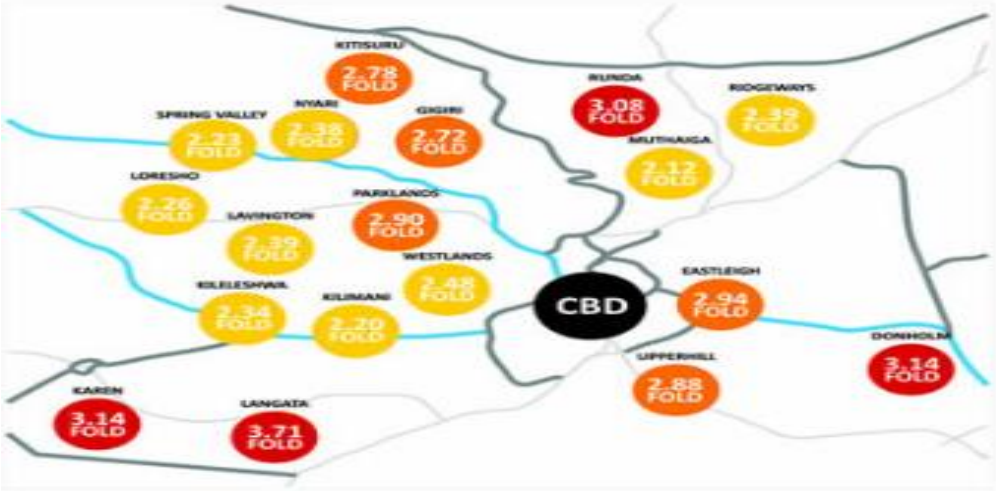
Table 2.1 House Price Trends by Town in Nairobi's Satellite Areas

	Sales Prices			Rental Prices		
Nairobi Satellite Property Index - All houses	Quarter % Change	Annual % Change	Change From 2007	Quarter % Change	Annual % Change	Change From 2007
Athi River	1.8 %	5.4 %	2.9 FOLD	-1.6 %	-5.3 %	1.5 FOLD
Juja	-0.3 %	-1.9 %	2.6 FOLD	0.4 %	-1.8 %	2.8 FOLD
Kiambu	0.2 %	6.4 %	2.5 FOLD	1.5 %	0.9 %	1.9 FOLD
Kiserian	0.2 %	2.1 %	2.5 FOLD	-3.5 %	-1.9 %	2.3 FOLD
Kitengela	2.0 %	9.1 %	2.7 FOLD	-0.1 %	-7.7 %	1.8 FOLD
Limuru	2.1 %	14.7 %	2.8 FOLD	1.3 %	11.2 %	2.3 FOLD
Ngong	3.7 %	10.9 %	2.6 FOLD	1.8 %	8.2 %	2.5 FOLD
Ongata Rongai	1.1 %	5.6 %	2.7 FOLD	-0.3%	-4.6 %	2.1 FOLD
Ruiru	1.2 %	5.2 %	3.2 FOLD	0.5 %	5.7 %	2.3 FOLD
Tigoni	1.0 %	6.4 %	2.2 FOLD	1.9 %	8.8 %	1.9 FOLD

Source: Hass Consult (2018)

From Figure 2.2 and Table 2.1, housing prices in Nairobi's satellite towns have been increasing since 2007; with the lowest change being 1.5 times in Athi River and highest being 2.8 times in Juja. This means that as population increases in Nairobi, households who are not willing to pay the increased house prices will move out of the city to satellite towns in search of residential accommodation. This means housing prices in the satellite towns will rise as demand for housing has now increased relative to supply, which is long term.

Figure 2.3 House Price Growth in Nairobi's Suburbs since 2007



Source: Hass Consult (2017)

Table 2.2 House Price Trends by Suburb in Nairobi

	Sales Prices			Rental Prices		
Nairobi Suburbs Property Index - All Houses	Quarter % Change	Annual % Change	Change From 2007	Quarter % Change	Annual % Change	Change From 2007
Donholm	0.4 %	3.9 %	3.22 FOLD	0.4 %	-2.3 %	1.67 FOLD
Eastleigh	2.1 %	6.5 %	3.04 FOLD	0.4 %	6.4 %	2.84 FOLD
Gigiri	-1.1 %	0.0 %	2.66 FOLD	0.0 %	1.2 %	1.95 FOLD
Karen	0.3 %	3.0 %	3.20 FOLD	0.5 %	1.1 %	1.89 FOLD
Kileleshwa	0.9 %	-3.9 %	2.70 FOLD	0.3 %	0.6 %	2.28 FOLD
Kilimani	-0.5 %	-4.8 %	2.47 FOLD	0.9 %	3.0 %	1.88 FOLD
Kitisuru	-0.6 %	1.3 %	2.78 FOLD	-1.5 %	0.2 %	2.54 FOLD
Langata	1.6 %	5.7 %	4.35 FOLD	-0.4 %	-6.9 %	1.64 FOLD
Lavington	-1.5 %	-2.5 %	2.68 FOLD	0.1 %	1.1 %	2.62 FOLD
Loresho	1.2 %	6.8 %	2.32 FOLD	-1.4 %	-5.6 %	2.31 FOLD
Muthaiga	0.2 %	5.1 %	2.19 FOLD	0.1 %	1.8 %	2.59 FOLD
Nyari	0.4 %	-0.1 %	2.38 FOLD	0.4 %	3.0 %	1.71 FOLD
Ridgeways	-0.4 %	-1.3 %	2.36 FOLD	1.5 %	0.3 %	2.16 FOLD
Runda	-1.3 %	-2.6 %	3.00 FOLD	-0.1 %	0.3 %	1.78 FOLD
Spring Valley	-0.7 %	3.2 %	2.28 FOLD	-1.7 %	-8.4 %	1.72 FOLD
Westlands	2.0 %	4.8 %	2.86 FOLD	0.9 %	-1.0 %	3.05 FOLD

Source: Hass Consult, 2018

From Figure 2.3 and Table 2.2, house price has also increased in Nairobi's suburbs for the last ten years. Compared to satellite towns, the increase in prices is higher in the suburbs.

2.4 Home Ownership vs. Rental Housing in Kenya

According to a Home Ownership Survey carried out in 2015, majority of urban homeowners in Kenya (72%) have constructed their own homes, most of which are bungalows[6]. This is because it is cheaper to construct than to buy already completed units. Most of the households construct homes for owner occupier as opposed to commercial venture (Centre for Research on Financial Markets and Policy, 2015). Further, due to the unaffordability of housing in Kenya as per the World Bank Report of 2017, two bedroomed bungalows are the most common types of houses for those who construct their own houses. Of the funding options, mortgages take 28% while majority use own income or savings. In addition, providers of houses less than 20,000 USD are not accessible.

Table 2.3 shows the mortgage financing alternatives for urban home owners in Kenya against the way of acquiring a home. From the results, 65.6 % of Kenyans who have constructed their own homes used their personal savings or no loan as compared to only 5% that acquired a mortgage for acquisition of a home.

[6] The National Housing Survey 2012/2013 defines bungalow as "a detached, stand-alone, house. It is typically designed to be occupied by one family. It also includes the 'townhouses' which are detached houses of a similar style built in one compound, often found in high-end urban neighborhoods. It can be a single story, double story or even triple story (p.14)

Table 2.3 Mortgage Financing Alternatives vs. Way of Home Acquisition

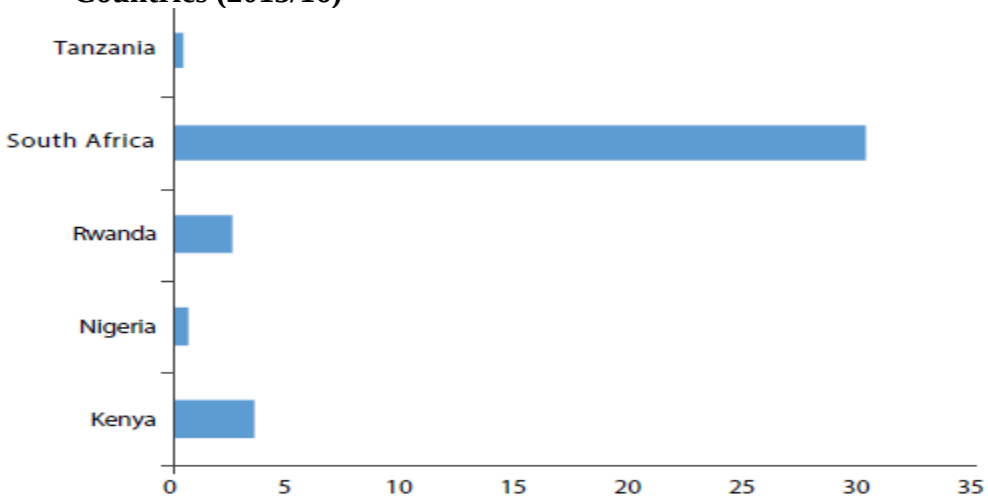
Mortgage financing alternatives	Ways of home acquisition			
	Total (%)	Bought(%)	Constructed (%)	Inherited(%)
Personal savings/ no loan	54.4	47.5	65.6	12.5
Bank loan / Home Construction Loan	**19.2**	**26.5**	**19.8**	**8.0**
Inheritance/ Gift	18.3	10.0	5.9	83.0
SACCO loan	11.1	8.5	13.2	4.5
A mix of different methods e.g. loan and savings	9.7	10.0	10.5	5.7
Mortgage	**6.4**	**13.5**	**5.0**	**4.5**
Chama/ Investment group	6.4	7.0	7.4	1.1
Sale of other family/personal asset e.g. land	5.8	9.5	5.5	2.8
Microfinance Institution Loan	3.7	5.0	3.3	4.0
Help by family and friends / Harambees (to build)	2.8	3.5	2.6	2.8
Employer housing scheme	2.2	3.5	1.9	2.3
Other methods	0.9	0.5	1.2	0.0

Source: Centre for Research on Financial Markets and Policy, 2015

2.5 Housing Finance in Kenya

The cost of housing finance in Kenya is very high which means that low and middle-income earners are not able to access it. Despite having a dynamic mortgage market that has shown a 30% growth as well as various housing finance lending institutions such as commercial banks, housing microfinance institutions, housing cooperatives and Savings and Credit Cooperative Organizations (SACCOs); Kenya still has very few mortgages (less than 25,000 outstanding mortgages in a population of 55 million people). These outstanding mortgages accounted for only 3% of GDP in 2015 as indicated in Figure 2.4 (World Bank, 2017)

Figure 2.4 Mortgage Loans Outstanding as a percentage of GDP for Select African Countries (2015/16)



Source: HOFINET and CAHF 2016 yearbook

Moreover, most of the housing finance in the country is short-term which makes it more expensive. The Capital Markets Authority introduced Real Estate Investment Trusts (REITs) to motivate housing financing institutions to access long-term housing finance which would eventually lower the cost of financing. However, the uptake is still very low; with only one bank having been cleared for an Investment REIT (IREIT).

Mortgage financing is expensive because of a number of reasons: - complex land administration and management processes; complex and disaggregated mortgage documents; a big percentage (75%) of informal market making lenders cautious on lending for housing thus driving the interest rates up to cushion risky debts. Due to the huge informal housing market, commercial banks do not have attractive rates for them as compared to housing microfinance institutions and SACCOs where members can access financing for incremental housing. SACCOs take on the largest share of mortgage financing in Kenya at 90% with commercial banks offering financing to about 10% of potential borrowers. For the SACCOs, borrowers can access smaller formal housing finance loans through a KUSCCO Housing Fund that is operated by Kenya Union of Savings and

Credit Cooperatives Ltd. (KUSCCO). KUSCCO is an umbrella body for all SACCOs in Kenya SACCOs and its Housing Fund provides members with loans for home ownership[7] at a rate of 12.6% per annum, which is lower than the average mortgage rate by commercial banks which is 17.9% per annum; for up to 7 years. Despite the SACCOs offering short-term mortgage financing, it is still the most preferred form of housing financing in Kenya because of the cheaper interest rates as compared to commercial bank rates (World Bank, 2017).

SACCOs also offer unsecured loans in large amounts to its members for self-construction. Housing Cooperatives have also emerged as an alternative source of mortgage financing in two ways: - one, they buy land for members in bulk, subdivide and sell to their members who do self-construction with some support from the cooperatives; two, they develop houses and sell to their members at a lower rate than the prevailing market price. The major challenge facing SACCOs and housing cooperatives is inadequate funding because they get their funding from deposits made by its members. In spite of this, it is estimated that SACCOs and housing cooperatives movement in Kenya has provided over 100,000 housing loans, with 10% being actual registered mortgages (World bank, 2017). This shows the significant role that SACCOs play in provision of housing in Kenya; which the government should tap into and provide incentives and funding to reach more potential home buyers.

Figure 2.5 indicates the prevalence of housing cooperatives in Kenya having developed about 250,000 housing units.

Figure 2.5 Housing Cooperatives in Africa and their contribution to provision of housing

[7] http://www.kuscco.com/index.php/our-products/fund/kuscco-housing-fund

	Number of Cooperatives	Number of Members	No. of Units Built
South Africa	9	900	800 (703 organised by Cape Housing Association)
Kenya	1250	500, 000	250,000
Zimbabwe	350	5,000	4500
Uganda	13	Not Known	2000
Tanzania	136	6,638	906 minimum

Source: UNCHS/ICA 2001, NACHU 2014

2.6 Slums and Informal Settlements in Kenya

The Sessional Paper No. 5 on Housing Policy of 1966/67 provided for the clearance of slums and informal settlements in Kenya which had been created during the colonial period. The World Bank also advocated for upgrading of slums around the world by providing funds to governments for this cause. Consequently, Kenya Slum Upgrading Programme (KENSUP) was established in 2004; to mobilize resources for upgrading and prevention of slums, provision of housing related infrastructure, to improve the living standards of slum residents by empowering the beneficiary communities, to involve stakeholders and slum dwellers in the upgrading and prevention of slums, and to provide security of tenure among others. Despite the creation of KENSUP, the 2009 Kenya Housing and Population Census, as at 2009, more than 34% of Kenya's population lived in urban areas with 71% of this living in slums and informal settlements (Government of Kenya, 2009). KENSUP completed its first pilot project in 2016 with a total of 822 housing units and related infrastructure as well as constructed 345 market stalls for income generation for the beneficiary groups. By 2016, about 61% (2.5 million) of Kenya's urban population lived in slums and informal settlements; with the country having about 498 settlements (Government of Kenya, 2016). This has been orchestrated by the accumulated housing deficit of

2 million units as well as the rising urban housing deficit of about 196,000 housing units per annum. In addition, the cost of housing in Kenya is very high, making it impossible for households to access decent housing, both rental and owner occupied.

2.7 Role of the Government and Private Sector in the Provision of Housing in Kenya

A World Bank report (2017) on Kenya's economic update asserts that the government can partner with the private sector to provide affordable housing finance to individuals. The report however emphasizes that the government has to provide a favorable working condition for the private sector so as to reduce the cost of financing. This is because most of the private developers in Kenya, whether local or international have cited challenges ranging from securing land for housing, stringent requirements that take too long demotivating developers, and corruption particularly by government officials both in the national and county governments among other challenges. This means that providing affordable housing is a collaborative effort where both parties have a role to play.

The government should provide incentives to the private sector as motivation since private developers' aim is to make profits; if the government does not provide incentives, then the private sector will not provide houses at affordable costs. The government can therefore provide the following incentives: - 1) developable land through land banking where private developers can easily access land for housing. This means that the cost of land will not be factored in the cost of the housing units, which in most cases, takes up to 30% of the total house cost; 2) providing basic housing related infrastructure, and especially offsite infrastructure like trunk sewer, roads, and electricity; 3) enhancing the efficiency of land processes from registration of land to obtaining titles for complete units. In addition, the government can improve the efficiency of processes such as collaborating with Kenya Bankers Association to harmonize mortgage documents to reduce

costs and complexities that cause delays. With these, the private sector will be incentivized enough to provide affordable housing (World Bank, 2017)

CHAPTER THREE: LITERATURE REVIEW

3.1 Introduction

This section details the house pricing models and also reviews the empirical literature on factors affecting housing prices.

3.2 Theoretical Literature: Approaches of Measuring Housing Prices

(Thibodeau, n.d) argues that house prices are influenced by several attributes that include the physical characteristics of the house, quality of the environment surrounding the house, amenities within the vicinity of the among others. This study will, therefore, be anchored on two house pricing models: Repeat Sales Price Model and Hedonic Pricing Model.

3.2.1 Hedonic Pricing Model

According to Oxford (2002), this model was built upon the monocentric model. It shows the price that people are willing to pay for features of a product. This means that the price of a property reflects, amongst other things, the quality of the environment or amenity in which it is located.

Price can be defined as the market price for a given quantity of a good. However, (DiPasquale & Wheaton, 1996) assert that since housing is heterogeneous with different characteristics, the price of housing is not measured per unit of housing demanded. Therefore, individual will choose a house to purchase or rent based on other characteristics surrounding the house, as opposed to the fixed quantity of a house. This means that the price that an individual is willing to pay for a particular house will depend both on inherent characteristics like number of bedrooms, number of bathrooms, size of the house; as well as explicit characteristics including quality of the surrounding environment, quality of social amenities among others.

Therefore, DiPasquale & Wheaton (1996) define a hedonic price as the characteristic price of a good. They developed the hedonic price equation which shows that the price of a good is determined by the characteristics of that good. Regressing the dependent variable (P) and the independent variables (characteristics) will give the estimated hedonic price. Equilibrium price is determined at a point where the quantity demanded is equal to the quantity supplied. Under equilibrium, the consumer with the highest willingness to pay gets house.

This model, however, assumes price does not depend on how much of the attributes a single housing unit has, that is, no diminishing marginal utility for every additional space. This may not hold in the long run given the fact that with time, housing quality diminishes due to depreciation. The utility derived will first rise at an increasing rate but later diminish.

The hedonic model has been criticized by some scholars. Gibb (2012) points out that the hedonic pricing model is not a good measure of the value of neighborhoods based on the environmental advantages of a location over others. In addition, (Thibodeau, n.d) asserts that it is difficult to attribute the housing prices in a particular location to its surrounding characteristics as opposed to specific individual house characteristics.

3.2.2 Repeat Sales Method

According to DiPasquale & Wheaton (1996), this model uses repeated sales of the same house to track the price changes over time. This means that the houses under consideration have been sold more than once during the study period. If there have been no changes made on the quality of the house over time, then this method gives a better measure of the changes in housing price over time.

The equation for repeat sales index is estimated as the logarithm of the difference between the earlier price and the recent price of a unit sold as a function of the difference in the set of dummy variables for the first date sale and the set for the most recent unit sold. In other words, it denotes the difference in prices for the same house in two periods

As compared to the hedonic price model, the repeat sales index gives the price index (price changes) over time while hedonic model only shows price levels. The advantage of the repeat sales method is that it only requires the selling price and year of sale. However, this method only considers houses that are repeatedly sold, which ignores other valuable housing information in determining housing prices.

3.3 Empirical Literature

Since the 2007 financial crisis, there has considerable interest in the factors affecting housing prices (Suhaida et al., 2011). Similarly, considerable research has been carried out on the factors that affect housing prices in Kenya. The proceeding sections outline findings by other researchers across the globe on factors that influence housing prices. Literature will be divided into global empirical literature, and national empirical literature that covers studies specifically carried out in Kenya.

3.3.1 Global Literature

Meen (1999), in a study in the UK found that interest rate is the most improtant factor that influences residential real estate property prices. This was attributed to the liberalization of the mortgage market in the 1980s which increased the volatility of interest rates in the UK. The study concluded that it is not how low interest rates in a country but rather how stable the monetary policy in any economy is, that can lead to rapid growth of the housing market as a result of

increased investments. This study was later confimed in the United States by Jud & Winkler (2002), who found that the increase in housing prices in the US between 1984 and 1999 had been as a result of a reduction in the after tax interest rates. This means that when interest rates go down, people will increase their savings as opposed to investing in government bonds and bills. This in return reduces investsment in real estate increasing housing prices because the demand for housing will outsrip supply.

In an article on the factors leading to a rise in housing prices in Shanghai China in 2000 to 2004, (Jiahua & Jie, 2005) the main factors affecting house prices were found to be the ratio of real estate investment to fixed asset investment, per capita disposable income and the vacancy rate of change. However, GDP per capita and per capita consumption expenditure had no significant effect on house prices. Further, government policy reforms like "removal of the house deed tax subsidies" and "suspending house purchases to deduct personal income tax" had a negative effect on house price. This means that government interventions can be applied to reduce rising house prices in a country and thereby increase affordability. However, reduced interest rates had no significant effect on the reduction in house process during the study period.

Urban Research Centre (2008) states that housing prices vary depending on geographical location and thus, may not be directly influenced by their fundamental factors.

In a study carried out using panel data for 35 cities in China from 1998 to 2007, housing prices in China during that period were affected by the country's land policy. From the findings, the supply of land and location of the house had a negative effect on housing price while financial mortgages had a positive effect on housing price (Yu, 2009). In addition, housing prices differed depending on the location of the cities, with major cities recording higher house prices with an

even higher increase. For instance, between 1997 and 2007, average house prices increased by 52.57% with over 100% increase in most big cities in China. As a result, researchers raised concerns about a potential housing price bubble; however, since the rapid increase was due to its land policy, concerns about the price bubble were seen as "far-fetched."

Meanwhile, Yoonsan (2011) analyzed the relationship between housing prices and educational performance in Daegu Metropolitan City of South Korea. In the study, educational performance has a significant influence on the value of residential housing units by almost double the initial price. In this case, since housing is a heterogeneous commodity, the prices of condominiums in Daegu rose by KRW 447.873 thousand per pyeong[8] whenever a high school sent one more student to the Seoul National University. People purchase or rent housing based on the neighborhood characteristics surrounding the house.

Zhang, Liu, Hang, Yao, & Shi (2016) sought to establish the extent to which urban rail transit facilities affect housing prices in China. Other factors tested include: per capita GDP, land price, population density and real estate investments. The study revealed a significant relationship between housing prices and rail transit facilities; that is, “a 1% increase in rail transit mileage increases housing prices by 0.0233%” (p.1). In contrast, Andersson, Shyr, & Fu, (2010, 18) found that accessibility to high-speed railway line did not affect the housing prices in Taiwan.

3.3.2 National Literature

A study by Karoki (2013) found that housing prices are only affected by macroeconomic variables including GDP, interest rate and level of money supply in an economy. From the findings, interest rates had the most significant but negative influence on housing prices. For the

[8] Pyeong is the traditional Korean unit for measuring the areas, lot sizes of real estate, and the value of 1 pyeong is equal to 3.3 sqm.

inflation rate, it was found that they have a positive but insignificant influence on the housing prices of urban residential houses in Kenya.

Karoki (2013) Waronja (2014) Baranoff (2016) asserts that "income is not a determinant of housing prices, but that other housing and demographic characteristics do impact housing prices. Waronja (2014) carried out an analysis of housing prices in Kenya between 2000 and 2012 using the hedonic pricing model; by analysing middle income residential areas in Nairobi. The findings of the study showed that interest rates, distance from the CBD, inflation rate, income and age of the building have a significant effect on housing prices. From the findings, adjusted R^2 was found to be 98% meaning that about 98% of the total variation in the housing price in Kenya's urban areas is affected by the previously mentioned factors.

Kibunyi (2015), maintains that there is no house price bubble in real estate industry in Kenya given the positive relationship between the housing price and GDP, lending interest rate, cost and construction and amount of loan disbursed. On the other hand, the results depicted a negative but weak relationship between housing price and inflation rate. This means that the housing prices in Kenya followed their fundamental factors and not speculation from investors as had been claimed. The variables in the study explained 98% of the variations in housing prices in Kenya. This disproved the existence of a housing bubble in Kenya.

Further, Wanyeki (2015) used the 2 SLS method to determine the optimal pricing, demand and supply functions of urban housing in Kenya. From the findings, "housing prices are affected by income, interest rate, construction cost and the number of bedrooms "(p. 51). This means that high-income earners are likely to own homes as opposed to middle and low-income earners. The study concluded that house prices are income elastic meaning that as individuals earn more

income, their demand for housing will go up and since supply responds slower than demand, there will be disequilibrium between demand and supply increasing house prices. In addition, the study found that a one percentage change in construction cost leads to a 4.99% increase in the housing price. This implies that as the cost of construction goes up, developers transfer these costs to home buyers through increased housing prices. However, for the number of bedrooms and interest rates, the coefficients were less than one showing an insignificant influence in the house prices at 5% level of significance. This is in contrast with Karoki (2013) that found that interest rates had the most significant influence on residential house prices in Kenya's urban areas.

CHAPTER FOUR: MODEL AND HYPOTHESIS

4.1 Introduction

This Chapter presents the model that will be used in the study. Data types, sources and data analysis methods that will be used in the study will also be detailed in the proceeding sections.

4.2 Research Design

This research analyzed the factors that affect housing prices in Kenya's urban between 2007 and 2017 using a descriptive research design to establish the relationship between the dependent and independent variables. I propose that bank lending rate, GDP per capita, population growth and housing stock have led to high housing prices making access to affordable housing difficult for the middle and low-income earners in Kenya. Secondary data for the study was obtained from The World Bank, Central Bank of Kenya, Hass Consult Kenya and IMF Data Mapper.

4.3 Empirical Model

4.3.1 Model Specification

Housing price is determined by supply and demand factors, house characteristics, location, and speculation among others. In this study, housing price is determined by GDP per capita, interest rates, housing stock and population.

A consumer with fixed income I and consuming X attributes of a good Z will maximize utility of good Z subject to its budget constraint. In the case, to maximize utility for housing, we use the hedonic price function that relates housing price to GDP per capita, interest rate, housing stock and population. For the model under study, the equation to be estimated is presented as follows:-

$$log\ (HPI) = \propto_0 + \propto_1 (log\ Pop) + \propto_2 IR + \propto_3 log(GDPPC) + \propto_4 log(HS) + \varepsilon_t \ldots\ldots\ldots\ldots\ldots 4.1$$

4.4 Definition and Measurement of Variables

Based on previous literature, the study used data on housing property index, bank lending rate, housing stock, population and GDP per capita. These variables have been defined in table 4.1

Table 4.1 Definition of Variables

Variable	Unit of Measurement	Definition and Data Source
Housing Price Index	Hass Property Index	Measures asking price changes of residential houses across Kenya indicating housing price trend. It was obtained from Hass Consult Kenya, a private company that collects housing data for over 320 suburbs and towns across the country
Interest rate	Percentage	Average annual rate charged to consumers by a commercial bank or paid for the use of money. It was obtained from the Central Bank of Kenya (CBK)
Population	Number	Number of people in a country at a given time period. Data on population was obtained from The World Bank
GDP per capita	USD	Gross domestic product divided by the population. It was used to measure the average income of urban households in Kenya. It was obtained from the IMF Data Mapper
Housing Stock	Number	The number of new residential houses developed in the urban areas in Kenya. It was obtained from Kenya National Bureau of Statistics

4.5 Data Collection

Secondary data for the study was obtained from The World Bank, Central Bank of Kenya, Hass Consult Kenya and IMF Data Mapper. Data was collected and cleaned before being analyzed.

For the purposes of this study, housing prices were measured using the Hass property index for residential housing across the country. Data on bank lending rate, housing stock, GDP per capita, and population growth rate was collected from Central Bank of Kenya, Kenya National Bureau of Statistics, The World Bank, and IMF Data Mapper respectively.

4.6 Diagnostic Tests

4.6.1 Tests for Time Series Data

The study obtained time series data that was used in analyzing the extent to which housing price is affected by its fundamental factors. The relationship between variables was assumed to be linear as specified in equation 4.1.

Stationarity tests are crucial because of the non-random behavior of time series data which can undermine the usefulness of the econometrics techniques if it is applied without considering time series properties of any data set (Russel & MacKinnon, 1993; Gujarati, 1995). Analyzing data that is non-stationary, that is, with a non-constant mean and variance, leads to a spurious regression. Data is said to be stationary if it's mean, variance and covariance do not vary across different time periods. The data obtained was therefore tested for stationarity using Augmented Dickey-Fuller (ADF) and Philips Perron (PP) methods. The null hypothesis for stationarity is that the data set is non-stationary while the alternative hypothesis is that the data is stationary.

Cointegration test was also carried out using Johansen's procedure to determine the existence of a cointegration vector among the specified variables in the model. If cointegration exists, then the interpretation is that there exists a long run relationship among the variables being analyzed. Johansen's procedure employs two tests to establish the number of cointegration vectors, that is, the Maximum Eigenvalue test and the Trace Test. In instances where the Maximum

Eigenvalue Test results vary from the Trace Test results, the Trace Test results are preferred (Alexander, 2001).

CHAPTER FIVE: RESULTS

5.1 Introduction

This section presents the empirical findings of the study. These finds were useful in addressing the objectives stated in section 1 of the research paper.

5.2 Summary of Statistics

The summary of descriptive statistics was computed as shown in **Table 5.1.** It includes the mean, standard deviation, minimum and maximum values of the variables, skewness, kurtosis and coefficient of variation of variables under analysis

Table 5.1 Summary of Descriptive Statistics

Stats	HPI	Interest rate	Population	GDP per capita	Housing stock
Mean	311.4248	15.58205	4.33e+07	1208.914	6623.364
sd	73.97617	1.995096	3732504	256.3878	3250.061
Max	414.67	20.21	4.98e+07	1707.06	12833
Min	175.3	13.07	3.73e+07	781.39	2154
Skewness	-0.3914386	0.7475173	0.0739237	0.2412074	0.42398
Kurtosis	2.021013	2.547429	1.796694	1.807188	2.069999
cv	0.2375411	0.1280381	0.086159	0.2120811	0.4906964

Source: Own computation

From Table 5.1, the average quarterly asking price changes for residential housing in Kenya between 2007 and 2017 was 311.43. Interest rate, population, GDP per capita and housing stock for the same period averaged 15.58 percent, 4.33 million, 1208.91 USD and 6623 units respectively. The population, GDP per capita and housing stock have a skewness of 0.0739, 0.2412 and 0.4239 meaning that they are fairly symmetrical while interest rate is moderately skewed. HPI has a skewness of -0.3914 meaning that is highly skewed.

5.3 Model Estimation

The results in Table 5.2 present the regression of raw data that has not been transformed nor undergone diagnostic test for time series data.

Table 5.2 Empirical Results of Raw Data

Dependent Variable: PI Method: Least Squares Date: 03/08/18 Time: 19:49 Sample: 2007Q1 2017Q4 Included observations: 44			
Variable	Coefficient	t-Statistic	Prob.
C	-1017.62	-8.22	0.00
Population	3.70E-05	8.14	0.00 ***
Bank lending rate	2.09	2.15	0.04 **
GDP per capita	-0.25	-4.64	0.00 ***
Housing stock	-0.01	-0.82	0.42
R-squared	0.98	Mean dependent var	311.43
Adjusted R-squared	0.98	S.D. dependent var	73.98
S.E. of regression	11.28	Akaike info criterion	7.79
Sum squared resid	4962.86	Schwarz criterion	7.99
Log likelihood	-166.40	Hannan-Quinn criter.	7.87
F-statistic	452.56	Durbin-Watson stat	0.47
Prob(F-statistic)	0.00		

*** coefficients statistically significant at 99%, ** coefficients statistically significant at 95% and *, coefficients statistically significant at 90%.

The F value of 452.56 and a p-value of 0.00 indicates that the fitness of the variables to the overall model is statistically important and that the regression equation is meaningful. In other words, it shows that the independent variables have an effect on the dependent variable, thus we reject the null hypothesis that population, interest rate and GDP per capita have no effect on housing price changes. Moreover, at 95% significance level, the p-value is below 0.05 hence we reject the null hypothesis that all slope coefficients were equal to zero. The R^2 value of 0.98 indicates that about 98% of the total variation in housing price changes is influenced by GDP per

capita, population, housing stock and interest rate. The coefficients indicate how much of the dependent variable, in this case, housing property index, changes with respect to a unit change in the interest rate, GDP per capita, population and housing stock. For bank lending rate, a coefficient of 2.09 means that a unit increase in interest rate will lead to an increase in residential housing price by 2.09%. This is consistent with the expectations in that when interest rate increases, the housing prices will also increase. However, for GDP per capita, a one unit increase in GDP per capita would reduce the residential housing prices by 0.24 which is not consistent with the economic theory where increase in income increases the quantity of a good purchased. This is because in Kenya, majority (75%) of urban households are renters who are not able to afford mortgages as well as high cost of finance meaning that even when their income increases, they will not buy houses. For population, a one percentage increase in population will not have an effect on residential housing prices. This is also inconsistent with economic theory; however, for Kenya, the housing deficit is so large that an increase in population will push more people into slums and informal settlements, which could be the reason why it has no effect on residential housing prices in this case. Lastly, for housing stock, its unit increase will reduce the housing prices by 0.01% which was not statistically significant.

However, with a low Durbin-Watson statistic of 0.49, the results were considered unreliable which means that they could have been spurious arising from a possible trend and stochastic behavior. Data was therefore transformed as indicated in the next section.

5.4 Model Estimation with Transformed Data

Table 5.3 Empirical Results of Transformed Data

Dependent Variable: LNPI Method: Least Squares Date: 03/08/18 Time: 19:55 Sample: 2007Q1 2017Q4 Included observations: 44			
Variable	Coefficient	t-Statistic	Prob.
C	-30.86	-1.62	0.11
Log population	2.03	1.62	0.11
Bank Lending Rate	0.01	2.29	0.03**
Log GDP per capita	-0.13	-0.35	0.73
Log Housing Stock	0.19	2.31	0.03**
R-squared	0.95	Mean dependent var	5.71
Adjusted R-squared	0.95	S.D. dependent var	0.26
S.E. of regression	0.06	Akaike info criterion	-2.71
Sum squared resid	0.14	Schwarz criterion	-2.50
Log likelihood	64.52	Hannan-Quinn criter.	-2.63
F-statistic	199.28	Durbin-Watson stat	0.22
Prob(F-statistic)	0.000000		

*** coefficients statistically significant at 99%, ** coefficients statistically significant at 95% and *coefficients statistically significant at 90%.

The transformed model was highly significant with the probability of the F-statistic equal to zero. This means that the regression model has good explanatory power. However, only two variables, interest rate and housing stock, were statistically significant at 95% significance level. From the results, 95.33% of the total variation in housing prices is influenced by population, bank lending rate, GDP per capita and housing stock. The Durbin-Watson statistic obtained was $0.217413 \approx 0$ and hence I concluded that the transformed variables suffered from first order

autocorrelation (positive serial correlation). Therefore, the data was subjected to various diagnostic tests as indicated in the following section as well as in the and appendices.

5.5 Stationarity Test

To avoid the problem of running a spurious regression, unit root test was conducted using the Augmented Dickey Fuller test as shown in Table 5.4.

Table 5.4 Summary of Stationarity Test Results

	At Level			At First Difference			At Second Difference			At third Difference			Order of Integration
Variables	**t-statistic**	**Critical values**		**t-statistics**	**Critical Values**		**t-statistics**	**Critical Values**		**t-statistics**	**Critical Values**		
		1%	5%		1%	5%		1%	5%		1%	5%	
Property Index	**-1.54**	-4.19	-3.52	**-3.96**	-4.19	-3.52079							I(1)
Interest rates	**-2.80**	-4.19	-3.52	**-4.36**	-4.20	-3.52362							I(1)
Population	**-1.76**	-4.25	-3.55	**1.36**	-4.25	-3.54849	**-2.56**	-4.25	-3.55	**-69.62**	-4.21	-3.53	I(3)
GDP per capita	**-2.06**	-4.19	-3.52	**-3.18**	-4.19	-3.52079	**-4.82**	-4.22	-3.53				I(2)
Housing stock	**-3.78**	-4.19	-3.52										I(0)

From the table, housing property index and interest rate were stationary at first difference, GDP per capita was stationary at second difference and population was stationary at third difference. Housing stock was however stationary at levels.

5.6 Test for Serial Correlation

The test for autocorrelation was done using the Breusch-Godfrey serial correlation test to establish whether the error term at time t was not correlated with an error term in another time period in the past.

Table 5.5 Test for autocorrelation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	3.846604	Prob. F (4,32)	0.0116
Obs*R-squared	13.31274	Prob. Chi-Square (4)	0.0098

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/08/18 Time: 19:37
Sample: 2007Q4 2017Q4
Included observations: 41
Pre-sample missing value lagged residuals set to zero.

Variable	Coefficient	t-Statistic	Prob.
C	-0.02	-0.33	0.74
D Bank Lending Rate	0.01	0.94	0.35
D3LN Population	59.31	0.93	0.36
D2LNGDP Per Capita	-0.13	-0.56	0.58
LN Housing Stock	0.01	0.33	0.74
RESID (-1)	0.62	3.39	0.00 ***
RESID (-2)	-0.36	-1.70	0.09 *
RESID (-3)	-0.11	-0.54	0.59
RESID (-4)	0.04	0.21	0.83

R-squared	0.32	Mean dependent var	-2.12E-17
Adjusted R-squared	0.16	S.D. dependent var	0.02
S.E. of regression	0.02	Akaike info criterion	-5.25
Sum squared resid	0.01	Schwarz criterion	-4.88
Log likelihood	116.65	Hannan-Quinn criter.	-5.11
F-statistic	1.92	Durbin-Watson stat	1.98
Prob(F-statistic)	0.09		

*** coefficients statistically significant at 99%, ** coefficients statistically significant at 95% and *coefficients statistically significant at 90%.

From the results obtained, there was strong first order autocorrelation for both the F and χ^2 values which were significant because their P-values were less than 0.05 and hence we rejected the null hypothesis of no serial correlation in the residuals.

5.7 Model Estimation after running Diagnostic Tests

Regressing the dependent variable against the independent variables, the results in Table 5.6 were obtained. Using the Akaike Information Criterion, a maximum lag length of 7 for GDP per capita was obtained.

Table 5.6 Empirical Results

Dependent Variable: DLNPI Method: least Squares Date: 03/08/18 Time 19:45 Sample (adjusted): 2009Q2 2017Q4 Included observations: 35 after adjustments			
Variable	Coefficient	t-statistic	Prob
C	0.16	3.24	0.00***
D Bank Lending Rate (-2)	0.00	1.35	0.19
D3LN Population	59.90	1.06	0.30
D2LN GDP Per Capita (-7)	0.53	2.86	0.01***
LN Housing Stock (-5)	-0.02	-2.96	0.01***

R-squared	0.47		
Adjusted R-squared	0.40	Mean dependent var	0.01
S.E. of regression	0.01	S.D. dependent var	0.02
Sum squared resid	0.01	Akaike info criterion	-5.50
Log likelihood	101.26	Schwarz criterion	-5.28
F-statistic	6.78	Hannan-Quinn criter.	-5.42
Prob(F-statistic)	0.00	Durbin-Watson stat	1.60

*** coefficients statistically significant at 99%, ** coefficients statistically significant at 95% and *coefficients statistically significant at 90%

The F value is 6.78 with a p-value of 0.00; which indicates that the fitness of the variables to the overall model is statistically important and that the regression equation is meaningful. In other words, it shows that the independent variables have an effect on the dependent variable, thus we reject the null hypothesis. Moreover, at 5% significance level, the p-value is below 0.05, hence we reject the null hypothesis that all slope coefficients were equal to zero. Therefore, the model in this instance was significant with (F = 6.78; p = 0.00) in explaining the housing price changes. The Durbin Watson value of 1.60 shows that there was no serial correlation among the variables.

The R^2 of 0.47 indicates that about 47.46 % of the total variation in housing price changes is influenced by GDP per capita, population, interest rate and housing stock. The coefficients indicate how much of the dependent variable, in this case, housing property index, changes with respect to a unit change in the interest rate, GDP per capita, population and housing stock. Overall, all the coefficients depicted the expected signs, for instance, the coefficients for bank lending rate, population and GDP per capita had positive signs while housing stock coefficient had a negative sign. This means that housing price will increase with an increase in GDP per capita, interest rate and population, *ceteris paribus*. On the other hand, for housing stock, the negative sign means that housing price will decrease with an increase in the housing supply, *ceteris paribus*. Specifically, for bank lending rate, a coefficient of 0.00 means that a unit increase in interest rate will lead to an increase in residential housing price by 0.01% in the following two quarters. This is consistent with the expectations in that when interest rate increase, the housing prices will also increase. Additionally, a one percentage increase in GDP per capita would increase the residential housing prices by 0.53% in the next seven quarters. This result is also consistent with economic theory in that as income increases, more people will demand housing and since housing supply is inelastic in the short run, housing prices will rise. For population, a one percentage increase in population will lead to a 59.96% increase in residential housing prices. This is true because as population increases, the demand for housing will increase with a larger proportion as compared to the supply which is inelastic in the short-run. This means that due to the construction lag, the demand will be much larger than the supply of houses leading to an increase in housing price. For the housing stock, a one percentage increase in the housing stock will reduce the housing price by 0.02% in the next 5 quarters. This means that when new housing units are supplied, housing price will fall since demand will also fall.

For the statistical significance of the independent variables, the results indicated that interest rate and population were not statistically significant because their p values were greater than 0.05 at 95% significance level; while housing stock and GDP per capita were statistically significant at 95% significance level because their p values were less than 0.05 as indicated in Table 5.6.

The estimated model also showed that if all the explanatory variables were zero, the housing property index would increase by 0.16%. In other words, even without the independent variables, other factors not considered would increase the housing price. From the results, the residential housing price changes in urban areas in Kenya is a positive function of the interest rate, population and GDP per capita whereas housing price changes is a negative function of the housing supply.

CHAPTER SIX: AFFORDABLE HOUSING IN KENYA

6.1 Introduction

To improve the living conditions of people especially in a fast urbanizing world, provision of housing is a necessity. However, how affordable housing remains a concern for many countries across the globe. In the United States, housing takes about one-quarter of the household's income while poor households devote up to one half of their income to housing (Quigley & Raphael, 2004). In Kenya, the National Housing Policy of 2004 requires households to devote one third (33%) of their income to housing. However, this is not the case. According to the 2012/2013 National Housing Survey, on average, Kenya's urban renters spent up to 33.1% of their total income on housing with the figure increasing to about 40.8% in the capital city Nairobi (Ministry of Housing, 2013). With the rising housing prices that have been discussed in the previous chapter, a majority of Kenyans will eventually be pushed into slums and informal settlements.

Before discussing housing affordability, it is important to define it. According to Quigley & Raphael (2004), housing affordability can be defined depending on whether a household is a renter or owner. For homeowners, housing affordability is defined as "terms on which dwellings can be purchased and loans to purchase these assets can be amortized; for renters, it refers "to the terms for rental contracts and the relationship between these rents and their low incomes" (p.193). In Kenya, the Sessional Paper number 3 on National Housing Policy 2004 defines affordable housing as housing that will cost less than one third of the occupier's income to rent or purchase the unit (Ministry of Housing, 2004).

6.2 Housing Affordability Index

To calculate housing affordability, three main alternatives are used (Quigley & Rafael, 2004):

1) Rent-to-Price Ratio (RPR) and User Cost of Capital

$$Rent\ to\ Price\ Ratio(RPR) = \frac{\text{Median Rent (n,)}}{\text{median Housing Price (n,t)}} = \text{user cost of capital (n,t)}$$

Where: n- Location and t- Time

The equation uses median as opposed to average because in instances where house prices are very high, use of average prices will distort the index. The disadvantage with this formula is that location and time vary widely (different regions, cities, annually, quarterly etc.)

2) Price-to-Income Ratio (PIR)

$$\text{PIR} = \frac{\text{Median HP (n,t)}}{\text{Median Income (n,t)}}$$

The advantage of this indicator is that it is simple to compute and thus the most widely used. However, it has the following disadvantages: it varies across time and locations since housing is a stock variable while income is a flow variable, this indicator is not a representative; housing quality varies across locations. To address the variation in housing quality, some studies have used hedonic price model.

3) HAI *with the mortgage qualification considered* (HAI_M)

$$\text{HAI}_\text{M} = \frac{Median\ Income\ (\text{n},\text{t})}{M_{Qualifying} Income\ (\text{n},\text{t})} * 100$$

Where: M_ Qualifying income is mortgage qualifying income given a standard mortgage contract for given time and location (i.e., minimum monthly/annual income for the relevant mortgage

contract attributes- interest rate, Loan To Value (LTV), Debt To Income (DTI) and amortization plan)

The advantage of this indicator is that it reflects the financing conditions. The disadvantage is that it assumes one type of mortgage contract.

It is imperative to point out the limitation of using the income to gauge household affordability. Quigley & Rafael (2004) argue that income is not a good measure for affordability without considering the age of households; retired households have lower incomes, yet a majority of them own homes. In their findings, older households have lower incomes, but about half of them own homes. This justifies the 45% homeownership rate of households in the bottom quantile in 2000 in the US. In addition, younger but poor households' homeownership rates are comparatively low. Further, housing is a heterogeneous good whose choice depends on several other factors including social amenities in the area, location, quality of the construction among others.

6.3 Housing Affordability Index for Kenya's Urban Areas

To calculate the affordability index, this study will adopt the Price-to-Income ratio by using average housing price and average income as opposed to median housing price and income. This is because the later data was not available.

The major limitation of this study is the unavailability of comprehensive housing data; because the government does not publish comprehensive and timely housing statistics. The available housing data are those published by the private sector like Hass Consult, Cytonn Investments, and Kenya Bankers Association. However, the publications have different information with Hass Consult and Kenya Bankers Association calculating house price index using

hedonic price model. This does not reflect the real picture[9] given that most of the houses are for the high-end markets.

For instance, World Bank (2017) argued that the average income for a Kenyan in 2017 was USD 1441 per month (USD 17,292 per annum). The average property value in the same year was USD 287,367. Using these statistics, the PIR will be calculated as follows:

PIR= USD 287,367/ USD 17292 = 16.62.

This means that the house prices in Kenya are 16.62 times higher than the average income. However, as discussed before, these figures are not representative given that over 80% of the houses supplied in the market in Kenya are for upper-middle-income categories. In comparison, the United States has a PIR of 2.6 meaning that the total price of a house is 2.6 times the median annual income. On the other hand, the Centre for Affordable Housing Finance in Africa (CAHF) found the PRR for Nairobi to be 12.3 % and outside city center 18.34 in 2016 (CAHF, 2016).

6.3.1 Housing Affordability Index using data from Hass Consult

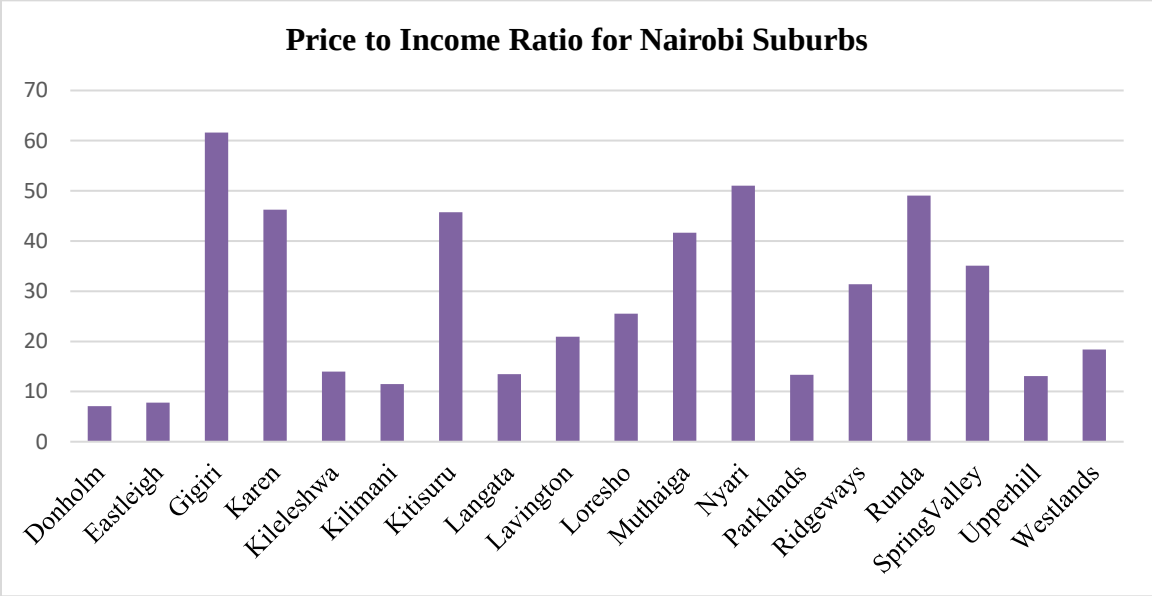
This section calculates the housing affordability index using PIR for different suburbs around the Central Business District (CBD) and satellite towns in Kenya as detailed in Tables 6.1 and 6.2.

Table 6.1 PIR for Nairobi Suburbs

Suburb	Average Income (USD)	Average Housing Price (USD)	PIR
Donholm	17,292	122,864	7.11
Eastleigh	17,292	134,500	7.78
Gigiri	17,292	1,065,615	61.62
Karen	17,292	799,565	46.24
Kileleshwa	17,292	241,361	13.96
Kilimani	17,292	199,100	11.51
Kitisuru	17,292	790,533	45.72

[9] The World Bank Report (2017) indicates that more than 80% of supply is for upper middle income and only 2% for the lower income households

Langata	17,292	232,524	13.45
Lavington	17,292	362,524	20.96
Loresho	17,292	441,732	25.55
Muthaiga	17,292	720,389	41.66
Nyari	17,292	882,353	51.03
Parklands	17,292	230,986	13.36
Ridgeways	17,292	543,086	31.41
Runda	17,292	848,183	49.05
SpringValley	17,292	606,222	35.06
Upperhill	17,292	225,816	13.06
Westlands	17,292	317,467	18.36



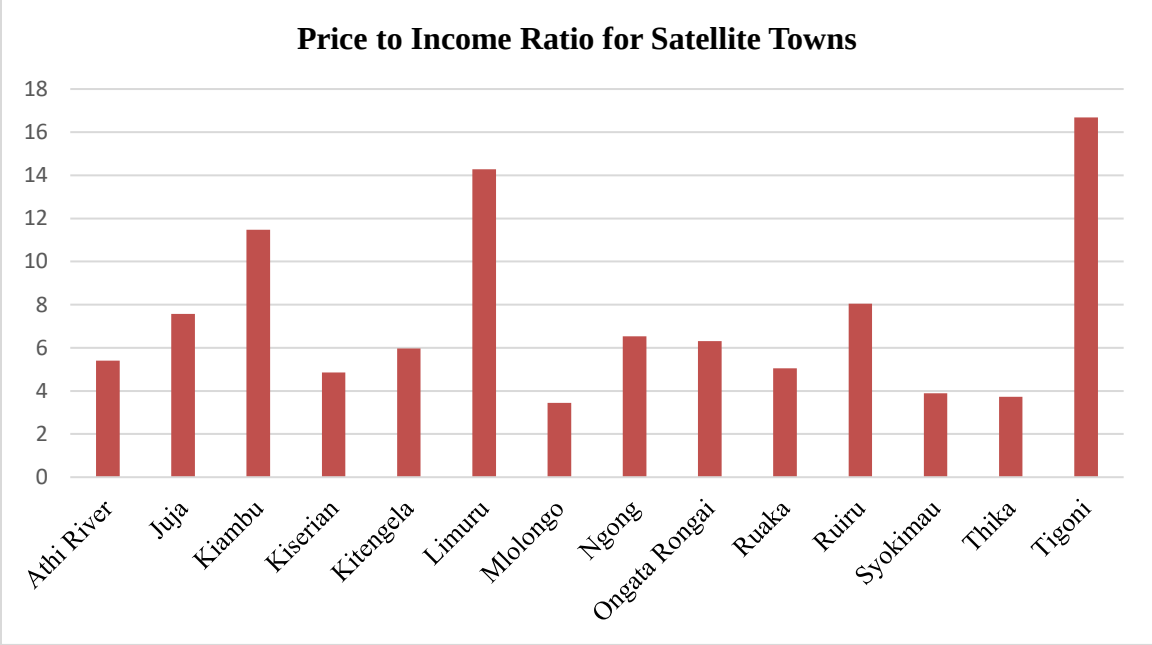
From Table 6.1 results, the PIR for suburbs further away from the CBD is higher than that of suburbs near the CBD. This follows the monocentric model (Alonso, 1964; Evans,1985) where as you move away from the CBD, the house prices reduce, thus reduced property values.

Table 6.2 PIR for Nairobi and its Satellite Towns

Town	Average Income (USD)	Average Housing Price (USD)	PIR
Athi River	17,292	93,489	5.41
Juja	17,292	130,909	7.57
Kiambu	17,292	198,565	11.48
Kiserian	17,292	84,000	4.86
Kitengela	17,292	103,190	5.97

Limuru	17,292	246,958	14.28
Mlolongo	17,292	59,621	3.45
Ngong	17,292	112,999	6.53
Ongata Rongai	17,292	109,150	6.31
Ruaka	17,292	87,242	5.05
Ruiru	17,292	139,085	8.04
Syokimau	17,292	67,300	3.89
Thika	17,292	64,417	3.73
Tigoni	17,292	288,435	16.68

Source: own computation based on data from Hass Consult (2018)



The PIR for Nairobi's satellite towns is lower as compared to the suburbs because the capital is larger than the satellite towns. In addition, the cost of construction, especially labor costs, is lower in satellite towns as compared to the capital city (DiPasquale & Wheaton, 1996).

However, the Hedonic pricing model, according to Oxford (2002), was built upon the monocentric model. It shows the price that people are willing to pay for characteristics of a product. This means that the price of a property reflects, amongst other things, the quality of the environment or amenity in which it is located. However, Gibb (2012) points out that the hedonic

pricing model is not a good measure of the value of neighborhoods based on the environmental advantages of a location over others.

6.4 Trends in the Rental and Owner-Occupied Housing markets

The rise in housing prices across the globe has drawn the attention of contemporary scholars to the debate on rental housing and global securitization. Pareja & Martinez (2009) assert that governments in developed and developing countries alike have given considerable attention on formulating policies that advocate for rental housing; as a solution to housing the low and lower-middle income households. Many countries, and in particular, European countries, have now embarked on providing " subsidies to developers, fiscal incentives to owners, taxes on vacant dwellings, vouchers and market regulations" to encourage rental housing (p.153). However, some countries like Spain, who have a demand deficit due to unaffordable housing for the low-income groups, have, for a long time advocated for home ownership (Pareja-Eastaway & Sanchez-Martinez, 2009). Also, Lowe (2011) acknowledges that the financial crisis that led to a burst in the housing bubble resulted in economies looking for other ways of financing mortgages like “global securitization" (p.5). This means that new capital was created to supplement the usual mortgage sources by putting together different mortgages and selling to investors in terms of bonds across the globe (Lowe, 2011). With increased sources of financing, many households were now able to invest in home ownership.

From the 1960s, the US homeownership rates have been on an upward trend for all income groups. By 2000, two-thirds of the US households were homeowners. The homeownership rate between 1960 and 2000 increased by 5% across the US for all income groups. For instance, “in

2000, 45% of households in the bottom-quantile owned homes with 37% of those below the poverty line owning homes as well (Quigley & Rafael, 2004).

However, Quigley & Rafael (2004) argue that income is not a good measure for affordability without considering the age of households; retired households have lower incomes, yet a majority of them own homes. In their findings, older households have lower incomes, but about half of them own homes. This justifies the 45% homeownership rate of households in the bottom quantile in 2000 as detailed in preceding paragraph. In addition, younger but poor households' homeownership rates are comparatively low.

CHAPTER SEVEN: CONCLUSION AND POLICY IMPLCATIONS

7.1 Introduction

The aim of this research was to analyze demand and supply factors that affect housing prices in urban areas in Kenya. The specific objectives of the study were as follows:- to determine the effect of bank lending rates on the housing prices in urban areas in Kenya; to establish the influence of housing stock on housing prices in urban areas in Kenya; to determine the effect of population growth rate on housing prices in urban areas in Kenya; to establish the influence of GDP per capita on housing prices in urban areas in Kenya; to establish the motivation behind the government of Kenya's focus on social and rental housing; and to give policy recommendations on possible interventions towards affordable housing in Kenya.

7.2 Summary of Findings and Policy Implications

The study objectives were analyzed using the hedonic pricing model. Overall, from the findings, the R^2 indicates that about 47.46 % of the total variation in housing price changes is influenced by GDP per capita, population, interest rate and housing stock. Each of the objectives has been presented as follows: -

7.2.1 Effect of Bank Lending Rate on the Housing Prices in Urban Areas in Kenya

The first objective was measured by estimating the effect of banking lending rate on housing price. Based on the findings, a coefficient of 0.01 means that a unit increase in interest rate will lead to an increase in residential housing price by 0.01% in the following two quarters. This is consistent with the expectations in that when interest rate increase, the housing prices will also increase. However, with a p value of 0.19, interest rate is not statistically significant at 95% confidence level because p value is greater than 0.05. This means that we do not reject the null

hypothesis. This can be explained based on the Report by the World Bank in 2017 that showed that 90% of Kenyans in urban areas borrow from SACCOs to finance housing construction as compared to 10% that borrow from commercial banks. In other words, the bank lending interest rate by the commercial banks in Kenya does not influence housing price changes because it is very high meaning that Kenyans will borrow from SACCOs that offer cheaper financing. In addition, these results justify why the mortgage loans outstanding as a percentage of GDP in Kenya is at an approximate 3%. However, this does not mean that nothing should be done to bring the interest rates down given that it is this high interest rate that pushes Kenyans to borrow from SACCOs which unfortunately offer short-term financing. In addition, developers borrow from commercial banks to finance housing because SACCOs have ceilings on the amount of loans offered.

7.2.2 Effects of housing stock on housing prices in urban areas in Kenya

The second objective was to establish the influence of housing stock on housing prices in Kenya's urban areas. From the findings, a one percentage increase in the housing stock will reduce the housing price by 0.02% in the next 5 quarters. This means that when new housing units are supplied, housing price will fall since demand will also fall. This is consistent with the economic theory because when the supply of a good increases, its prices will fall because the demand for that good will fall. However, the case for housing involves the construction lag, which is the reason as to why the effect will be felt in the next 5 quarters.

Housing stock has a p value of 0.01 which means that the variable is statistically significant at 95% confidence level. This is true because demand and supply of a good directly influence its price where at equilibrium, the demand and supply are equal. This implies that with the huge urban housing deficit of 196,000 housing units per annum, the housing prices will keep on increasing

due to increased demand. This will eventually make housing more costly pushing those who cannot afford high end houses into slums and informal settlements.

7.2.3 Effects of GDP per capita on housing prices in urban areas in Kenya

The third objective was to establish the influence of GDP per capita on housing prices in Kenya's urban areas. From the findings, a one percentage increase in GDP per capita would increase the residential housing prices by 0.53% in the next seven quarters. This means that when a household's income increases today, the housing price will increase in 1.75 years from now; because an increase in income will shift the demand curve for housing to the right and since housing supply is inelastic in the short run, housing prices will increase. The increase is not immediate because housing is an investment good and a potential home owner will take time to ensure they make rational investment decisions. The process of acquiring a mortgage loan in Kenya takes up to 9 months from the land acquisition complexities to bank procedures. However, when a construction loan has been acquired, the demand for housing will increase leading to an increase in housing price.

GDP per capita has a p value of 0.01 which means that is statistically significant at 95% confidence level. This is because income is the major determinant of the price that an individual is willing to pay for a commodity.

7.2.4 Effects of population on housing prices in urban areas in Kenya

The fourth objective was to determine the effect of population increase on housing prices in Kenya's urban areas. From the findings, a one percentage increase in population will lead to a 59.96% increase in residential housing prices. These results are also consistent with the economic

theory that as population increases, the demand for housing will increase with a larger proportion as compared to the supply which is inelastic in the short-run. This means that due to the construction lag, the demand will be much larger than the supply of houses leading to an increase in housing price.

From these findings, population has a very big influence on housing prices in Kenya's urban areas due to the huge housing deficit in Kenya. With an average supply of 6,624 housing units between 2007 and 2017; against a demand of about 200,000 per annum in urban areas, the government must deliberately drive the housing sector to cushion the middle and low-income households from moving into slums and informal settlements.

7.2.5 The motivation behind the government of Kenya's focus on social and rental housing

Home ownership has long been the ultimate goal of many households in both developed and developing countries since housing is not only an investment good but also a source of wealth and prestige. However, in countries where ownership is costly, the government can explore alternative ways of encouraging access to housing; which can be tenant purchase or rental housing. In the case of Kenya, a study carried out by the Centre for Affordable Housing in 2013 revealed that; on the average, the least priced housing delivered in the market was between $50,000 and $70,000. The mortgage repayment for this house would be between $700 and $1,000 per month. Since the National Housing Policy recommends using 30% of income for housing, such a house can only be affordable to households earning between $2100 and $3,000 a month. Only 5% of Kenyans earn this much a month (CAHF, 2016). This means that 95% of Kenyans cannot afford to own homes.

In addition, the World Bank (2017) revealed that the average income for a Kenyan in 2017 was USD 1441 per month (USD 17,292 per annum). The average property value in the same year was USD 287,367. Using these statistics, the PIR would be calculated as follows:

PIR= USD 287,367/ USD 17292 = 16.62. This means that the house prices are 16.62 times higher than the average income.

Moreover, the 2012/2013 National Housing Survey carried out in Kenya found that at least two thirds of urban households rent their accommodation. From these, it is important that the government takes deliberate steps to implement innovative strategies to improve access to housing, and more so rental housing; which is the best option given the prevailing conditions. One of the interventions has been the operationalization of the National Housing Fund by the National Treasury as per the revised National Housing Policy of 2016 that aimed at "Creating a National Social Housing Development Fund to be financed through budgetary allocations and financial support from development partners and other sources for rental social housing and related infrastructure, and other low-cost housing programmes" (Ministry of Transport, Infrastructure, Housing and Urban Development, 2016, pg. 12).

7.3 Policy Recommendations

Based on the findings of this study, it is evident that housing in Kenya is not accessible nor affordable to the middle and low-income households. This means that the government must partner with the private sector to ensure that affordable housing is delivered to prevent proliferation of more slums and informal settlements. The study therefore recommends the following: -

i. Collaborate with housing cooperatives and SACCOs and provide incentives to the private sector to increase the stock of affordable houses in the country. The incentives can include providing housing related infrastructure to bring the cost of housing down;

fast track processing of land registration documents to attract potential investors who face complexities at the Ministry of Lands, tax cuts and exemptions on construction materials, tax relief for first time home buyers among others

ii. The government should ensure GDP growth by enhancing investments, control population growth and also encourage consumer spending that can increase the country's GDP per capita giving households more income to invest in housing. This will increase the wealth of a nation since housing is an investment good.

iii. The Central Bank of Kenya to control the bank lending rates to allow potential home owners and developers borrow for housing. This will in turn reduce the cost of construction and consequently the overall cost of housing; as well as increase the housing stock which will reduce housing prices.

iv. The government to focus on developing social housing for the low and middle-income households to reduce proliferation of slums and informal settlements. This can be done by increased budgetary allocations and creation of a national fund for social housing.

v. Increase budgetary allocation to the National Housing Corporation to invest more in housing as well as establish Mortgage Backed Securities (MBS) and Asset Backed Securities to mobilize funds for provision of affordable housing.

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APPENDICES

Appendix 1 Test for Multicollinearity

A correlation matrix of the transformed series at levels was generated in order to establish the relationship or degree of association between the independent variables as indicated in appendix 1.

Correlation Matrix Table

Covariance Analysis: Ordinary
Date: 03/08/18 Time: 19:08
Sample: 2007Q1 2017Q4
Included observations: 44

Correlation t-Statistic Probability	LNPI	R	LNP	LNGDPC	LNHS
LNPI	1.000000 ----- -----				
R	0.434304* 3.124690** 0.0032***	1.000000 ----- -----			
LNP	0.962011 22.83620 0.0000	0.328513 2.254115 0.0295	1.000000 ----- -----		
LNGDPC	0.938934 17.68393 0.0000	0.310146 2.114232 0.0405	0.989484 44.33397 0.0000	1.000000 ----- -----	
LNHS	0.964695 23.73836 0.0000	0.409203 2.906418 0.0058	0.959954 22.20616 0.0000	0.925427 15.82745 0.0000	1.000000 ----- -----

* Correlation coefficients, ** t statistics values, *** probability values for the variables

From the paired correlations, some of the variables had very high correlations which were significant. It was therefore important that the variables be tested for multicollinearity using the variance inflation factors which yielded results in Appendix 2

Appendix 2: Variance Inflation Factors

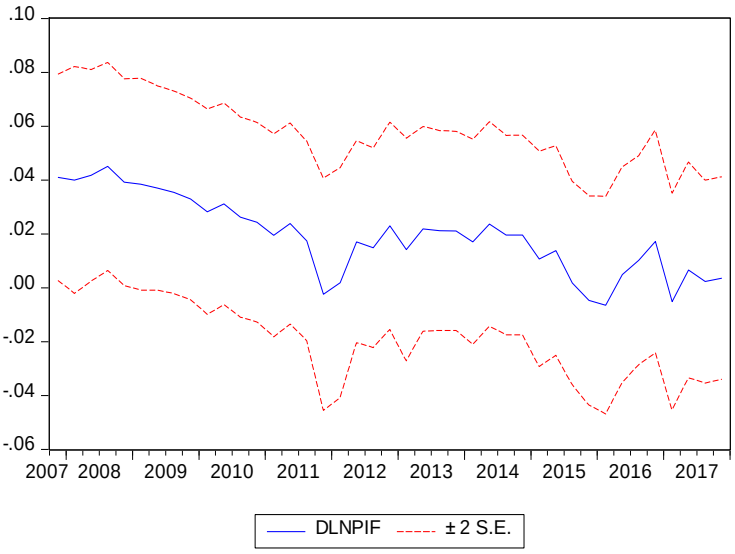
Variance Inflation Factors
Date: 03/08/18 Time: 19:17
Sample: 2007Q1 2017Q4
Included observations: 41

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.002880	354.0064	NA
DR	1.03E-05	1.096191	1.095911
D3LNP	5009.544	1.004776	1.004776
D2LNGDPC	0.056344	1.077413	1.074644
LNHS	3.76E-05	353.5375	1.089781

From the results obtained, all the variance inflation factors were less than 10 meaning that there was no serious problem of multicollinearity. This shows that the variables are distinct from each other.

Appendix 3 Test for Cointegration

Cointegration test was done to establish whether there exists a long run relationship between the variables. The Engel and Granger two-step method was used; it involved estimating the cointegration regression model by OLS and obtaining the residuals which were then tested for stationarity using Augmented Dickey-Fuller test. The property index model was estimated and the following forecast obtained.



Forecast: DLNPIF	
Actual: DLNPI	
Forecast sample: 2007Q1 2017Q4	
Adjusted sample: 2007Q4 2017Q4	
Included observations: 41	
Root Mean Squared Error	0.017115
Mean Absolute Error	0.014277
Mean Abs. Percent Error	201.1279
Theil Inequality Coefficient	0.322479
Bias Proportion	0.000000
Variance Proportion	0.224900
Covariance Proportion	0.775100
Theil U2 Coefficient	0.999404
Symmetric MAPE	87.65370

Appendix 4 Augmented Dick-Fuller Test for Stationarity

Null Hypothesis: ECM has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.894496	0.0047
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

*MacKinnon (1996) one-sided p-values.

The residuals were found to be stationary at levels as the tau t statistics of -3.894496 was far more negative (left) as compared to -2.936942 critical value at 5% with Mackinnon p-value of 0.000. This shows a long run relationship amongst the variables meaning that the parameters of property index function could be interpreted as long run parameters. The existence of cointegration between property index and interest rates and GDP per capita indicate that the variables have a long-term or equilibrium relationship. There however, may be disequilibrium in the short run which is indicated in Appendix 5

Appendix 5: Short Run Estimation of The Model

Dependent Variable: DLNPI
Method: Least Squares
Date: 03/08/18 Time: 19:35
Sample (adjusted): 2008Q4 2017Q4
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.241896	0.064043	3.777063	0.0007
DR	-0.004718	0.003209	-1.470277	0.1516
D3LNP	71.42148	69.10353	1.033543	0.3093
D2LNGDPC	-0.209559	0.288607	-0.726106	0.4732
LNHS	-0.025502	0.007253	-3.516021	0.0014
ECM (-4)	-0.113849	0.179027	-0.635935	0.5295

R-squared	0.369636	Mean dependent var	0.016685
Adjusted R-squared	0.267964	S.D. dependent var	0.020712
S.E. of regression	0.017721	Akaike info criterion	-5.080772
Sum squared resid	0.009735	Schwarz criterion	-4.819542
Log likelihood	99.99428	Hannan-Quinn criter.	-4.988676
F-statistic	3.635586	Durbin-Watson stat	1.220035
Prob(F-statistic)	0.010542		

The coefficients for interest rates, population and GDP per capita were found insignificant in the short-run at 11% or lower level. However, the short-run model was significant with an F-statistic of 3.635586 and p-value 0.010542. The coefficient of the error correction term of about 0.11 suggests that only about 11% of the discrepancy between long-term and short-term property index is corrected within a quarter of the year suggesting a slow rate of adjustment to equilibrium. In the short run, a one percentage increase in housing stock would lead to 0.02% decline in property index.