DETERMINANTS OF HOUSING SUPPLY IN KENYA

By

THEURI JAMES WAGURA

B42/82150/2012

SCHOOL OF BUILT ENVIRONMENT

Research Paper Submitted to the School of Built Environment, University Of Nairobi in Partial Fulfillment of the Requirements for the Award of Post Graduate Diploma in Housing Administration.

September 2013

DECLARATION

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

Signature: _____ Date: _____

THEURI JAMES WAGURA

This research paper has been forwarded for examination with my approval as the University supervisor

Signature: _____ Date: _____

DENIS MUTHAMA

SCHOOL OF BUILT ENVIRONMENT

UNIVERSITY OF NAIROBI

DEDICATION

This research paper is dedicated to my late father who passed on during the course work, for his insistence on the culture of gaining knowledge and knowing how to apply it.

ACKNOWLEDGMENTS

I would like to thank my supervisor Mr. Muthama for his commitment, advice and guidance he offered during the period of research. I also acknowledge the School of Built Environment for the knowledge gained during the course study as well as the library staff of the School of Economics for their assistance during research.

I am also thankful to the Government of Kenya for sponsoring me to this course, and to my family for supporting me during the course.

Finally, I thank God for the good health, wisdom and power that He has given me.

LIST OF ABBREVIATIONS

NHC	National Housing Corporation
ANOVA	Analysis of Variance
VIF	Variance inflation factor

ABSTRACT

Housing as an economic good is often considered as an investment good with expected returns either in terms of rent or capital gains made from sale of the investment. The problem of provision of adequate shelter is a complex one due to the heterogeneous nature of housing as a good and the fact that housing is a social right. For this reason, the focus of the government should be facilitating private sector in terms of housing finance, production and construction as well as provision of infrastructure. This study analyzed the factors influencing the housing supply of housing. The research is biased towards the urban areas due to the significant shortages being experienced in urban areas, of housing. The study utilized regression analysis to analyze the relationship between stock of houses and the price of houses, income per capita, inflation and interest rate.

The study found out that the price of housing is the most positive significant factor in determining the number of houses delivered in a period. As prices become favorable for the producers, the number increases. However, this has to be met by equal demand for the houses constructed. The research has indicated that increased per capita income does not result into an increase in houses and therefore the ability to build may limit the willingness to do so. To the contrary, there was an inverse relationship between stock of houses supplied and the income per capita. The other determinants; inflation and interest rate were found to have positive relationship although they were statistically insignificant.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

1.1 Introduction

Housing can be defined as a process, the actual product of creating human shelter and as a cultural reality. For the purpose of this study, the word housing is used to mean all the three since they are all incorporated in the price of the final product and form part of the choice of housing, affordability, as well as the tenure status.

The housing problem has become central in many societies with respective governments trying to make various interventions that can alleviate the problem. Developing countries such as Kenya are experiencing high rates of population growth and rapid urbanization occasioned by the rising population as well as migration to the urban areas in search of better opportunities. These factors lead to an increased demand for housing which is often not matched by the stock of houses supplied.

1.2 Housing Supply in Kenya

The Government of Kenya recognizes housing as a basic need and thus since independence has had as an objective, to facilitate provision of adequate shelter for all both in urban and rural areas (Chesang 1991). Governmentôs role in housing has been through direct provision of houses through the National Housing Corporation, implementing the Housing Policy, housing subsidies and facilitation of access to credit from commercial banks. The role the government has played has however not been enough to avoid the housing problems that have faced the country over the years. They are characterized by acute housing shortage and poor living conditions in the ever increasing informal settlements.

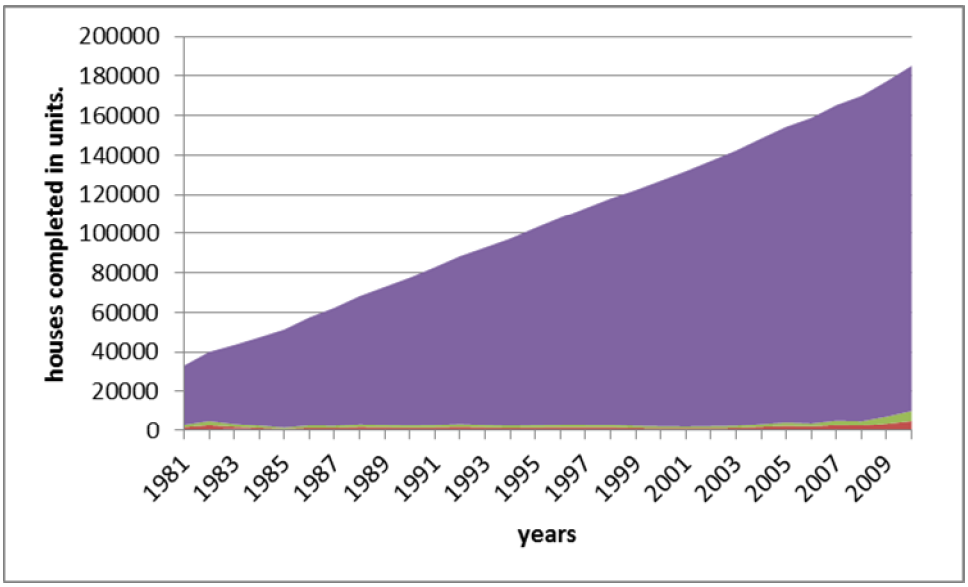
The Kenyan housing sector has been characterized by a steady increase in deficit in supply as evidenced by the 1974-1978 and 1997-2001 development periods where an estimated 25,000 housing units were built compared to an estimated demand of 50,000 units, and. Only 112,000 units were produced in comparison to 560,000 units demanded respectively (Source: Economic Surveys, 1997 - 2001). Thus with time the supply lag continues to increase. The supply lag can

be attributed to a number of factors key among them being land shortage, red tape bureaucracy, inadequate housing finance and high price of building materials.

The housing supply lag in urban areas has been worsened by rapid urbanization, population pressure resulting from a growing urban population, escalating poverty among the urban low income earners, inflation eroding the purchasing power and reducing the propensity to save, and high cost of building materials which make decent houses unaffordable to the urban poor who in turn result to makeshift houses, lack of adequate funds to cater for housing infrastructure by the government and increasing prices and scarcity of land.

The graph below shows the reported number of houses completed in selected major towns in Kenya over a thirty year period. The figures are far much fewer than the quantities required. In ordinary economics of free market, it is expected that resources will be reallocated to the sector with high profits until the quantities increase to the point where the returns in the industry are normal. In this regard, according to economic theory, the price of housing will adjust to equilibrium where the supply meets the quantity demanded. However, the market does not meet the assumption of perfect information. There are also other factors such as location of the houses that will influence both the quantity as well as the price of houses. Effective demand may also be limited since those who are willing to purchase the houses are not able to pay.

Fig 1: Housing supply deficit growth (1981 to 2010)



Source: Economic Surveys from year 1982 to year 2012

To improve on the above situation[1] the government has increased its expenditure on housing related activities in the recent years. For instance, the approved expenditure in the 2004/2005 fiscal year was KES 542.64 million which has since increased considerably to KES 3.13 Billion in 2007/2008 fiscal year. Such funds are often used in production of new houses for the civil servants under the Civil Servants Housing Scheme, promotion of appropriate building materials and techniques, promotion of housing policy issues as well as investment in research and development, human capacity building and upgrading of informal settlements. However, it is notable that only a proportion of allocated expenditure is often spent. Table 1 shows the various allocations and actual expenditure over the past eight years.

Table 1: Central Government's Expenditure on Housing

Year	Approved Expenditure (KES in million)	Actual Expenditure (KES in million)	Actual Expenditure (%Approved Expenditure)
2004/2005	542.64	480.65	88.6
2005/2006	1,615.96	1,056.96	65.43
2006/2007	1,992.10	1,969.89	98.9
2007/2008	3,130.12	2,853.51	91.2
2008/2009	3,781.67	3333.8	88.2
2009/2010	2,082.0	1,863.6	89.5
2010/2011	2,840.9	2,829.5	99.6
2011/2012	3,875.8	3,191.0	82.3

Source: Economic Surveys (2005-2013)

The Government through the principal implementing agency, National Housing Corporation has also played a role in delivery of middle-income and upper income houses. For instance the houses completed in 2012 in Madaraka Estate, the rental flats in Woodley and Sadi that began in 2008, and the mortgage marionettes in Kiambu (Phase III) were all targeted at the upper middle and upper class groups of people. In the yester years, the National Housing Corporation played a

[1] Growing housing supply deficit

key role in delivery of low cost houses such as the ones developed and handed over to the local authorities. However, the administration of the partnerships between the corporation and various local authorities became unmanageable thereby reducing the role the National Housing Corporation played in delivery of low cost houses. This explains the decline in approved expenditure between years 2008 to 2010 as shown in the table. The lack of amicable interrelationship between the two resulted in reduced trust on the effective use of the funds granted. This is a major challenge that hinders the mitigation of the growing housing deficit.

Table 2: Completed Houses by National Housing Corporation in selected years

Year	Residential Units (No.)
2005	360
2006	20
2007	309
2008	88
2009	116
2010	390

Source: Economic Surveys (2006-2012)

As evidenced by the table above, the residential units completed by the NHC are relatively low. The population of willing and able potential residents is outnumbered by the population of willing but unable potential residents. This is because the NHC targets the middle class and upper-class dwellers leaving out the low class dwellers. Most private developers all target the same cluster of dwellers as they are economically more viable in terms of returns.

The objective of government is facilitating private sector in terms of housing finance, production and construction as well as provision of infrastructure. It is therefore important to study the factors that influence supply of housing.

This research focuses on an empirical model that can be recommended for policy use by the government in its interventions to facilitate housing supply. The model assesses the strength of each variable in order to assess their significance in terms of policy execution. The variables tested are macro-economic variables of inflation, gross domestic product per capita and interest rates.

Inflation being the persistence increase in general prices of goods and services influences an individualôs economic power to take up the houses established. More often than not, an individualôs income remains constant despite the increase of prices. This reduces their ability to take up those houses. Gross domestic product (GDP) per capita directly determines an individualôs disposable income. It is the average income per head. If it is high that translates to high disposable incomes and hence better housing is afforded. A low GDP leads to development of slums. Interest rates charged by banks may encourage or discourage the take up of mortgages to purchase these houses. Inflation results to high interest rates in most cases. These factors collectively determine the price of houses as discussed above. The price of housing is included in the model as a major determinant of housing supply.

1.3 Statement of the Problem

Housing is an important sector in the economy both for economic and non-economic reasons. Lack of it or its consumption in inadequate proportion results into undignified livelihoods of the countryôs citizens. The Kenyan government alone has no adequate capacity to provide housing to all its citizens and therefore the need to work closely with the private sector.

Housing is often considered especially in the private sector an investment good with expected returns either in terms of rent or capital gains made from sale of the investment. To this extent, housing contributes to the countryôs gross domestic product. Additionally, the construction industry with housing sector being one of its key products, has strong forward and backward linkages. The growth of the sector brings with it growth in manufacturing industry for the building materials such as cement and steel and it provides employment for the people directly employed in the construction sites and those indirectly employed such as the architects, quantity

surveyors, construction managers, as well as giving rise to opportunities for entrepreneurship for instance along the supply chain of building materials there are hardware owners, transporters and in the end there are real estate agents and valuers.

The problem of provision of adequate shelter is a complex one due to the heterogeneous nature of housing. In addition to that housing requires significant investments which are not always available due to scarcity of resources. In addressing the problem of housing shortage, the governmentôs focus is usually on the demand side namely the affordability of owning or renting a house, lowering cost of building materials and raising incomes to stimulate demand. The attention given to low cost housing for low income groups is justified by the fact that this target group is often the worst hit by deteriorating housing conditions. Secondly, more units can be delivered with fewer resources than in conventional housing for upper and middle class.

In the 1980s, the National Housing Corporation had a strategy called Site and Service. The aim was to deliver affordable housing to the low income group. Between 1980 and 1984, NHC completed a total of 10,420 housing units. The number was significantly higher (a total of 1875 housing units above the previous figure during the same period) than the units delivered by the institution to the conventional middle and upper-class market which is demand driven by willing and able buyers (Economic Survey, 1985). The Site and Service proves that more low cost houses can be established than the conventional middle and upper-class houses resources kept constant.

Wahome (1984) criticized the site and service approach arguing that the impact was not felt by the targeted low income group but rather the process ended up benefiting middle and upper income earners. According to him the low income earners did not have the financial empowerment necessary to benefit from the project. Those who had money could easily edge out those who were struggling financially. From the above example it is clear that the studies that focus on the demand side of the housing needs such as Wahome (1984), Mwania (2010), Muthaka (2001) give an insight to the problem and how it can be handled from fulfilling the demand. DiPasquale (1999) rightly noted that in comparison with the large literature on housing

demand, housing supply has been studied far less, and often with inconclusive results. Since resources are scarce and the available resources cannot fulfill the immediate shortage of housing, there is a need to study how the problem can be solved from the supply side.

This study therefore seeks to investigate the supply side of the housing market in order to comprehensively and better understand what factors influence the quantity supplied; the macroeconomic factors influencing housing supply

1.4 Objectives of the Study

The objective of the study is to find out the macro-economic factors influencing the housing supply of housing.

The specific objectives of the study include:

1. To estimate a housing supply function for the Kenyan market
2. To determine the significance of the identified housing supply function key variables
3. To draw policy recommendations based on the finds of the study

1.5 Hypothesis

This research study will seek to validate the following:

i. The housing supply function for the Kenyan market is $\text{Log } H_s = A + \beta_1 \log P + \beta_2 \log Y_{t-1} + \beta_3 \log r + \beta_4 \log \acute{} + \mathring{U}$

Where:

$\text{Log } H_s$ is the Natural logarithm of quantity of housing stock supplied.

A is a constant

βi (i=1, 2) measure the responsiveness of housing supply to changes in price, income

log P is the Natural logarithm of the average price of the houses supplied

$\log Y_{t-1}$ is the Natural logarithm of per capita income of the previous year (t-1)

log r is the Natural logarithm of the real interest rate during year t

log ´ is the Natural logarithm of inflation in year t

$\mathring{U}$is the error term

ii. the above variables have significant influence on the supply of houses.

1.6 Significance of the Study

The current housing prices are high and thus it is expected that resources will be reallocated to the sector with high (abnormal) profits until the quantities increase to the point where the returns in the industry are normal. However, this is not happening or the rate of relocation is less than the rate at which the shortage is growing. There is thus a need to find a policy mix that can encourage accelerated growth in the supply of houses that meet effective demand. Since the demand for housing is ever rising in the urban areas due to migration and population growth, there is need to continuously evaluate various variables that can facilitate the growth of stock of houses that can effectively match the demand.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter has the following sections: an introduction to housing, the housing market, the determinants of housing supply, legal and policy framework, theoretical and empirical literature and finally the overview of the literature.

2.2 Housing

Housing the product has a heterogeneous nature. It is a consumption good which an individual will derive utility from as it serves its basic purposes such as warmth, shelter from adverse weather and privacy. It is also an investment good. In this case, an individual will develop a house or houses in order to sell them in future at a profit. The profits and capital gains associated with the rising prices and appreciation of value make housing an investment good.

For the purposes of this study, housing is studied as an investment good. The justification for this approach is derived from the Tobinôs Q theory which implies that even the owner occupiers incur an opportunity cost [2]

2.3 Housing Market Factors

This section looks at the factors influencing housing demand and supply.

2.3.1 Demand for housing

The factors influencing demand for housing can be broadly categorized into the following:

[2] Owner occupation means one loses out on rental income similarly; the money invested in that house could have been invested elsewhere where it could be earning income.

Demographic changes: the increase in population creates an increase in demand for housing. In Kenya the population has been rising over the years with bulk of the population increase being experienced in urban areas.

Rates of urbanization: this is closely related to population growth where the rate of urbanization increases due to natural population growth and rural-urban migration. In addition, there is inter-urban mobility as people get job transfers or expand their opportunities. Thus a high urbanization rate leads to demand pressure for housing in the urban areas.

New household formation: household formations relate to the changing demographic structure. As young people mature and move out of their parental homes, they desire to have their own homes and thus creating demand for housing. Other issues relating to household formation are divorce and separation rates and job transfers where a member of the family has to leave the dwelling unit to work in another town.

Property rights: Security of ownership leads to increasing investment which creates job opportunities for people luring more to urban centres. This creates a growing demand for housing for the laborers

Housing finance: the ability to access financing to acquire housing will determine the effective demand for housing. Where there is access to housing finance, housing subsidies, low-income banking facilities and cooperative systems, the effective demand will be higher.

Macroeconomic conditions: these conditions affect the affordability of housing. Where an economy is experiencing inflationary pressures and high cost of funds, then the demand for housing will be low.

2.3.2 Supply of housing

Market supply in the housing sector is affected by;

Availability of land: since houses are built on land, the availability of land, the related transactional cost and security of tenure influences the supply of housing.

Infrastructure: physical and social infrastructure such as roads, pavements, street lights, waste collection facilities, water and sanitation systems, transportation networks, electrification, market and commercial centers accessible to residential areas, are all important in enhancing the market to supply housing. The establishment of infrastructure is determined by the level of GDP. The higher it is the higher the taxes and hence more government income.

Building materials: the availability of building materials determines the cost of houses built which in turn determines the number of units supplied. Inflation may result in the increase of their prices. The materials must meet technical adequacy and socio-cultural demand.

Organization of the building industry: the manner in which the construction industry is structured has a direct effect in the quantity of houses supplied. Where the industry is well organized, unrestricted, and competitive, the supply of housing will be higher than in a restricted industry all other factors kept constant. Government policies including those of tax rebates and other housing incentives form part of the structure. Other policies affecting the interest rates are also influential.

Quality of the labour force: high quality of the labour force has a positive impact on the efficiency and standard of housing supply. If the same labour force is highly mobile, the construction industry will be able to access skilled and quality labour and therefore have a positive impact on supply.

2.4. The Kenyan Housing Market

The housing market is far from perfect. Infrastructure is not well established leave alone distributed. This is usually attributes to the limited resources. Building materials are expensive due to the transport and importation costs. Laborers in most cases require some training as some of them are not literate.

The role the government has played has however not been enough to avoid the housing problems that have faced the country over the years which are characterized by acute housing shortage and poor living conditions in the ever increasing informal settlements.

2.4 1 The Government and the Kenyan Housing Market

The Government of Kenya recognizes housing as a basic need and thus since independence has had an objective to facilitate provision of adequate shelter for all both in urban and rural areas (Chesang, 1991). Governmentôs role in housing has been through direct provision of houses through the National Housing Corporation, implementing the Housing Policy, housing subsidies and facilitation of access to credit from commercial banks. The next sections analyze governmentôs approach from a development paradigm angle.

2.4.2 Housing development paradigms and the Kenya policy framework

Demolitionist approach: this viewed spontaneous rise of informal settlements as an eyesore destroying the beauty of the scenery and thus the settlements needed to be demolished. This ultimately reduced the supply of housing for the urban poor.

Supportive approach: this is an approach taken by the government to support the urban poor through development based on consensus. A project such as the site and service was based on the consensus between the two parties while acknowledging the project as a measure of development. The approach relied in goodwill from both the political leadership and the communities. Kenya had its own challenges in following this approach. The Housing Policy of 1966/1967 Sessional Paper No 5 advocated for greater budgetary vote for the government to provide affordable housing.

The World Bank Approach: this approach was adopted in the 1970s. It was a modification of the supportive approach. In this approach, governments could borrow from World Bank, build low cost houses and then transfer the debtors (occupants) to commercial banks while the government re-invests the money. This approach was not feasible since it ignored the ability of the dwellers

to afford credit as well other non-monetary issues such as land tenure. In Kenya, the governmentôs policy objectives for the period 1989-1993 as stated in the development plan were to increase home ownership for low income earners, provide long term mortgage funds to the buyers and finally enhance private sectorôs capacity to plan, develop and finance low cost housing for low income households.

The objectives of the above approaches had limited success. The government objectives were inadequate since they ignored the larger housing sector only concentrating on low income stock of houses without due regard to other housing issues such as social and physical infrastructure. Besides, it is such narrow focus that occasioned the failure of government interventions to such projects as Kibera site and services project as the upper and middle class (not a target of the project) ended up edging out the poor who were targeted by the well-intended projects (Wahome, 1984). Besides, some of the objectives were wrongly addressed for instance the requirement that all new public houses should cost below K£ 1,200 in the early 1970s was found to be unrealistic (Chesang 1991). The challenges were enormous and in 1973, the Ministry of Housing and Social Services (now Ministry of Housing) had to direct the National Housing Corporation to stop lending due to high default rates and otherwise directed that ninety percent of the available government funding be used for the low cost housing projects with only 10 percent for rental schemes.

Rod-Burgess Approach: this advocated for a political structural formation that combines with the urban communities and gives them the right to build and organize their neighborhoods. It advocated for reduced conflict between communities and authorities and less reliance on capitalist approaches.

Collaborative Approach: It was developed in the 1980s. It brought together the government, non-governmental organizations, the market and the communities. The approach advocated for a comprehensive outlook of housing issues that could address the problems of market imperfections as well as addressing the problem of homelessness of the urban poor. This is evident in 1984/88 Development Plan; which illustrated that a significant portion of the undeveloped urban land was held by co-operative societies, and to promote the development of

this land, the newly formed National Co-operative Housing Union (NACHU) was to be supported in order to provide technical, financial and management assistance to both the existing and new housing co-operatives as a means of accelerating housing provision through the medium of co-operative societies. For the Civil Servants Housing, the plan noted that civil service comprises a large part of the urban labour force and a single strategy for providing it with housing is inadequate. A combination of mortgage, pool and institutional housing strategies will continue to be adopted for this target group.

The plan noted that there was need for private sector involvement was needed. It noted that enormous financial, land and management resources are held at domestic level by the private sector. The Government would come up with a strategy for mobilizing these resources and enhancing the participation of this sector in housing development through; co-operating in opening up of either private or public land urban development, thus curbing land speculation, undertaking joint ventures between approved local authorities and private developers to achieve speedy low/medium cost housing development, injecting long term money into the mortgages market to stimulate and back up increased private investment into housing, promoting the development of a secondary mortgage market in the economy, providing technical assistance to such housing agencies as co-operatives and land companies in the planning, design and building of housing and enacting the Estates Agent Bill to regulate the activities of Estate agents.

New Neo-liberal approach: More recently, the government came up with a housing policy in 2004. The government through the then Ministry in charge of housing (Ministry of Lands and Housing) formulated the National Housing Policy under the Sessional Paper No. 3 of 2004. In formulating this policy, the government acknowledged that there was a deficit in the stock of housing supplied with the then estimated demand for housing being 150,000 per annum against an estimated annual supply of 30,000 to 50,000 units. The Government through this policy committed to playing an effective role as an enabler, partner and catalyst in the housing delivery process. The focus of the government is facilitating private sector in their housing finance, production and construction roles and in enabling low and medium income households to access housing. The supply of houses is wanting. The above analysis provides a guide as to what should

be done. The government should liaise with the private sector to facilitate the establishment of more houses (New Neo-liberal approach). Through opening up of either private or public land the government more houses can be built to increase the low supply of houses (collaborative approach).

The National Housing Policy aims at:
(i) enabling the poor to access housing and basic services and infrastructure necessary for a healthy living environment in urban areas;
(ii) encouraging integrated, participatory approaches to slum upgrading including income generating activities that effectively combat poverty;
(iii) promoting and funding research on the development of low cost building materials and construction techniques;
(iv) harmonizing existing laws governing urban development and electrical power to facilitate more cost effective housing development;
(v) facilitating increased investment by the formal and informal private sector in the production of housing for low and middle income urban dwellers; and
(vi) creating a Housing Development Fund to be financed through budgetary allocations and financial support from development partners and other sources.
The policy has targets focused on issues of urban and rural housing, slum upgrading and vulnerable groups and gives solutions of how to alleviate poverty among the disadvantaged. It also addresses the issues to do with management of housing inputs such as building materials, land, finances, technology and infrastructure. The policy also covers estate management and building maintenance that ensures longevity of housing stock as well as maintaining their value, disaster management, environmental impact assessment for housing projects, human resource development and monitoring and evaluation. The policy also has in its objectives legislative and institutional framework.

2.5 Legal framework

The right to housing is embedded in the Constitution of Kenya 2010. Under the Bill of Rights Article 43(b) states that every person has the right to accessible and adequate housing, and to reasonable standards of sanitation. This makes housing a right bestowed on every citizen. Schedule four of the Constitution of Kenya 2010 stipulates that the function of county planning and development shall be devolved to the County Governments. This includes statistics, land survey and mapping, boundaries and fencing, housing and electricity and gas reticulation and energy regulation. All these elements have an effect on the housing supply at the county level since the efficiency in planning for urban growth and the restrictions or otherwise will have a bearing on whether the supply will increase or decrease.

The Housing Bill intends to put in place a Housing Authority to facilitate housing and infrastructure provision through the County Governments, National Housing Corporation, mortgage financial institutions, bank and non-bank financial institutions, housing cooperatives, developers among other actors. The Bill provides for a National Housing Development Fund from which any implementing agency stipulated in the Bill can apply for funding for public, social and rural housing. Such efforts can increase the growth of housing sector and increase the stock of houses supplied.

2.6 State and non-state actors in housing development

2.6. 1 National Housing Corporation

The National Housing Corporation is the principal implementing agency of the housing policies adopted by the government. Since its formation, National Housing Corporation has been a key player in the housing sector as it has invested heavily in housing in major towns in Kenya. The National Housing Corporation is mandated to among others: develop and manage housing estates either to supplement the capacities of the local authorities or meet the demand for houses in areas where the local authorities are not able to initiate and manage housing estates on their own; support and encourage the development of housing research; and to stimulate greater participation of the private sector in housing delivery. Even though the National Housing Corporation greatest and visible role to the citizenry is that of actual delivery of houses, this role has been far from adequate with the stock of houses constructed over the years fluctuating and

mostly declining. For instance its contribution to the economy in terms of number of houses in the year 1984 was 2,398 units, in 1988 the units delivered declined to 229 (Statistical Abstract 1989), 15 units in 2004 and 88 units in the year 2008. The table below shows some selected years and the output of National Housing Corporation in terms of residential units to show the declining impact of the state agency.

The National Housing Corporation has often played a role in delivery of middle-income and upper income houses. The table above shows the number of completed houses from 1984 to 2000 by the NHC. For instance the houses completed in 2012 in Madaraka Estate, the rental flats in Woodley and Sadi that began in 2008, and the mortgage marionettes in Kiambu (Phase III) were all targeted at the middle and upper class groups of people. In the yester years, the National Housing Corporation played a key role in delivery of low cost houses such as the ones developed and handed over to the local authorities. However, the administration of the partnerships between the corporation and various local authorities became unmanageable thereby reducing the role the National Housing Corporation played in delivery of low cost houses. From table 1 between the year 2008 and 2010, the administration of the partnerships between the corporation and various local authorities became unmanageable thereby reducing the role the National Housing Corporation played in delivery of low cost houses.

2.6. 2 Central Government's expenditure on housing

The government has increased its expenditure on housing related activities in the recent years. For instance the approved expenditure in the 2004/2005 fiscal year was KES 542.64 million which has since increased considerably to KES 3.13 Billion in 2007/2008 fiscal year. Such funds are often used in production of new houses for the civil servants under the Civil Servants Housing Scheme, promotion of appropriate building materials and techniques, promotion of housing policy issues as well as investment in research and development, human capacity building and upgrading of informal settlements. However, it is notable that only a proportion of allocated expenditure is often spent (see Table 1).

2.6. 3 Financial Intermediaries

Besides the Government, the private sector has also played a key role in housing supply. Key to this is the access to credit. Kenya has various financial intermediaries that facilitate the access to credit. They range from commercial banks, microfinance institutions, housing cooperatives, building societies and other mortgage lending institutions. To begin with is the Housing Finance Company of Kenya.

2.7. 4 Housing Finance Company of Kenya (HFCK)

Housing Finance Company of Kenya was incorporated in 1965 as public company mandated with the role of provision of mortgage credit to the citizen who wished to borrow credit for construction of houses. Housing Finance Company of Kenya in its incorporation was a partnership between the Government of Kenya and Commonwealth Development Corporation (CDC). In its early days up to the 1990ôs, HFCK was the largest of its kind with large amount of funds from the Commonwealth Development Corporation and the Government of Kenya. One of the largest projects that were associated with Housing Finance Company of Kenya was its involvement in the lower-middle housing estates in Buru-Buru Nairobi (Chesang 1991). It also offered loans up to 90 percent of the cost which greatly improved the chances of lower levels of income groups in accessing housing.

In the present day, Housing Finance Company of Kenya continues to offer mortgages to borrowers as well as partnering with developers in improving the housing supply. The mortgage interest rates and the cost of construction however still hinder the accessibility of these mortgages by the larger population which cannot qualify to get the loans.

2.6. 5 Commercial Banks

Commercial banks have played a crucial part in giving loans to developers who construct houses for sale as well as individuals who want to develop houses for owner occupation. Kenya Commercial Bank (KCB) is one of the oldest and biggest banks in Kenya and its role can be remembered for some of the products it offered in the 1980ôs such as the mortgage loans it offered to farmers as long as they contributed 25% of the cost in order to encourage rural

housing development. Over the years, a large number of industry players have come on board thus widening the access to credit. However, some institutions have high interest rates making the products unaffordable. The conditions of lending are also stiff in some commercial banks making borrowing almost impossible.

2.6. 6 Housing Cooperatives

Housing Cooperatives were often regarded as more of an informal way of raising funds for housing (Chesang 1991). Housing cooperatives are common among the low income groups and their utilization has been growing over the years. Organizations such as Shelter Forum (an NGO mainly funded by Swedish Development Agency), Ministry of Housing through the Kenya Slum Upgrading Programme and other community based organizations have devoted resources towards the formation of housing cooperatives in the informal settlements in order to enhance home ownership and improvements among NHC and tenants.

2.6. 7 Building Societies

In the present day, there are no building societies in existence since those that existed in the past either transformed into fully fledged commercial banks or were wound up. Examples include East Africa Building Society (now Eco Bank) which when as a building society invested in the Akiba Housing Estate in Nairobi. It catered for middle income earners and rarely granted loans for more than 70 percent of the cost (Chesang 1991). Others include Family Finance Building Society (now Family Bank) and Equity Building Society (now Equity Bank).

2.6. 8 Micro-finance institutions and deposit taking microfinance institutions

Microfinance institutions have played a role in enhancing construction of new houses in two ways: encouraging savings and using these savings to loan their borrowers at a relatively low rate.

2.6. 9 Pension funds

According to data from Old Mutual website (2012), pension schemes in Kenya amounts to approximately KES 200Billion. The pension funds in Kenya are operated by the National Social

Security Fund which caters for all statutory contributions, sponsor-led schemes and individual retirement benefit schemes. These pension funds have invested in real estate among other choices in their investment portfolio. An example is the National Social Security Fund which has put up housing estates in the city such as the Nyayo High Rise and

2.6. 10 Government parastatals

Government parastatals have contributed positively to housing development through provision of houses to their employees. Parastatals such as University of Nairobi, Kenya Ports Authority have built houses to accommodate their employees. In addition to provision of staff quarters, some public institutions such as Jomo Kenyatta University of Agriculture and Technology have also facilitated their employees to purchase land for housing development. They also negotiate with commercial banks for lower interest rates for the employees.

2.8 Housing Market Empirical literature: towards an empirical model

Bower (1965) conducted a study of the rate of commercial construction in the United States. According to him, since commercial construction is an investment flow, the rate of construction in buildings is best explained by means of two factors that determine prospective profitability of the investment. Bower modified the investment function such that investment in housing is a function of vacancy rate, construction costs, the stock of old and new space and rent which is a lagged average price of old and new space. He tested the model in both cross-sectional and time series data for the same country. The results indicated that the average rent and vacancy rates are directly and inversely related to investment in housing respectively. However, the sign (whether negative or positive in the function) of construction cost and capital cost took either a positive or negative signs in cross-sectional analysis but with time series analysis they have negative and positive signs respectively. He found that the fitted equations were statistically significant.

Years later Adala (1978) studied the housing market in Nairobi and noted that the greatest barrier to new residential construction is the availability of credit finance at levels that can significantly alter the stock of housing and at prices that will promote the kind and form of long term investment required in housing. She proposed that improved access to mortgage facilities by low income in order to increase the supply of low income housing. She suggested that housing

finance, insurance, pension schemes, and commercial banks have a big role to play in delivery of housing stock.

Wahome (1984) conducted a study on the reason why the ósite and servicesô project which are meant to benefit the slum dwellers but end up benefitting the middle and upper income groups. The aim of the study was to identify the factors inhibiting the housing conditions upgrading in the site and services. He used a random sample of 200 heads of households in two parts of the Kibera slum. He found out that the target population had not benefited from the project because of economic reasons such as lack of finance to compete with the middle and upper income groups. He concluded that such projects were not the ideal answer to the housing problems associated with low income groups and recommended that housing subsidies be limited to only the poorest so that resources can be released to cater for more housing units

.

Chesang (1991) studied the determinants of private investment in urban housing in Kenya. He estimated the investment function for the housing sector and how investors respond to changes in income, construction costs, credit, housing stock and investment lagged one year using time series data. The results showed that Kenyaôs housing investors are highly responsive to income changes, credit and construction costs.

The above findings were consistent with those of Mitullah (1993) who studied the important variables in state policy and urban planning in Kenya with a bias to low income housing. The findings from a middle-income estate in Nairobi showed that 92.9 percent of the landlords were married with children while the rest was the proportion of single landlords. In case of the tenants, 75.1 percent were married and educational background was mainly A-levels and University In that study, landlords were found to be older than the tenants and had less years of education. This contrasted with the findings of low income households who were found to have no education (23.5 percent), basic primary education (63 percent) or secondary education (25 percent) with only 2.7 percent having completed post-secondary or higher education

In another case Raymond, Tse, and Ganesan (1998) conducted an empirical study of Hong Kongôs market to examine how matching housing supply and demand. The objective of the study was to analyze the determinants of house prices and investment demand for residential. According to the study, buying a house was viewed as a favorable investment for hedging against inflation. If new construction were based mainly on housing demand, house prices will be very volatile due to the fluctuation of investment demand. Conversely, if the construction were based on investment demand, housing vacancy would be very volatile.

Further, Muthaka (2001) assessed the housing needs of Nairobi residents and the extent to which individual characteristics contribute to the choice of housing. His study took two dimensions namely quality of building materials and occupancy rate as a measure of congestion. A discrete model of housing adequacy was estimated separately for the household size and building materials in order to determine the likelihood of an individual with a set of characteristics living in an adequate housing unit. The results indicated that the following characteristics had a significant effect on the choice of housing: education level, sex and the number of years one has stayed in Nairobi. Other factors such as age generations, marital status and sector of employment (whether formal or informal) showed different effects on the choice of housing for the different measures of housing adequacy.

In addition, Serrano (2004) also studied the impact of labour uncertainty on home ownership in Spain and Germany. Using a simple theoretical formula that highlighted the role of risk perceptions and attitudes towards risk in the housing tenure decision, he carried out tests using income uncertainty measure and found out that households facing increasing income uncertainty prefer to rent while those with a less uncertainty have a preference for home ownership. The study concluded that income uncertainty analysis in the housing tenure decision has important implication in designing private mortgage products.

In addition, Cocco (2005) conducted an analysis of the lifecycle optimization problem of home owners to explain the variation in the composition of wealth. He found that there was a crowding out effect whereby the risk element in housing prices crowds out stock holdings. This study was

based on the perceptions that the housing price functions are unpredictable and that the stock of houses is an illiquid investment and thus housing as an investment is risky.

In contrast, Sinai and Souleles (2005) proposed a different view of home ownership arguing that investment in housing is not as risky. They argued that the alternative to home ownership which is renting was even more risky. Given only two choices that is to rent or to own a home; they argued that households that choose to rent must pay the rent on spot market and thus expose themselves to fluctuations in rent, which in most cases is usually heading upwards. Home ownership on the other hand often hedges against such housing price fluctuations. Their empirical analysis concluded that in places where the local rent prices fluctuate highly, the probability of home ownership is high.

Into the bargain, Lauridsen and Skak (2007) studied the determinants of home ownership of Danish Homes. They used the characteristics of the home owners such as civil and social status and magnitude of income for the homeôs income earners in their study and analyzed these characteristics with respect to their effect on the tenure status that is whether owned or rented. Their analysis showed that these characteristics actually influence the tenure status of a household.

More to that Halicioglu (2007) did a study on estimation of an aggregate private demand function for Turkey using an Autoregressive Distributed Lag. The results indicated that the real income, housing prices and urbanization level were the most significant determinants of housing demand in order of priority. The stability tests used indicate that the housing demand function represented a stable long run relationship between independent and dependent variables. In connection, Belayet and Latif (2007) studied the determinants of housing price volatility in Canada. They used the Generalized Autoregressive Conditional Heteroskedastic (GARCH) and Vector Autoregressive models to analyze the time variations in housing price volatility and how they interact with some fundamental macroeconomic variables. The study concluded that housing price volatility is significantly affected by the Gross Domestic Product (GPD) growth rate, housing price appreciation and the volatility itself.

Additionally, Grimes and Aitken (2006) analyzed two inter-related features of regional housing markets namely determinants of new housing supply, and the impact of supply responsiveness on price dynamics. They demonstrated that a suitably specified q-theory model (including residential land values as well as construction costs) explains intended housing effects. Grimes and Aitken examined the interaction of supply responsiveness and price adjustment following demand shocks, using a dataset covering 53 quarters across 73 regions of New Zealand. The results showed that regions with high supply responsiveness had relatively small price spikes following demand shocks, consistent with a rational response that limits house price jumps in regions with strong supply responses.

Ortalo-Magn´e and Prat, (2007) studied the political economics of housing supply with respect to homeowners, workers, and voters. The model generated an inefficiently low supply of housing in equilibrium. Voters support artiýcial supply restrictions in order to protect their investment. In turn, they invest because they expect the value of their housing investment to be protected by urban growth restrictions. Under plausible assumptions, there is no new construction, which leads to the most extreme form of size persistence. The opposite occurs in a city that starts from a relatively high housing supply and thus low housing costs relative to income.

Moreover, Murphy (2008) created a dynamic micro-econometric model of housing supply to study the micro-foundations of housing markets, particularly the timing of housing supply responses to demand shocks. He argued that housing markets often exhibit a high degree of volatility in prices and quantities, with signiýcant economic consequences for both homeowners and the construction sector. In the model, parcel owners choose the optimal time and nature of construction taking into account their expectations about future prices and costs. While retaining computational tractability, the model included space, allowed proýts to vary, and incorporated a broader deýnition of costs. Estimates of the model, using a rich data set on individual land parcel owners in the San Francisco Bay indicated that changes in the value of the right-to-build are the primary cause of house price appreciation and that the demographic characteristics of existing residents are determinants of the cost environment. The study found out that þuctuations in broadly deýned cost variables, which include regulation costs, determine when and where

building occurs. A counterfactual simulation suggested that without pro-cyclical costs and forward looking behavior, construction volatility would be substantially greater

.

Furthermore, Ooi and Le (2011) used econometric models to trace the price response of existing houses to the quantity of new units launched by homebuilders in Singapore between 1996 and 2009. Contrary to the "competition" hypothesis prediction of a negative reaction, they found that marginal supply granger-cause existing house prices in a positive manner. The effect is robust to the inclusion of exogenous demand factors as well as price interaction in the primary (new houses) and secondary (existing houses) market segments. The ñcontagionò effect is consistent with the hypothesis that developers, due to their ability to predict the market, are price leaders in the housing market. They also found that homebuilders exhibits ñherdingò behavior in mimicking each otherôs timing on when to market their new residential projects.

The above were supported by Song et al (2007) who studied the impact of fluctuations on labour income, housing prices and rent on the tenure and portfolio choices made by a household over the life cycle. The study demonstrated that the two hedging functions of home ownership which are to hedge against labour income risk and rent risk have a significant effect on the decision a household will make with respect to whether to own or to rent a house and the portfolio mix over the householdôs lifecycle. In his findings, Song et al (2007) argued that in instances where the labour has less correlation with the housing price, such a household is likely to be owning the home and also concluded that in areas with volatile rental prices, households find homeownership more attractive and therefore will have more wealth and income invested in home equity and less in stocks and more in bonds.

In contradiction to Chesang 1991, Mwania (2010) estimated the demand for housing in Kenya based on annual time series data for the period 1980-2009. He constructed a log-linear demand equation to model the effect of housing prices, income per capita, average lending rate, prices of other related goods and inflation on number of housing units purchased. The results showed that income per capita was the most significant variable in explaining the demand for housing in

Kenya both in the short-run and in the long-run. Additionally, the study found that the prices of other non-housing goods have a negative impact on the demand for housing.

2.8 Overview of the literature

The literature reviewed reveals several determinants of housing supply. The determinants range from macro- economic variables such as inflation and lending rates to non-economic issues. Limitations such as access to land and the transactional volumes have been addressed in the literature while geographical limitations were also studied (Saiz, 2010). Political economics and their influence on housing supply were covered by (Ortalo-Magn´e, and Prat, 2007). In addition to this, there are studies that explain the determinants of housing from the perspective of householdôs propensity to homeownership (Cocco 2005, Sinai and Souleles 2005, Lauridsen and Skak 2007, Serrano 2004).

From the literature, it is evident that many studies that attempt to explain price determination and housing supply focus on the inter-dependence of the two variables (Ooi and Le 2011, Grimes and Aitken 2006, Raymond, Tse, and Ganesan 1998) using econometric models. These studies focus on supply of housing stock and price volatility of housing and thus explain some of the determinants of price shocks and supply limitations in the housing sector. Murphy (2008) created a dynamic micro-econometric model of housing supply to study the micro-foundations of housing markets, particularly the timing of housing supply responses to demand shocks.

In Kenya, there are limited studies on supply-side of the housing sector. Adala (1978) focused on credit supply and demand for housing while Muthaka (2001) and Mwania (2010) assessed the demand for housing in Kenya. Other studies were focused on the low-cost housing such as Wahome (1984) and Mitullah (1993).

From the foregoing, it can be noted that there is limited knowledge on what affects the supply of housing in general for Kenya. While acknowledging the need to focus on low cost housing, there is a need to understand the housing sector as a whole so that the government can implement policies that can deliver the targeted objectives without being inhibited by other issues such as the ones that limited the success of site and services projects (Wahome, 1984).

CHAPTER THREE

3.0 RESEARCH METHODOLOGY, MODEL SPECIFICATION AND ESTIMATION PROCEDURE

3.1 Theoretical framework

In analyzing the determinants of housing supply, the cost of housing consumption is considered the same for the developers who develop for renting out and for those who develop or buy for owner occupation. The underlying assumption is based on the Tobinôs Q theory which implies that the home owners incur an opportunity cost for occupying that house instead of renting out, or could have invested the money elsewhere where it could be earning income. In addition to the

opportunity cost, there is depreciation to the housing stock other costs include costs of maintenance and servicing mortgages.

The model begins with the basic production function stating that the quantity supplied is a function of various inputs. The factors of production are broadly categorized in terms of land, capital, labor and entrepreneurship. For simplicity, the Cobb- Douglas function is shown below:

$Q = f(K, L)$ ---------- (i)

Where Q is Output

K capital

L is labor

Since developers are profit seeking agents, they will seek to maximize their profits by building as many houses subject to a given budget, and other non-financial restrictions. The costs for the developers include land costs borne in period, building costs (materials and labour) and financing costs (determined by the nominal interest rate). The price of the house has to be greater than the costs for the developers to supply.

Profit (Y) = price- total cost ---------- (ii)

Therefore the major constrain is the budget constraint of which the cost cannot exceed. Using the langrage multiplier can give the production function of the developer (producer)

Hs=H(P, Y) meaning housing stock (Hs) is a function of price and income. -------- (iii)

Based on similar literature (such as Mwania, 2010), the study assumes a multiplicative model of housing supply holding the assumption of housing as an investment good and that the investment is multiplicative rather than additive. In addition, the model follows Glaeser et al (2008) in introducing a time lag in income. The rationale behind introducing a time lag is the assumption that income in year t determines the investment choices in year t+1. The investment in houses will happen once a developer realizes and/or estimates future returns based on the condition today. Housing construction also takes time with an average construction period of one year.

The model is thus written as

$Hs = AP^{\delta 1} Y_{t-1}^{\delta 2}$ ---------- (iv)

Where: Hs is the stock of houses supplied in year t

A is a constant

ϐi (i=1, 2) measure the responsiveness of housing supply to changes in price, income.

Further, the model specifies a log-linear supply function a modification of the supply function proposed by Glaeser et al (2008) and the demand function used by Mwania (2010).

Thus the model is shown below:

$$\text{Log } Hs = A + ϐ_1 \log P + ϐ_2 \log Y_{t-1} \quad \text{---------- (v)}$$

From the literature, the quantity supplied is determined by availability of capital, the price of the houses, the associated cost of housing stock, the finance cost, availability of land, and building restrictions. From the literature, there are other factors such as future expectation of housing and land prices, geographical limitations and regulation in building.

From the above some economic variables can be used to estimate the supply function. Capital is a function of investment which in turn is a function of interest rates and income.

The model further assumes that the non-economic and non-quantifiable information is symmetrical in the market and therefore incorporated in the price. To this extent, transactional value of land, its availability or scarcity and the related transactional costs are assumed to be all incorporated in the price or value of the house.

From the model in (v) above some more macro-economic variables are added

$$\text{Log } H_s = A + ϐ_1 \log P + ϐ_2 \log Y_{t-1} + ϐ_3 \log r + ϐ_4 \log ´ + Ů$$

Where:

Log H_s is the Natural logarithm of quantity of housing stock supplied.

A is a constant

ϐi (i=1, 2) measure the responsiveness of housing supply to changes in price, income

log P is the Natural logarithm of the average price of the houses supplied

log Y_{t-1} is the Natural logarithm of per capita income of the previous year (t-1)

log r is the Natural logarithm of the real interest rate during year t

log ´ is the Natural logarithm of inflation in year t

Ůis the error term

3.2 Explanation of variables

The dependent variable in this study is the stock of houses supplied per annum. It is measured as the quantity of reported completed houses per annum.

The explanatory variables include:

Income: income is directly proportional to investments. Since housing in this case is considered an investment, an increase in income is likely to increase the supply of housing stock. Additionally, the government can use the high tax revenues accompanying increased housing to offer infrastructure and other housing subsidies that encourage investment. The variable used is the per capita income at constant prices.

Price: this is measured in terms of the aggregate value of the house. It is the total cost of the house including the construction cost, cost of the land and other incidental costs such approvals plus a premium. For the purpose of this study, the average value of the completed house shall be used.

Inflation: it is the sustained increase in general price levels. Inflation is usually a measure of economyôs stability. It affects the economy negatively as it erodes peopleôs income as well as reduces the purchasing power of the economic agents. The annual nominal average inflation figures have been used.

Interest rate: the prevailing interest rate is inversely related to investment. If the cost of borrowing is high, developers will shy away from borrowing and therefore less stock of houses will be completed. The annual average interest rate is used as a measure of access to credit assuming that the process of application is not stringent.

3.3 Type and Sources of Data

The data used in this study is time series data covering the period of 1981 to 2010.

All the data used is secondary data generated from the various Economic Surveys and Statistical Abstracts.

3.4 Data Analysis

Data collected was quantitative and qualitative in nature and was analyzed appropriately using descriptive statistics. The descriptive statistical tools helped the researcher to describe the data. This included frequencies, percentages, mean and standard deviations. In addition, advanced statistical techniques (inferential statistics) were also considered. SPSS (Statistical Package for Social Sciences), Ms Excel were used in analyzing the data. This generated quantitative reports which were presented through tabulations, charts and graphs. The researcher used content analysis to analyze qualitative data obtained from open ended questions. The data was then presented in a prose form.

CHAPTER FOUR

DATA ANALYSIS

4.0 Introduction

This chapter analyzes the data collected. The chapter is divided into two parts; model building and the regression analysis.

4.2 Model Building – Stepwise Regression

Stepwise Regression process to determine the independent variable(s) added to the model at each step using t-test

Table 2 Correlations

		Log Hs	Log ´	Log P	LogYt-1	log r
Pearson Correlation	Log Hs	1.000	.151	.851	.470	-.187
	Log ´	.151	1.000	.024	-.124	.097
	Log P	.851	.024	1.000	.795	-.148
	$LogY_{t-1}$	.470	-.124	.795	1.000	.004
	log r	-.187	.097	-.148	.004	1.000
Sig. (1-tailed)	Log Hs	.	.208	.000	.004	.157
	Log ´	.208	.	.450	.254	.301
	Log P	.000	.450	.	.000	.214
	LogYt-1	.004	.254	.000	.	.492
	log r	.157	.301	.214	.492	.
N	Log Hs	31	31	31	31	31
	Log ´	31	31	31	31	31
	Log P	31	31	31	31	31
	LogYt-1	31	31	31	31	31
	log r	31	31	31	31	31

The above correlation indicate that the variables with the strongest individual relationship with the dependent variable (Log Hs). In our case its Log P (0.851) and $LogY_{t-1}$ (.47). This meant that Log P was entered first in the stepwise regression.

Table 3 Model 1 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.851[a]	.725	.715	.092606884173	.725	76.303	1	29	.000
2	.917[b]	.841	.830	.071593824450	.116	20.521	1	28	.000

a. Predictors: (Constant), Log P

b. Predictors: (Constant), Log P, LogYt-1

c. Dependent Variable: Log Hs

Model 1 contains the variable Log P with a Multiple R of .725, producing an R^2 of .715, which is statistically significant at $p < .001$ (as indicated in the table of correlation). The table of correlations doesnôt show which variable will be entered second since the variable entered second must take into account its correlation to the independent variable entered first. The table of Excluded Variables was therefore used since it shows the Partial Correlation between each candidate for entry and the dependent variable.

As indicated in the in the table below, LogYt-1 has the largest Partial Correlation (-.650) and is statistically significant at $p < .001$, therefore it was entered on the next step.

Table 4: Excluded Variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	Log ´	.131[a]	1.368	.182	.250	.999	1.001	.999
	LogYt-1	-.563[a]	-4.530	.000	-.650	.368	2.719	.368
	log r	-.062[a]	-.626	.536	-.118	.978	1.022	.978
2	Log ´	.054[b]	.692	.495	.132	.944	1.059	.348
	log r	.008[b]	.096	.924	.019	.938	1.066	.345

a. Predictors in the Model: (Constant), Log P

b. Predictors in the Model: (Constant), Log P, $LogY_{t-1}$

c. Dependent Variable: Log Hs

4.3 Regression results:

From Table 4 below, the R Square is 0.842 meaning that from the model, 84.2 percent of the changes in the dependent variable (stock of houses supplied) can be explained by the predictor variables (the price of houses, Interest, Income, and Inflation). Only 15.8 percent of the changes in the number of houses supplied in year t are determined by unexplained variables and the error term.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918[a]	.842	.818	.0740508

a. Predictors: (Constant), Interest, Income, Inflation, HsePrice

Table 5 below shows the analysis of variance (ANOVA). The F calculated figure is 34.673 is greater than the critical value of 2.6802, at 95 percent confidence interval meaning that we reject the Null hypothesis that neither the value of house, income per capita, inflation nor interest rate are predictors of the number of houses supplied and accept the alternative hypothesis that the

dependent variable can be predicted by the dependent variables and therefore the model is statistically significant.

Table 5: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.761	4	.190	34.673	.000[a]
	Residual	.143	26	.005		
	Total	.903	30			

a. Predictors: (Constant), Interest, Income, Inflation, HsePrice

b. Dependent Variable: HseNo

T-statistic at 95 percent confidence interval is 2.042. From the t-figure in Table 6 below, the absolute values for price and income are greater than the critical value. We therefore reject the null hypothesis and conclude that both the predictor variables are significant predictors of the dependent variable. However, the absolute t values for inflation and interest are lower than the critical value. For this reason, we accept the null hypothesis that both inflation and interest rates are not significant determinants of the stock of houses supplied.

Table 6: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.186	.520		8.050	.000
	HsePrice	.501	.054	1.295	9.228	.000
	Income	-.847	.215	-.552	-3.947	.001
	Inflation	.030	.047	.052	.635	.531

Interest	.028	.079	.030	.355	.726

a. Dependent Variable: HseNo

From Table 6 above the estimated housing supply function is therefore:

Log H_s= 4.186+ 0.501 log P ï 0.847 log Y_{t-1} + 0.028 log r + 0.03 log ´

Where:

Log H_s is the Natural logarithm of quantity of housing stock supplied.

4.186 is a constant

log P is the Natural logarithm of the average price of the houses supplied

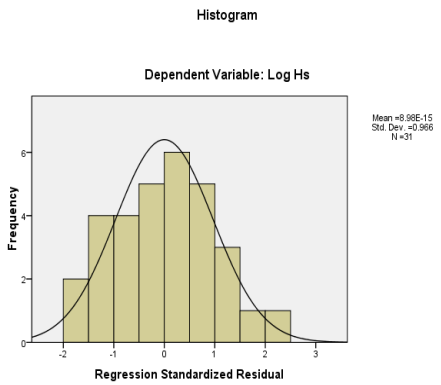
log Y_{t-1} is the Natural logarithm of per capital income of the previous year (t-1)

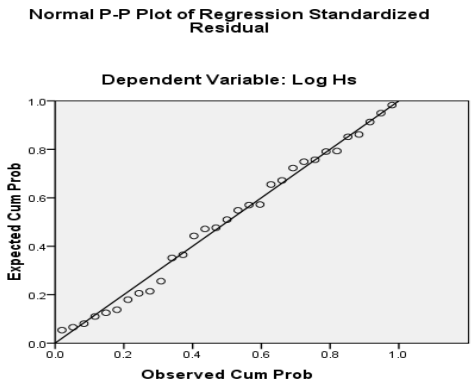
log r is the Natural logarithm of the real interest rate during year t

log ´ is the Natural logarithm of inflation in year t

4.4 Residual Tests and Diagnostic Plots

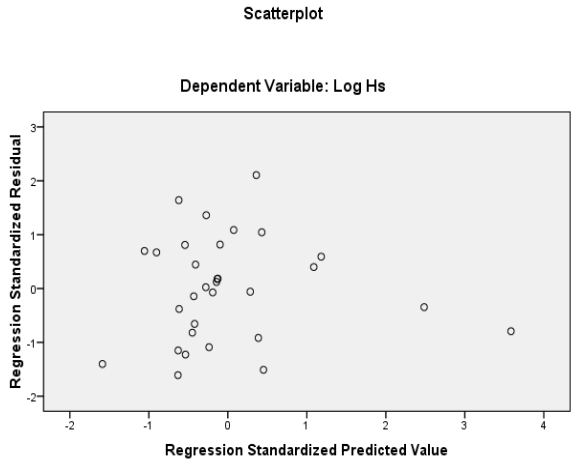
From the histogram below, the residual is the difference between the observed and model-predicted values of the dependent variable. The residual for a given variable is the observed value of the error term for that variable. This was used to check the assumption of normality of the error term. The shape of the histogram is acceptably close to the normal curve.





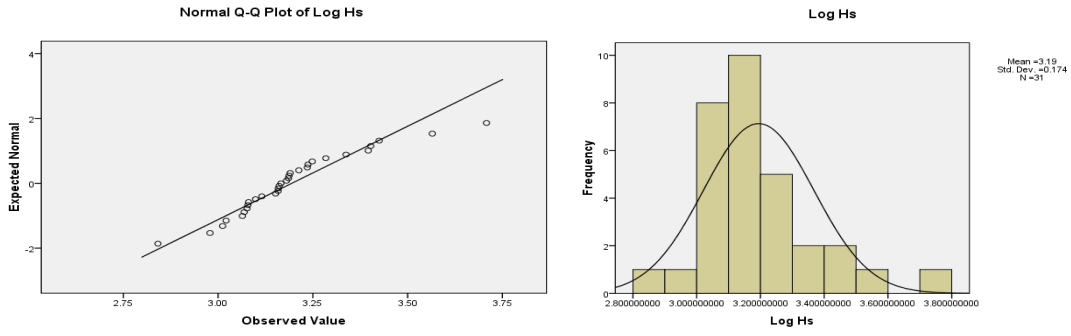
The P-P plotted residuals follow the 45-degree line as indicated above.

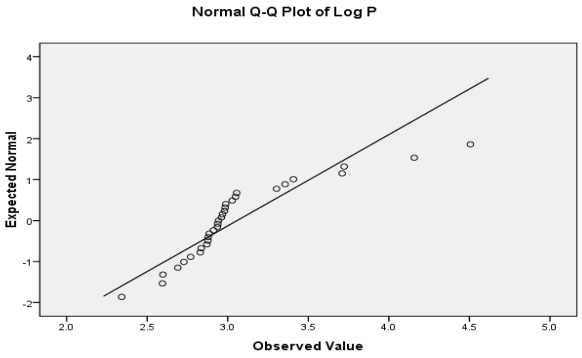
Neither the histogram nor the P-P plot indicates that the normality assumption is violated. When considering the scatterplot graph, plot of residuals by the predicted values shows that the variance of the errors increases with increasing predicted Log Hs. The scatter as is shown below:

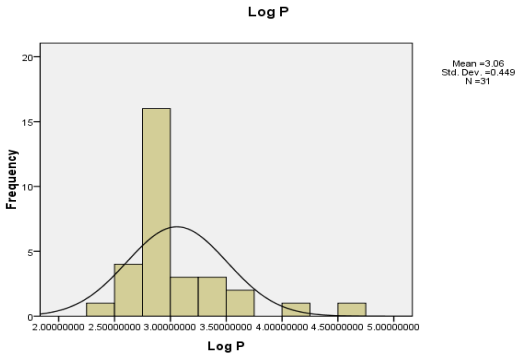


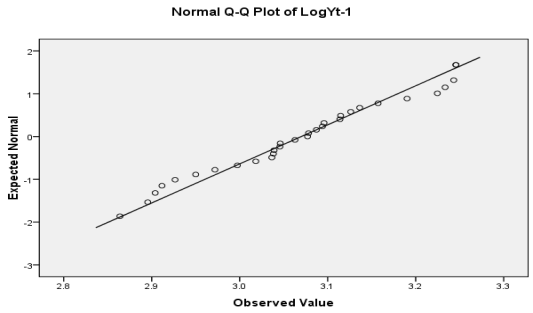
4.4.1 Normality Test

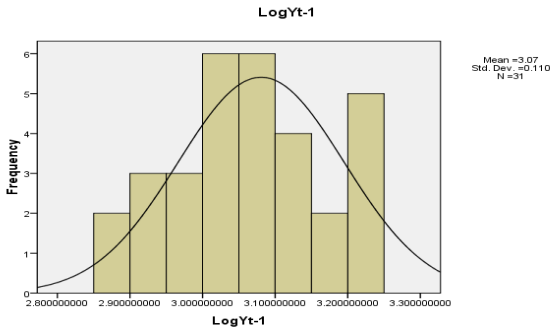
The P value represented by Sig. is used to disapprove whether the hypothesis is true or false. For Log Hs (.051), LogYt-1 (.297) the P value is greater than .05 thus these variables have a normal distribution as opposed to the other variables. This scenario was best represented by the QQ plot. For normal data the points plotted in the QQ plot should fall approximately on a straight line, indicating high positive correlation. The plots were further supported by histograms showing the respective nominal curves.

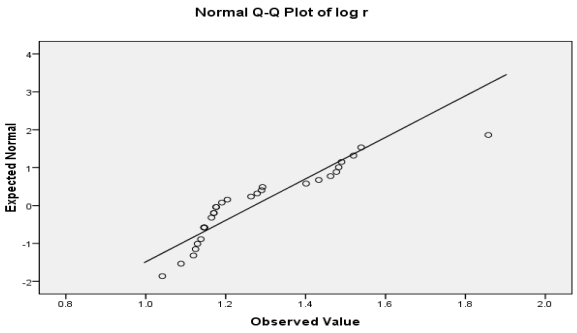


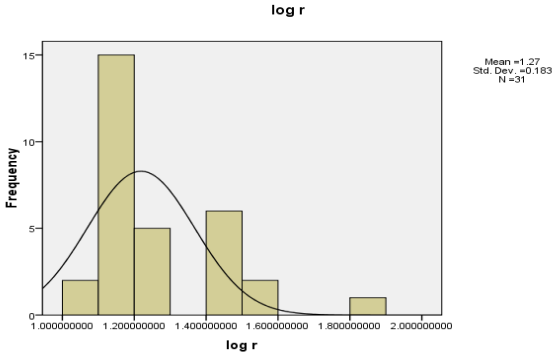

Normal Q-Q Plot of Log P
Expected Normal
Observed Value

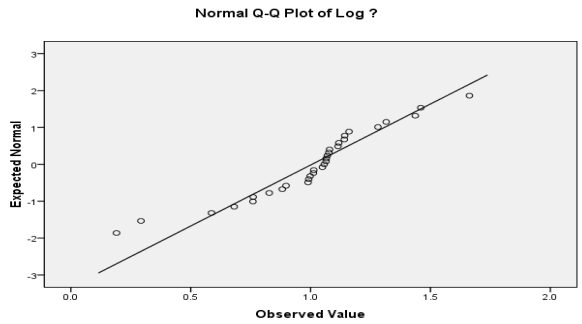

Log P
Mean =3.06
Std. Dev. =0.449
N =31
Frequency
Log P

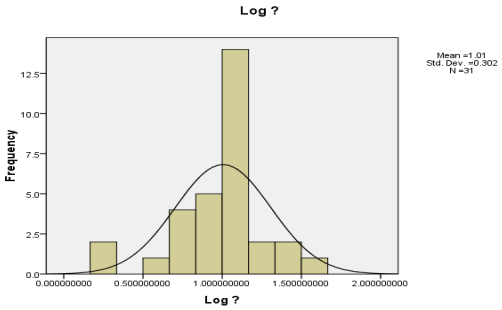

Normal Q-Q Plot of LogYt-1
Expected Normal
Observed Value


LogYt-1
Mean =3.07
Std. Dev. =0.110
N =31
Frequency
LogYt-1


Normal Q-Q Plot of log r
Expected Normal
Observed Value

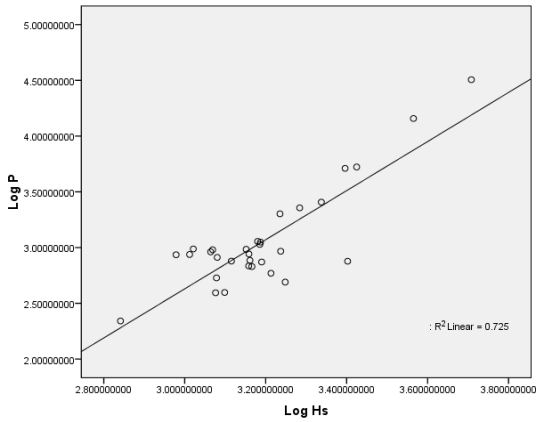

log r
Mean =1.27
Std. Dev. =0.183
N =31
Frequency
log r

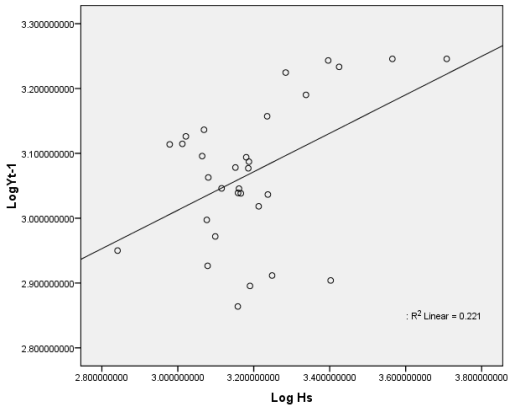




4.4.2 Linearity Test

To test for linearity, scatter plots were done for each of the independent variables against the dependent variable (Log Hs). A line of best fit was the derived and the corresponding R^2 values indicated. The results were as follows:

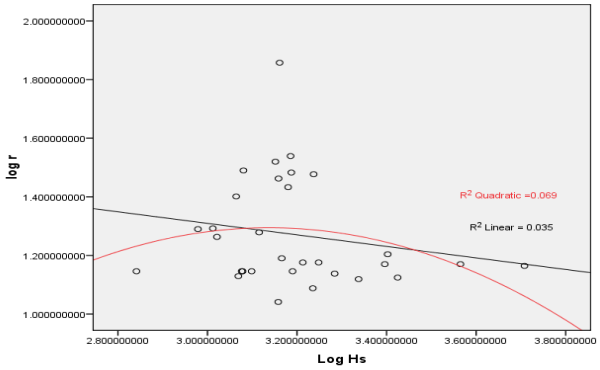


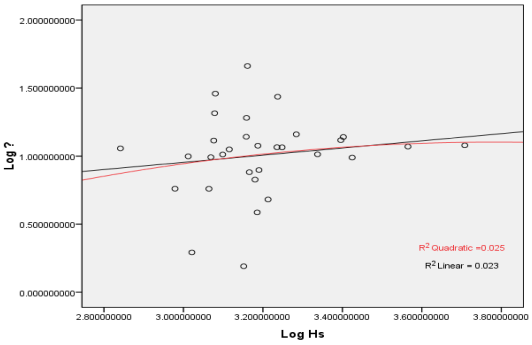


The coefficient of determination (R^2) value for Log P (0.725) shows a strong positive relationship while that of Log Yt-1 (0.221) is a weak positive linear relationship.

As for the other two variables the linear relationship was found to be too low i.e. Log r (.035) and log ´ (.025). To investigate this further a quadratic fit line (shown in red) was tested to gauge whether there would be need for a squared transformation of these variables. However the results

indicated that Log r (0.069) and Log ´ (0.025) had no linear correlation. The graphs are shown below:-





The normality and linearity tests indicate that there is a strong relationship between stock of houses supplied in a particular year, the price of houses and the average per capita income of the preceding year. There is the relationship between the dependent variable (housing stock) and inflation and interest rate is however a weak one.

4.5 Potential Modeling Problems and Solutions

4.5.1 Assumptions Violation

Violation of the assumption weakens the relationship between the independent variables and the dependent variable, and also weakens the individual relationship between the individual independent variable and the dependent variable. Furthermore, the impact on the relationship is stronger when the variable violating the assumption is the dependent variable than when the variable violating the assumption is an independent variable. The following was the test carried out to determine which assumptions were violated.

4.5.2 Multicollinearity

Multicollinearity is assessed by examining tolerance and the Variance Inflation Factor (VIF).

The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. There is no formal VIF value for determining presence of multi-collinearity. Values of VIF that exceed 10 are often regarded as indicating multi-collinearity, but in weaker models values above 2.5 may be a cause for concern. When VIF is high there is high multi-

collinearity and instability of the b and beta coefficients. The figures in the above figure indicate a VIF figure of 2.719 which is relatively low meaning that there is less multicollineality.

Table 7 Test for collinearity using VIF

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	2.188	.116		18.793	.000	1.950	2.426					
Log P	.329	.038	.851	8.735	.000	.252	.406	.851	.851	.851	1.000	1.000
2 (Constant)	4.395	.495		8.871	.000	3.380	5.410					
Log P	.502	.048	1.299	10.454	.000	.404	.600	.851	.892	.788	.368	2.719
LogYt-1	-.891	.197	-.563	-4.530	.000	-1.294	-.488	.470	-.650	-.341	.368	2.719

a. Dependent Variable: Log Hs

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

This chapter contains the summary of the study findings, the conclusions drawn and policy recommendations. It also lists the limitations of the study as well as indicating the areas of further research.

5.1 Summary of the results

The objective of this study was to analyze the factors that determine housing supply in Kenya with a bias towards residential housing in urban areas over a period of 30 years from 1981 to 2010. The study seeks to establish the responsiveness of housing supply to the various determinants.

The study used multiple linear regression to estimate a housing supply function. The estimated supply function is

Log H_s= 4.186+ 0.501 log P ï 0.847 log Y_{t-1} + 0.028 log r + 0.03 log ´

From the function above, the constant is a positive non-zero digit. This means that with no changes in any if the explanatory variables, the stock of houses supplied is positive.

The slope of the function with respect to price of the house is positive meaning that as the price increases, the stock of houses supplied in a year will increase. This is consistent with the laws of supply and demand which state that as the price increases the quantity of goods supplied will increase. The variable was also statistically significant which means it can be used as a policy tool to increase the housing supply in Kenya.

The slope of income of the previous year is negative and the variable is also statistically significant in the model. This means that as income increases the stock of houses declines. This could be explained by the fact that the model used per capita income, which is the average income for the Kenyan citizens. However, the income distribution in Kenya is skewed and therefore the income increase could as well be skewed towards home owners who may not be

interested in putting up new houses but rather to invest in other alternatives such as bonds. Additionally, majority of Kenyan population being low income earners may not afford to buy or build houses with their small increases in disposable incomes. Finally the inverse relationship could be explained by the sector perceptions which make real estate to be a likely choice of investment. People may choose to buy land for speculative purposes without the intention to develop and once they sell they buy consumable investments such as cars and electronics. The same could be the trend with developers who sell property and invest the proceeds from sale in other sectors.

The slope of interest rate is positive but the variable is statistically insignificant. This could be explained by the fact that most developers choose to build using their own savings rather than borrow or they do not mind the interest rate as they will recover by passing on the cost of funds to home buyers.

Inflation also has a positive slope but is statistically insignificant in the model. This can probably be explained by future expectations in the real estate where the value of a property is always expected to appreciate and therefore as prices increase, people believe they will not decrease but will continue to increase indefinitely. However the purchase power may limit the ability to buy and therefore making the variable insignificant.

The above phenomenon of two macroeconomic variables insignificant in the model negates the basic economic principles that relates to them. The ultimate causal effect of high interest rates and escalating inflation is high prices of housing. This erodes purchasing power of both developers and home buyers as the price of construction materials rises, labour prices increases and more resources get employed in into the housing sector. In ordinary economics, this is supposed lead to a decline in housing stock. However, this does not occur in the model. The explanation can be based on two schools of thought on the occurrence of housing bubbles.

The first school of thought to housing bubbles is that associated with pro-Keynesian economists and proponents of behavior sciences share the beliefs that psychological factors plays key role in

housing bubbles. Case and Shiller (2003) suggest that a bubble ñreferred to a situation in which excessive public expectations of future prices increases cause prices to be temporarily elevatedò. The assumption given by Case and Shiller is that houses are bought by individuals only as investments and investors are likely to speculate as they express their expectations. For this reason, home buyers buy not because they are happy to own a home but because they are speculating about future prices. According to Case and Shiller (2003) buyers who in normal circumstances would not buy a particular unit because it is costly will be tempted to buy for the simple reason that the price of the unit will go high in future. There is therefore a motivation to buy now at the high price rather than wait until the prices have risen beyond your reach. These clients often try to justify the purchase with the notion that the risk of prices falling is very small. Based on this thought, it is argued that Case and Shiller suggest that rapid price increases are not sufficient evidence of the existence of a bubble. Rather, expectations are more likely to have led to higher prices and thus are a predictor of future behavior of the housing market. In summary, during the bubble period in which housing prices have been rising substantially, a different set of factors should influence housing prices.

The second school of thought is the Austrian School associated with among others and Austrian economist Frank Shostak, who defined a bubble as any activity that ñsprings upò from loose monetary policies as a result of this pumping, a misallocation of reasons develops whereby non-productive activities increase relative to productive (Thorton 2004). According to this school, bubbles are caused by real factors and market psychology, which are influenced by business cycles, in an economy. These cycles can be easily regulated by the government using monetary policies.

The Austrian School of thought argues that once the government releases money through expansionary monetary policies, the money will be channeled to one particular sector and remains unavailable to the other sectors of the economy. In this case, the resources will be allocated to the housing sector only causing a boom in the construction industry. According to this school of thought, the boom start with the price of existing housing stock going up, then creating demand for construction of more housing stock and thus raising the prices of

construction materials and labour. Due to the high returns in the housing sector, resources will tend to be allocated to the sector including labour.

5.2 Conclusions and policy recommendations

From the findings, the price of housing is the most positive significant factor in determining the number of houses delivered in a period. As prices become favorable for the producers, the number increases. However, this has to be met by equal demand for the houses constructed. The research has indicated that increased per capita income does not result into an increase in houses and therefore the ability to build may limit the willingness to do so.

On the basis of these findings, one can recommend that the government needs to find ways of reducing the cost of construction. This will in turn lower the price of houses while maintaining a reasonable margin of profit to the developers. The lower prices and lower cost of construction can encourage the low income earners saving for their houses in financial intermediaries or by short term investments to construct or to buy and create demand for more. This process will eventually lead to increased stock of houses.

Inflation and interest rates can be part of the macro-economic stabilization measures that create an enabling environment for investors which in turn is reflected in the price of housing.

5.3 Limitations of study

The study assumed that the value of the stock of houses could be used as a proxy of the price. However, the price of the houses is sometimes distorted relative to the cost of construction. In considering the investment function of housing, the study failed to take into account substitute investments such as bonds. Finally, the study ignored qualitative factors such as ease of building approvals, availability and transferability of land among others.

5.4 Areas of further study

This study focused on the supply side of the housing sector as whole; aggregated in terms of low-income, middle-class and high income housing. It would be important for future studies to focus on sectorial issues affecting housing supply in the various classes. In addition it would be

important to study housing delivery in terms of the types of houses constructed for example flats, stand-alone bungalows, studio apartments among others.

It is also important to study other factors affecting housing delivery for instance why the number of approvals is significantly less than the completions even after factoring time lags.

Finally, future studies may be undertaken to study the impact of physical and social infrastructure on housing delivery in order to guide the government on areas of fiscal expenditure; that is whether to invest in infrastructure exclusively and leave the private sector to deliver actual houses, or whether to engage in both infrastructure and building houses.

REFERENCES

Aaron H.J (1972). Shelter and Subsidies: Who Benefits from Federal Housing Subsidies? Books Institute, Washington DC.

Adala P.A. (1978). An Economic Study of the Urban Housing in Kenya. University of Nairobi

Belayet and Latif (2007) Determinants of Housing Price Volatility in Canada: A Dynamic Analysis. Journal of Real Estate Finance and Economics

Bower L.J (1965). Investment in Commercial Construction. Review of Economics and Statistics.

Case, Karl, and Shiller, Robert (2003). Is there a Bubble in the Housing market? Brookings Papers on Economic Activity, Vol. 2003, No. 2. The Brookings Institution.

Chesang C.B (1991) Determinants of Private Investment in Urban Housing in Kenya. University of Nairobi.

Cocco, J. (2005). Hedging House Price Risk with Incomplete Markets. London Business School.

DiPasquale, D. 1999. Why don't we know more about housing supply?, Journal of Real Estate Economics, 18:1, pp. 9-23.

DiPasquale, D. and Wheaton .C. 1994. Housing Market Dynamics and the Future of Housing Prices, Journal of Urban Economics, 35:1

Egebo and Lienert (1998) Modeling Housing Investment for Seven Major OECD Countries, Working Paper No. 6, Department of Economics and Statistics, Organization for Economic Co-operation and Development.

Glaeser, Edward L., Gyourko, Joseph, and Saiz,Albert. 2008. Housing Supply and Housing Bubbles. Journal of Urban Economics 64(2): 198-217.

Grimes, A., and Aitken A. (2006) Housing Supply and Price Adjustment. Motu Working Paper 06-01, Motu Economic and Public Policy Research

Halicioglu (2007). The Demand for New Housing in Turkey: An Application of ARDL Model. Global Business and Economic Review 9 (1), p62-74

Lauridsen J. and Skak M. (2007) Determinants of homeownership in Denmark, Discussion Papers on Business and Economics No. 2/2007, University of Southern Denmark

Mayer, C.J. and Somerville C.T. 1996. "Regional housing supply and credit constraints," New England Economic Review, Nov, pp. 39-51.

Mayer, C.J. and Somerville C.T. 2000a. "Land use regulation and new construction," Regional Science and Urban Economics, 30, pp. 639-645.

Mayer, C.J. and Somerville C.T. 2000b. "Residential Construction: Using the urban growth model to estimate housing supply," Journal of Urban Economics, 48:1, pp. 85

Mitullar W.V (1993), State Policy and Urban Housing in Kenya: The Case of Low-Income Housing in Nairobi. University of New York.

Murphy, A. (2008). A Dynamic Model of Housing Supply. Olin Business School, Washington University, St. Louis.

Muthaka D.I. (2001) Housing Needs Assessment: A Case Study of Nairobi. University of Nairobi.

Ooi J T. and Le TT. (2011) New Supply and Price Dynamics in the Housing Market, IRES Working Paper Series, National University of Singapore

Ortalo-Magn´e, Fran¸cois and Prat, Andrea (2007) The Political Economy of Housing Supply: Homeowners, Workers, and Voters. Discussion Paper No. TE/2007/512, London School of Economics and Political Science, London WC2A 2A, January 2007

Raymond Y.C., Tse, C.W., and Ganesan S. (1998) Matching Housing Supply and Demand: An Empirical Study of Hong Kongôs Market. Department of Building and Real Estate, Hong Kong Polytechnic University, Hong Kong.

Republic of Kenya (2004). National Housing Policy, Sessional Paper No 3, 2004. Government Printer.

Republic of Kenya (1983-2010) Economic Surveys. Government Printer

Republic of Kenya (1983-2010) Statistical Abstracts. Government Printer

Saiz Albert (2010) The Geographic Determinants of Housing Supply. Quarterly Journal of Economics the Quarterly Journal of Economics (2010) 125 (3): 1253-1296. Retrieved from http://qje.oxfordjournals.org/content/125/3/1253

Serrano (2004) Labour Income Uncertainty, Risk Aversion and Home Ownership. National

University of Ireland, Discussion Paper No. 1008.

Sinai T. and Souleles N.S. (2005). "Owner-occupied housing as a hedge against rent risk," Working Papers 05-10, Federal Reserve Bank of Philadelphia.

Song J., Wang E., Zhang W., Peng, P. (2007) Housing Suburbanization and Employment Spatial Mismatch in Beijing, Department of Geography, Beijing Normal University, Beijing.

Mwania P M. (2010). Residential Housing Demand in Kenya. School of Economics, University of Nairobi.

Wahome G.J. (1984). An Economic Evaluation of Kibera Sites and Services Project. University of Nairobi

APPENDICES

Appendix I

Data used in the model

year	houses No	Per capita Income	inflation	interest rate	value
1980	1439	665.91	13.87	11	684.2
1981	1549	730.91	7.9	14	742.4
1982	2526	786.12	13.82	16	754.2
1983	1771	801.57	11.6	15	490.2
1984	1198	815.83	20.67	14	534.6
1985	694	844.36	11.4	14	219.8
1986	1255	891.31	10.28	14	396
1987	1192	937.25	13.01	14	393.2
1988	1633	993.88	4.8	15	588.2
1989	1465	1042.98	7.62	15.5	675.8
1990	1304	1092.2	11.2	19	756.2
1991	1441	1111.73	19.1	29	875.8
1992	1726	1094.09	27.33	30	927.6
1993	1449	1087.73	45.98	72	767.6
1994	1203	1110.77	28.81	30.9	816.2
1995	1418	1155.57	1.55	33.1	964.4
1996	1533	1197.3	3.86	34.6	1066.4
1997	1539	1194.1	11.92	30.4	1118
1998	1514	1222.19	6.72	27.1	1135.2

1999	1159	1241.61	5.75	25.19	915.2
2000	1028	1246.84	9.96	19.6	867.31
2001	952	1302.19	5.76	19.49	862.4
2002	1050	1299.76	1.96	18.34	972.4
2003	1172	1337.21	9.82	13.47	956.08
2004	1719	1368.96	11.62	12.25	2008.6
2005	2175	1436.11	10.31	13.16	2556.3
2006	1923	1549.59	14.46	13.74	2271.17
2007	2659	1677.37	9.76	13.32	5281
2008	2489	1711.63	13.1	14.8	5133.9
2009	3673	1750.82	11.75	14.8	14373.8
2010	5105	1760.67	12.65	14.6	32064.5

Appendix II: share of house production between public and private

year	public	private	Total
1981	83	1466	1549
1982	443	2083	2526
1983	790	981	1771
1984	552	646	1198
1985	116	578	694
1986	184	1071	1255
1987	150	1042	1192
1988	167	1466	1633
1989	169	1296	1465
1990	156	1148	1304
1991	177	1264	1441
1992	167	1559	1726

1993	144	1305	1449
1994	141	1062	1203
1995	129	1289	1418
1996	99	1434	1533
1997	90	1449	1539
1998	68	1446	1514
1999	46	1113	1159
2000	11	1017	1028
2001	11	941	952
2002	10	1040	1050
2003	30	1142	1172
2004	15	1704	1719
2005	360	1815	2175
2006	20	1903	1923
2007	309	2350	2659
2008	88	2401	2489
2009	116	3557	3673
2010	390	4715	5105

Appendix III

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Log Hs	31	100.0%	0	.0%	31	100.0%
Log P	31	100.0%	0	.0%	31	100.0%
LogYt-1	31	100.0%	0	.0%	31	100.0%
log r	31	100.0%	0	.0%	31	100.0%

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Log Hs	31	100.0%	0	.0%	31	100.0%
Log P	31	100.0%	0	.0%	31	100.0%
LogYt-1	31	100.0%	0	.0%	31	100.0%
log r	31	100.0%	0	.0%	31	100.0%
Log	31	100.0%	0	.0%	31	100.0%

Appendix IV

Descriptives

			Statistic	Std. Error
Log Hs	Mean		3.19433961916E0	.031161811870
	95% Confidence Interval for Mean	Lower Bound	3.13069870909E0	
		Upper Bound	3.25798052923E0	
	5% Trimmed Mean		3.18552548911E0	
	Median		3.16583762500E0	
	Variance		.030	
	Std. Deviation		.173501625609	
	Minimum		2.841359470	
	Maximum		3.707995746	
	Range		.866636276	
	Interquartile Range		.169761743	
	Skewness		.983	.421

	Kurtosis		1.899	.821
Log P	Mean		3.0581828292E0	8.05985507799E-2
	95% Confidence Interval for Mean	Lower Bound	2.8935786289E0	
		Upper Bound	3.2227870295E0	
	5% Trimmed Mean		3.0194234314E0	
	Median		2.9424049410E0	
	Variance		.201	
	Std. Deviation		4.48753738728E-1	
	Minimum		2.34202769	
	Maximum		4.50602447	
	Range		2.16399678	
	Interquartile Range		.21988931	
	Skewness		1.690	.421
	Kurtosis		3.362	.821
LogYt-1	Mean		3.07001802168E0	.019675485037
	95% Confidence Interval for Mean	Lower Bound	3.02983532052E0	
		Upper Bound	3.11020072283E0	
	5% Trimmed Mean		3.07108871179E0	
	Median		3.07704069800E0	
	Variance		.012	
	Std. Deviation		.109548464411	
	Minimum		2.863863904	
	Maximum		3.245677964	

	Range	.381814060	
	Interquartile Range	.139056808	
	Skewness	-.047	.421
	Kurtosis	-.701	.821
log r	Mean	1.27128387377E0	.032802141755
	95% Confidence Interval for Mean Lower Bound	1.20429296316E0	
	Upper Bound	1.33827478439E0	
	5% Trimmed Mean	1.25684975637E0	
	Median	1.17609125900E0	
	Variance	.033	
	Std. Deviation	.182634595890	
	Minimum	1.041392685	
	Maximum	1.857332496	
	Range	.815939811	
	Interquartile Range	.286841255	
	Skewness	1.357	.421
	Kurtosis	1.899	.821
Log ´	Mean	1.00558838219E0	.054285070654
	95% Confidence Interval for Mean Lower Bound	8.94723477609E-1	
	Upper Bound	1.11645328678E0	
	5% Trimmed Mean	1.01637453592E0	
	Median	1.05690485100E0	
	Variance	.091	
	Std. Deviation	.302246481820	

	Minimum	.190331698	
	Maximum	1.662568967	
	Range	1.472237269	
	Interquartile Range	.258553072	
	Skewness	-.684	.421
	Kurtosis	1.706	.821

Appendix V: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Log Hs	.155	31	.056	.932	31	.051
Log P	.277	31	.000	.825	31	.000
LogYt-1	.090	31	.200*	.960	31	.297
log r	.224	31	.000	.843	31	.000
Log ´	.188	31	.007	.932	31	.049

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.