DETERMINANTS OF CAPITAL FORMATION IN KENYA'S HOUSING SECTOR

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DECLARATION

I declare that this paper is my original work which has not been submitted to any University for award of any degree:

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Signature …… Date……

This paper has been submitted for the award of a degree of Masters of Arts in Economic Policy Management with my approval as a university supervisor:

Dr. Awiti Japheth

Signature …… date……

DEDICATION

This paper is dedicated to my family; Rita my dear wife, Rhenne and Gabby our lovely daughters for the support and standing my absence during the study period.

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First and foremost, I thank God Almighty for the gift of life, good health and sound mind throughout the entire study period.

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ACRONYMS

AIC	Akaike Information Criteria
CBK	Central Bank of Kenya
CBS	Central Bureau of statistics
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GoK	Government of Kenya
ICESCR	International Covenant on Economic, Social and Cultural Rights
IDP	Internally Displaced Person
KNBS	Kenya National Bureau of statistics
KES	Kenya Shillings
NGO	Non-Governmental Organizations
NHC	National Housing Corporation
No	Number
SBIC	Schwarz's Bayesian information Criteria
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNHABITAT	United Nations Human Settlements Programme
US	United States
VAR	Vector Auto Regression
VECM	Vector Error Correction Model

ABSTRACT

This study undertook an investigation of the main determining factors for capital formation in the Kenya's housing sector. The study was inspired by the fact that investment in capital equipment not only leads to increase in production; but also accelerates growth in employment opportunities, technical progress, economies of scale, market expansion and helps in removal of market imperfections and creating economic and social overheads capital, hence breaking the spiteful sphere of poverty both on the demand and supply side of housing.

The study is national-based focusing on determinants of capital formation in the Kenya's housing sector using a time series data. The study employed 35 observations of all the variables studied. The study period was 1980-2014. The period covered the period during which social indicators like housing were used while estimating economic growth in Kenya.

The study's dependent variable was the Gross Fixed Capital Formation in the housing sector while the independent variables examined were population growth rate, per capita GDP growth rate, Net national savings, interest rates, exchange rates, personal remittances and the net foreign direct investment.

Using a Vector Error Correction Model, the study found that the 1st lags of Population growth rates, savings as a percent of GDP, exchange rates and remittances were statistically significant in explaining the changes in Kenya's housing sector gross fixed capital formation. To the contrary, Per capita GDP growth rate was not found to be a significant factor in explaining the changes in gross fixed capital of housing. A short run test among the variables showed that there was a short run causality running from exchange rates, remittances and savings to gross fixed capital formation of housing in Kenya.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Theoretically, capital formation is taken to involve the activities of savings, finance and investment, in which all the activities are taken to be interdependent. Savings is an activity by which a claim of current resources is reserved for future consumption, finance involves a process where claims to resources are either assembled from among those released by domestic savings, created locally by bank deposits or notes, or obtained from international sources (abroad), while investment is an activity by which resources are committed to production of the capital goods. Therein the amount of capital formation depends on the intensity and efficiency within which these activities are involved (Abramowitz, 1955).

Capital formation involves the addition of stock of tangible goods within a country or to the foreign claims. The nationwide capital formation is a sum of the net changes in the stock of goods within the country and in the net balance of foreign claims and it is estimated on a gross basis, as such the existence of the gross capital formation (Kuznets & Jenks, 1961). Gross Fixed Capital Formation (GFCF) is therefore a microeconomic concept that measures the value of acquisition of fixed assets or change in inventories for production in an economy. It is an expenditure component of an economy's Gross Domestic Product (GDP) that shows the proportion of new value added in the economy is invested in exchange of consumption.

GFCF can be classified into two broad categories: gross public investment and gross private domestic investment. Gross public investment comprises additional stocks of fixed assets through purchases and own-account capital formation, net of disposal of worn-out or obsolete fixed assets by the public sector. On the other hand gross private domestic investment relates to additional private capital invested in domestic production through purchase of fixed assets or inventory stocks.

The gross private domestic investment involves three categories: business fixed, residential and inventory. The latter includes changes in inventories of finished goods, inputs and work in progress

while the other two relates to expenditures on capital goods for production and expenditures on residential structures and Equipment by landlords for renting out (Mankiw, 2012).

Investment is thus an important component of GDP that links the present to the future. It provides an indicator for an economy's future productive capacity. The higher the rate of investment in an economy, the higher the capacity of future production.

Capital formation facilitates an economy's growth in physical capital; investment in social and economic infrastructures. It accelerates production of tangible goods like tools, equipment, machinery, houses and intangible goods like health, education and research services (Jhingan, 2006). It does not only results to investment in capital equipment leading to increase in production, but also accelerates growth in employment opportunities, technical progress, economies of scale, market expansion and helps in removal of market imperfections and creating economic and social overheads capital hence breaking the spiteful sphere of poverty both on the demand and supply side. This portrays an important aspect of capital formation in any country anticipating growth in all its sectors and therein calling for an investigation of the main determining factors affecting capital formation.

This study examines the main determinants of capital formation in the housing sector of Kenya. 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. Housing is often considered especially in the private sector as an investment good with expected returns either in terms of rent or capital gains made from sale of the investment. The activities within this sector stimulate growth in other sectors. It also creates provides employment opportunities within the sector and in other related sectors.

The study is motivated by the fact that majority of Kenyan prefer owning a home than paying for the high rents. The high rents have made many urban dwellers to opt living in settlements that are cheap, miss in some important construction fabrics, security and have poorly established basic infrastructure. The settlers lack an access to vital social infrastructure but they get the comfort of cheaper rents (World Bank, 2011).

The present Kenyan housing policy takes into cognizance of the supply and demand gap of housing in the country, and has taken up strategies to encourage investments in the housing sector by both the public and private sectors. To attract private sector participation, the government needs to better

understand the main factors that can attract/repel capital accumulation in the housing sector. The incentives will facilitate consistent supply of housing units to meet the rising demand. To date, the policy's objectives which include provision of incentives to housing developers are yet to be met. These incentives aims at facilitating increased housing units supply by all stakeholders; both public and private.

This study took to fill this gap by investigating the main factors influencing capital formation in the Kenya's housing sector using a time series data for the period 1980-2014. The study was a national-based study focusing on the main factors affecting the capital formation in Kenya's housing sector. Since independence the general economic growth had largely been judged on economic data leaving out social indicators covering population, health and nutrition, education and literacy, housing and water supply, transport etc. which are important social indicators of measuring the extent to which development strategies change the trends in the living standards. The study therefore chooses a period during which socio indicators have been used as a critical measure of economic growth in Kenya.

1.0.1 Institutional and Regulatory Framework of Housing in Kenya

The National housing policy provides the institutional framework for the implementation of housing policies under the management of the ministry in charge of housing. The ministry in charge of housing runs a number of housing development projects among them being; the Kenya Informal Settlement Improvement Programme, The National Housing Development Programmes and The Civil Servants Housing Scheme. The ministry collaborates with other key stakeholders like UNDP, the ministry in charge of land, UNHABITAT, ministry in charge of environment and the ministry in charge of public works in the implementation of these projects.

The main housing planning is normally managed by the ministry in charge of housing- department of physical planning. The ministry also supervises the private sector housing supporters like the National Housing Corporation (NHC), various housing cooperative societies and Non-Governmental Organizations (NGOs) involved in the housing activities. County Governments are also involved in the planning processes and overseeing legal frameworks for housing in their respective counties.

Decent housing is a right as spelt out in the article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR), which Kenya is a party. The Article states that "Everyone has the right of an adequate standard of living for himself and his family, including adequate food, clothing and housing and to continuous improvement of living conditions". To facilitate this, the government of Kenya, through the Constitution has as well recognized the right to housing in section 43 (1) (b).[1]

1.0.2 Policy Directives in Kenya on the Housing Sector

Vision 2030

The Vision 2030 is the Kenya government's key development blueprint. The vision calls for the radical reshaping of all urban planning processes in order to create conditions for an "adequately and decently housed nation (living) in a sustainable environment" (GOK, 2008). Subsequently, the recognition of this goal will be reinforced under a number of initiatives that aim to augment fairness in accessing adequate housing. The first initiative was to recognize that the Housing Development initiatives will be the engine for the production of housing units whose annual production rate ought to be increased from 35,000 in 2008 to 200,000 by the end of 2012.Secondly, the Mortgage Financing Initiative will be set up to create a variety of housing investment facilities which provide affordable financing to large numbers of Kenyans to enable them to buy their own homes. Finally, the Vision recommends the passage of housing legislation to facilitate consolidating of all housing-related legislation into one law.

Sessional Paper No. 3 on National Housing Policy for Kenya, 2004

Under the growing housing needs by Kenyans, this policy has been developed to cater for the demand due to increased population growth, widespread poverty in the country and rapid urbanization. Among others, the key objectives of the policy is to facilitate progressive acceptance and realization of the right of housing by enhancing ownership of housing through expansion of access to housing finance by promoting security of tenure for land for all categories of Kenyans, particularly the low income earners in the country. This policy also advocates on improvement of

[1] The article states that everyone has a right to "accessible and adequate housing and reasonable standard of sanitation". The country has further committed to protect, esteem and realize the human rights among them the right to adequate housing by signing itself to international human rights treaties.

land management and widening of infrastructure like water accessibility and electricity that are important for modest housing. Another objective of the policy is to promote inclusive participation in development of the public housing policy and streamline the institutional and legal framework of promoting housing development. All these activities of the policy are coordinated by the ministry of housing.

Draft National Policy on Human Rights, 2010.

The main aim of the policy is to advocate the government of Kenya to implement the national housing policy. Further the policy advocates on measures by the government of upgrading slums and stem proliferation of the slums. It also compels the government to develop a legal framework for settlement of IDPs -internally displaced persons in Kenya and domesticate the African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa.

1.1 Background of the Study

The Government of Kenya recognizes housing and related services as a basic need for all her citizens. It has endeavored to facilitate provision of decent shelter Kenyans both in the urban and rural areas (Chesang, 1991). The Governments' role in housing has been through direct provision of houses through the NHC, implementing the Housing Policy, housing subsidies and facilitation of access to credit from commercial banks.

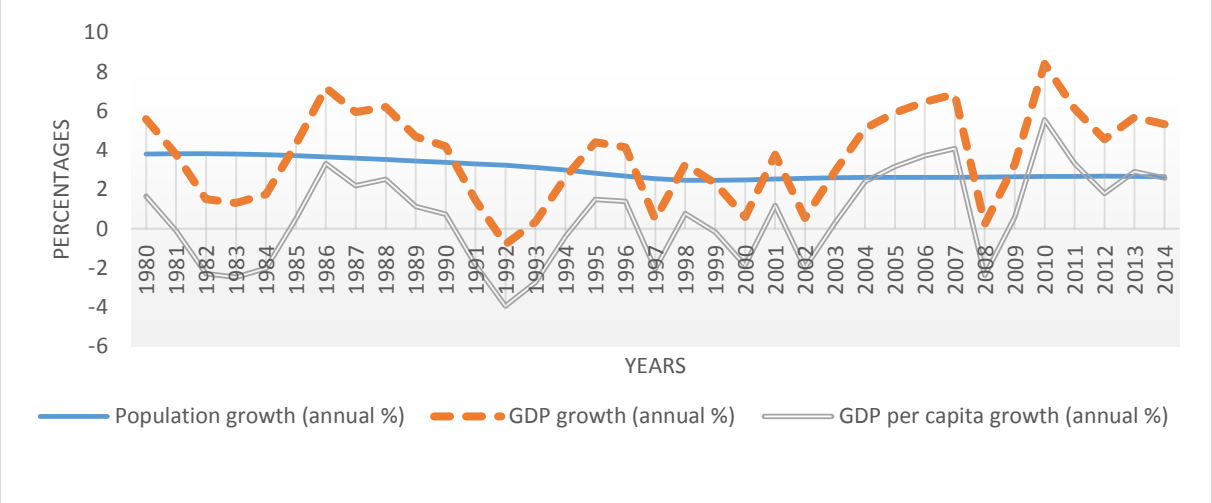
The Kenyan housing sector has been characterized by a steady increase in deficit in supply as evidenced by the 1974-1978 and 1997-2001 development periods where an estimated 25,000 housing units were built compared to an estimated demand of 50,000 units, and only 112,000 units were produced in comparison to 560,000 units demanded respectively (GoK, 1997-2001). 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 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 (Urban population growth rate have continued to be on the rise as compared to the rural population growth rates) and rapid urbanization occasioned by

the rising population as shown in Figure 1 as well as migration to the urban areas in search of better economic and social opportunities.

The high population growth rate and rapid urbanization have led to an increased demand for housing which is often not matched by the stock of houses supplied. The shortfall in housing stock is brought about by the high demand that far surpasses supply. Population explosion, rapid urbanization, widespread poverty, and escalating costs of providing housing have made the situation worse. Overcrowding, proliferation of slum and informal settlements especially in peri-urban areas are a true manifestation of housing shortage in the urban areas.

Figure 1: Population and GDP growth rates



Source: Economic Survey of Kenya

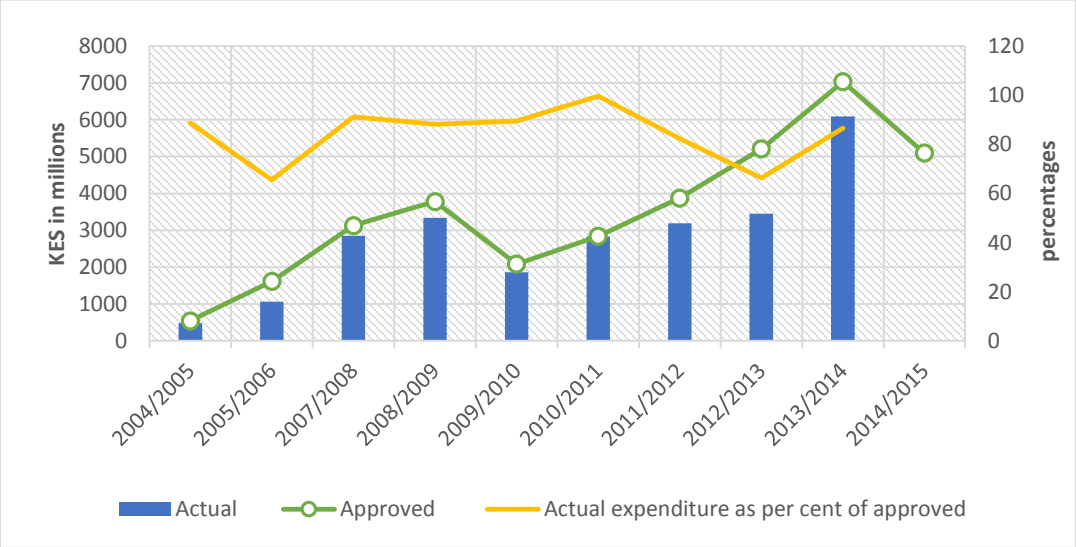
There is a concern that majority of Kenya's financial institutions however have expanded their credit lines and financial products in financing housing for mortgage to the wealthy only. This has constrained the low cost mortgage segment the necessary funds to participate in the process effectively. In Kenya, urban cities are continuously exhibiting housing problems. The UNHABITAT, other UN agencies and various multilateral agency offices are working together with Kenyan ministries to reduce the number of slums by encouraging private sector participation in curbing the growth of slums in Kenya (Housing Corporation of Kenya, 2010).

The government has been increasing its expenditure on housing related activities. For instance, the approved expenditure in the 2004/2005 fiscal year was KES 542.64 million which has since

increased considerably to KES 5.208 Billion in 2012/2013 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 as shown in Figure 2.

The Government through its principal implementing agency, NHC 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 maisonettes in Kiambu (Phase III) were all targeted at the upper-middle and upper-class earners of population (Housing corporation of Kenya, 2010)

Figure 2: Approved and Actual Central Government Expenditure on Housing 2004/05-2014/15



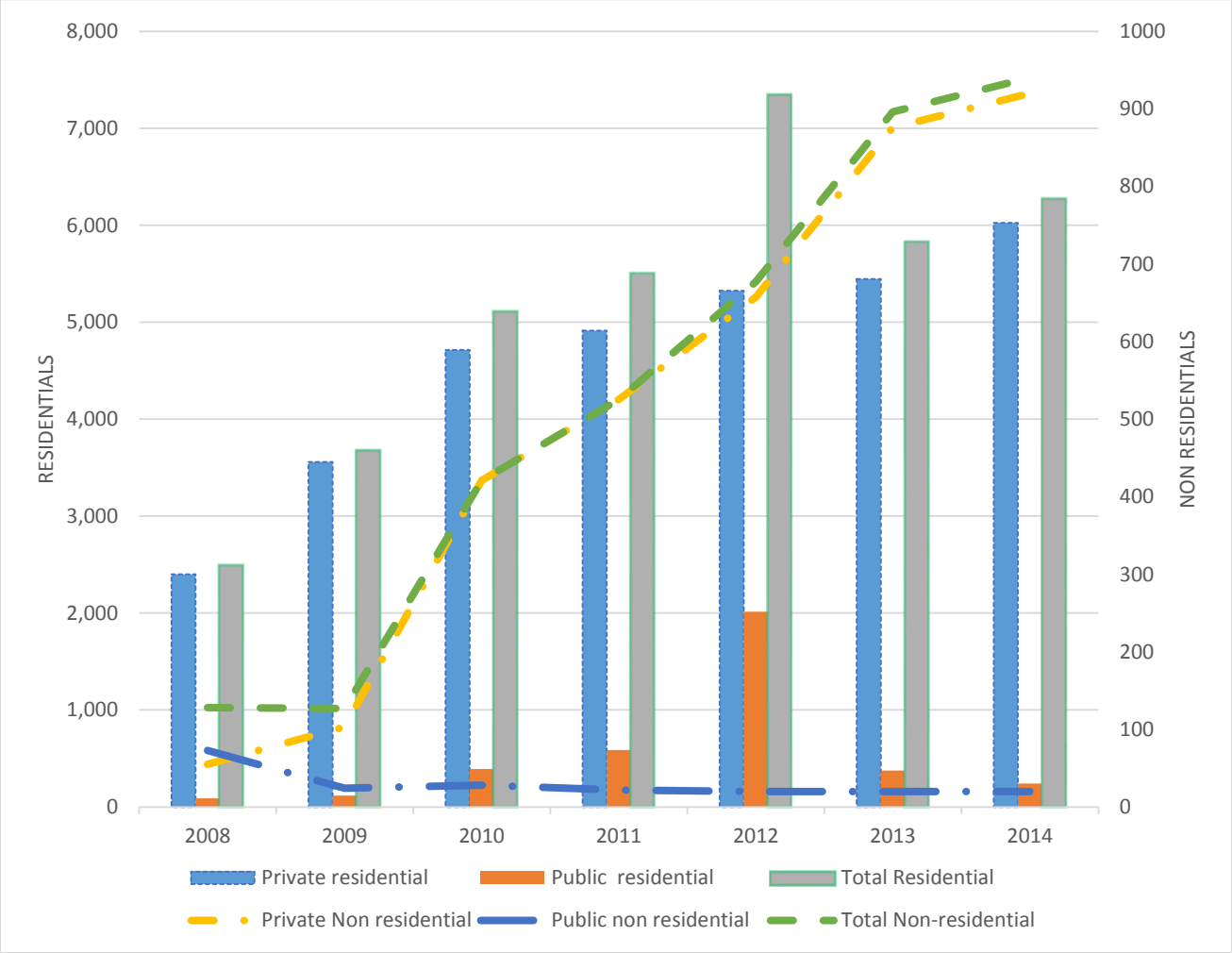
Source: Economic Survey of Kenya

In the early years of 2002; the National Housing Corporation played a key role in delivery of low cost houses such as the ones developed and handed over to the defunct local authorities. However, the administration of the partnerships between the corporation and the defunct local authorities became unmanageable thereby reducing the role the NHC played in delivery of low cost houses.

This explains the decline in approved expenditure between years 2008 to 2010 as shown in Figure 2. The lack of amicable interrelationship between the two players 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.

The private sector has played a critical role in provision of both residential and non-residential houses in Kenya as shown in Figure 3 below.

Figure 3: Completed New Private and Public Buildings in Selected Years



Source: Economic Survey of Kenya

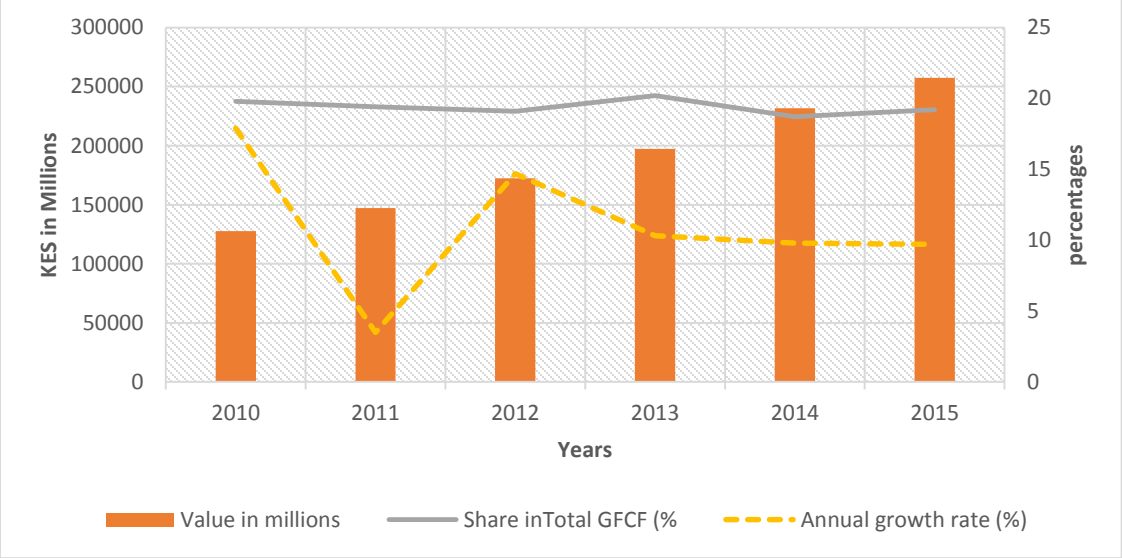
From Figure 3; the public residential units completed by the NHC are relatively low as compared to the private residential units. The public accounted for only 11.86 per cent of the total 30,121 units during the period 2008-2013. This could be attributed to the fact that the population of willing

and able potential residents is out-numbered 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.

The private sector supplied 88.14 per cent of the total residential units during the same period. The private developers just like the NHC targets the middle class and upper-class dwellers they are economically more viable in terms of returns thus leaving out the low class dwellers.

The stock of dwelling units has been a major contributor of the total GFCF in Kenya. Dwelling units constitute the top four assets in GFCF. However, the housing sub-sector has been experiencing erratic contribution to the total national GFCF as shown in Figure 4;

Figure 4: Residential Structures Status in Kenya



Source: Economic Survey of Kenya

From Figure 4 above, the share of residential structures on total gross fixed capital formation (percentage) had only a small growth in 2013, but since 2010 it has been declining until late 2012. The 2013 increase was followed by a further decline until 2015. Growth in residential structures has been declining, with a sharp decrease exhibited in 2011 and later from mid-2012. Nonetheless the value of residential structures has been on an increase since 2010.

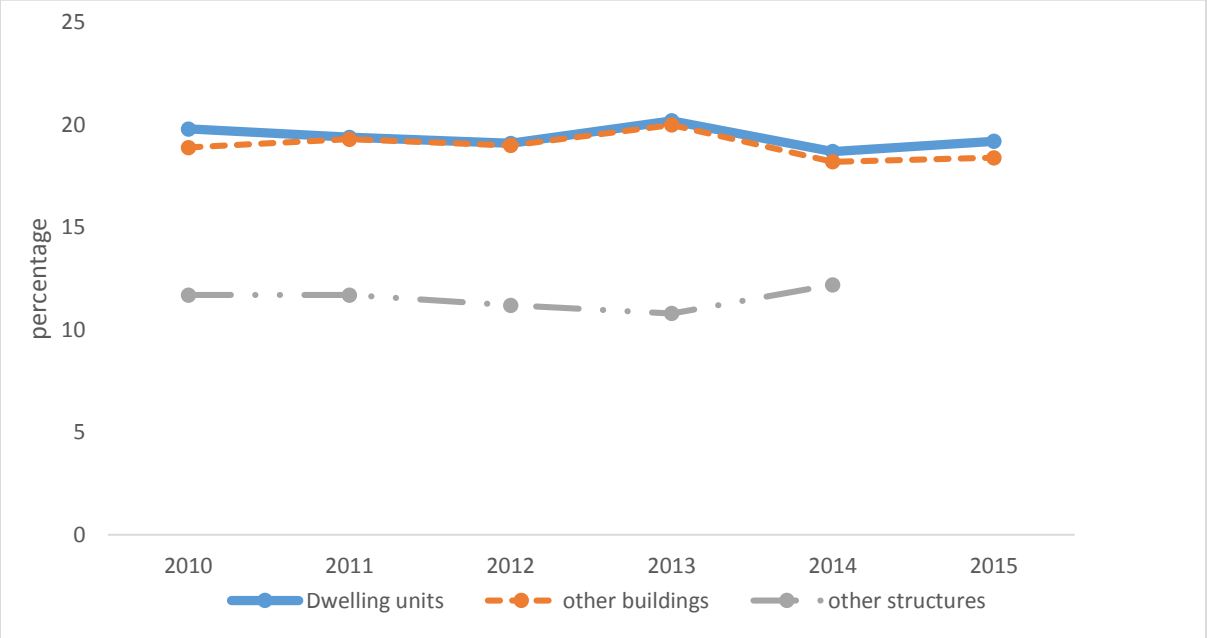
The objective of the government is facilitating private sector in terms of housing finance, production and construction as well as provision of infrastructure. It is therefore important to study

the factors that influence supply of housing in order to maintain a rising trend in the gross fixed capital formation.

1.2 Statement of the Problem

In Kenya the ratio of housing units to populations in the urban area is approximately 6.5 against a recommended 5 implying a positive trend in the urban center, however in rural areas the ratio is very low at 3.1 against the recommended (GoK, 2011). This give raise to an aggregate shortfall in housing supply for the Kenyan population. It is thus apparent that if the investment in low cost housing is not accelerated; pressure will keep on mounting on the already few housing units with the market forces exerting price pressures beyond the reach of many Kenyans who have low earnings. At the same time informal settlements will keep on exerting pressures on the inadequate space as people are in need of shelter. This will lead to poor living conditions which will in-turn exert pressure on productivity of the labor force, quality of life, efficiency of the labors, health and competitiveness of cities therein leading to lower economic growth (Giddings, 2007). It is therefore important to rethink on improvement in the gross capital formation in the housing sector of Kenya.

Figure 5: Housing Sector Contribution to Total GFCF (%)



Source: Economic Survey of Kenya

From Figure 5 above, the dwelling units' contribution to the national GFCF has been averaging 19.45 per cent. Likewise, the contribution of other buildings and other structures has been averaging of 18.97 and 13.12 per cent respectively. The dwelling units' highest contribution was 20.2 per cent in 2013 which was preceded by a low of 19.1 per cent in 2012. The share is relatively high compared to other assets in the economy. However, the share has been declining over the years. Notably from 2010 to late 2012 and later a decreasing trend from mid-2013 onwards. Previous studies which have tried to address the issues of housing include that of Chesang (1991) which focused on the determinants of private investment in urban centers, his study did not only miss to cover the period 1984 to 2014 but only focused on the urban centers while downplaying on the rural areas. Others like Vuluku & Gachanja (2014) limited their study to the housing supply for Mombasa and Nairobi cities. This study intends to fill these gaps by carrying out a country wide analysis of the determinants of capital formation in the housing sector in Kenya.

1.3. Research Questions

The main question that will guide this study is:

What are the country-wide determinants of capital formation in the Kenya's housing sector?

1.4. Objectives of study

The main objective of the study is to determine the main determinants of capital formation in the Kenya's housing sector.

Specific objectives:

1. To identify the factors affecting capital formation in the Kenya's housing sector.
2. To estimate the effect of each factor identified in (1) above on GFCF in the housing sector.
3. To draw appropriate policy implications based on the study findings.

1.5. Significance of 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

2.0 Introduction

The chapter has two sections; section one discusses the theoretical review behind housing demand and supply, and theories behind capital formation. Section two discusses some empirical reviews behinds capital formation in the housing sector.

2.1 Theoretical Review

In economic theory, supply increases with increase in prices, a rise in prices can spur supply of housing by the producers in the housing market their supply or suppliers of an input of production in the housing market to increase its production; this translates to an increase in investment in the housing sector and more capital accumulation in the sector (Green , Malpezzi, & Mayo, 2005). As such the housing market can be viewed in the same way as the market for other goods, but it is a private good in which owners have control over; Following this, the classical price theory assumes a competitive market in which prices are determined by forces of supply and demand in setup of no government intervention and price controls. This implies the amount supplied in the market is the amount the sellers are willing and able to supply under their usual production aspects like costs of inputs, technology changes and expectations of future prices. Nonetheless "housing" can as well be viewed as a merit good in which it cannot be solely be left to the pure market forces for political reasons and ethical reasons which might cause market failures (Oxley & Smith, 1996).

Another theoretical aspect of the housing market is the Ricardian rent theory, which makes the assumption that land is a fixed factor of production and as such a house can only be "produced" in the land which is available. As such since land is fixed; the demand for land will be derived from the demand for "housing" as a good as well where the equilibrium in the market between demand and supply will fix the land price. According to the Ricardian rent theory; land's price is high because the price "returns" of housing are high and not vice versa. Nonetheless the neoclassical theory views production process as using land as an input in production rather than for income distribution, and as such the theory proposes that land has many uses as a factor of production and

rational producers will always follow the use that is most profitable amongst them all (Meen, 2001).

According to the Urban Spatial theory; the growth in population is equated to the flow of new constructions and housing in the urban sector. Therefore the land prices will be based on the stock of housing "Demand for housing" as opposed to the amount of construction activities, implying house prices initially generate huge returns but the housing output increases temporarily above some normal level. As such when the stock of houses increase; the land prices will follow suit and eventually they will absorb excess returns and therein forcing constructions to adjust downwards to their normal points (Di pasquale, 1994).

2.2 Empirical review

Empirical studies on the housing market, cover the housing demand and supply factors, but this study aims at identifying the determinants of capital accumulation in the housing market and as such a more emphasize on the supply side of the housing market than the housing demand, but few studies have a shown a connection between the housing demand, supply and capital accumulation. Esteban & Altuzarra (2008) for instance note that life expectancy of a dwelling is an important aspect of housing, as such the supply of housing in any setup involves a composition of new and existing dwellings as such; investors would tend to invest in more dwelling considering how the old ones have so far been performing. According to them developers are willing to increase their capital investments on housing if the house prices are rising over the years, but holding all other things constant. In a study they conducted in Spain; they noted as housing demand continued to increase due to demographic or wealth factors in Spain; housing prices also continued and this in turn led to an increase in more supply of housing and therein a boost in capital formation in the housing sector.

Whilst Esteban & Altuzarra (2008) looked at it in terms of life expectancy, Muellbauer & Murphy, (2008) observed that households make their own decisions of investing in the housing taking into considerations other alternative investments available to them. Using a micro-econometric model of housing supply responses to demand shocks; they argued that housing markets exhibit a high degree of volatility in prices and quantities, with economic consequences for owners and construction shareholders. In United Kingdom (UK), income, demographic factors, housing stock,

interest rates, credit availability and lagged appreciation are the main drives of house prices, who's in turn have an impact on capital investments in the housing sector in UK (Muellbauer & Murphy, 2008). As such both sets of authors in Spain and UK are in agreement that house prices are a major factor in investments in housing, and as such investigating the main factors of housing prices in their respective countries.

In Malaysia, a study done by Ong (2013) showed that there existed a positive association between population growth rates, GDP growth rates, and real property gains tax with housing prices. Their study also revealed that GDP fluctuations in Malaysia had a significant relationship with house prices. Population increase, led to a rise in demand for housing in Malaysia and as such increasing the prices of housing units in the country and therein an increase in the supply of houses in the country. Interest rates were found to be insignificant in explaining the house prices in Malaysia while real property gains tax had an inverse significant relationship with house prices (Ong, 2013).

Contrary to Ong (2013), an earlier study conducted in the United States by Topel & Rosen (1988) showed that real interest rates and expected inflation rates had a significant negative association with new housing constructions. For them to arrive at this conclusion; they used an adjustment cost model and Instrumental variable estimation on a 25 year data series. Still in the US a study by Dipasquale & Wheaton (1994); DiPasquale (1999) showed that factor prices were positively correlated with the level of new constructions and with relative house prices. Nevertheless Ansah, (2012) study in the United States have found that the use of consolidated national data may not reveal the actual picture of housing supply as regional factors may also affect the housing supply uniquely. Still in US, a study conducted by Saiz (2010) focused on geography and found it to be a contemporary factor in explaining the housing supply elasticity interestingly he observed that highly regulated areas tended to be geographically constrained and housing price together with population growth rate.

On a study conducted in 44 metro areas, Mayer & Somerville (2000) found that land use regulations lowered the levels of new constructions, with these areas having up to 45 per cent lower statistics and up to 20 per cent lower price elasticity than those of regulated areas. They concluded that land regulations lengthened and brought to delays on new constructions, but they at the same time observed that financial regulations had less impact on new constructions in these

areas. However, according to Differing to this cost of construction has no impact on supply of housing (Dipasquale & Wheaton, 1994; Phang, 2010).

Using Tobin's Q specification and a panel data of seventy three administrative regions in New Zealand Grimes & Aitken (2010) showed that housing supply elasticity helps in containing price changes which were caused by housing demand shocks. They found out that the land prices had a moderate impact on house prices as compared to the construction costs, but they concluded that there was an interrelationship between the housing supply and the house price dynamics, this was in agreement with the other authors earlier discussed above.

Ortalo-Magne & Prat (2007) studied the political economics of housing supply with respect to homeowners, workers, and voters. Voters were found to support artificial supply restrictions because they were protecting their investments, therein they invest expecting the value of housing to be protected by the urban growth restrictions.

In Australia, a study by Liu & London (2011) showed that residential construction costs and demographic factors had a negatively significant influence on the housing supply. The authors had used a panel data and the error correction model in their analysis, but their findings and methodology was in contrast with Tu (2000), whom using countrywide and sub nationwide time series had found that nationwide house prices could not characterize the sub nationwide amount models and therein modeling the housing supply at a regional perspective without provincial heterogeneities was not realistic.

A study by Malpezzi & Maclennan (2001) revealed short term interest rates increased economic activity and construction costs; positively affect the housing prices. However he noted that the speed of adjustment took several years in the case of a deviation from the long run equilibrium. In the East African Community context low-cost housing have helped in financing the construction of housing with advance rent payment to the landlords. A study done by Sinai (2005) shows that this policy has helped to people especially in Tanzania to move to these settlements when they are completed. In Tanzania, the policy helps the renters of the houses to pay the needed rent at a slower pace which he can afford until the whole amounts is finished. In South Africa and Namibia the benefits of savings programs have also contributed to a large amount of financing in the housing of low-income settlements rather than acquiring mortgages and large amounts of loans which are cumbersome in paying, similar programs are also established in Malawi and Pakistan.

A study done by Hassanali (2009) shows that low income housings are found where areas have low costs and high building impermisibility. Living in these areas, has a challenge of accessing infrasturtures like water, roads, electricity, sewerage, security and social services (Nabutola, 2004). 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 Kenya's housing investors are highly responsive to income changes, credit and construction costs. The results showed that Kenya's housing investors are highly responsive to income changes, credit and construction costs.

The above findings were consistent with those of Mitullar (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. To the contrary, landlords were found to be older than the tenants and had less years of education. This contrasted the findings of low income households who were found to have low levels of education at 23.5 percent. The education levels of this class constituted 63 percent with basic primary education, 25 percent with secondary education and only 2.7 percent having completed post-secondary or higher education.

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

2.3 Summary of Literature review

On theories discussed; classical price theory assumes a competitive market in which prices are determined by forces of supply and demand with no government intervention and price controls, as such the demand and supply of housing, will not depend on government controls but price. The Ricardian rent theory postulates that land's price is high because the price "returns" of housing are high and not vice versa, as such more investments on housing will be spurred by the 'returns' of lands. On the other hand Urban Spatial theory; the growth in population is equated to the flow of new constructions and housing in the urban sector. Therefore the land prices will be based on the stock of housing "Demand for housing" as opposed to the amount of construction activities.

Empirically, factors affecting housing investments positively were identified by Esteban & Altuzarra (2008), Muellbauer & Murphy (2008), Ong (2013), Manheim (2008), Sinai (2005), Hassanali (2009) & Nabutola (2004) as; life expectancy of dwellings, wealth and demographic factors (age, gender, marital status, level of education), income, housing stock, credit availability, Population growth rates, GDP growth rates, real property gains, Savings of individuals and location of embedded infrastructures like water, road and Sewer.

Saiz (2010), Liu & London (2011), Grimes (2010), Mayer & Sumerville (2000), Ong (2013) and Muellbauer & Murphy (2008) identified Poor geography of land, residential construction costs, Land use regulations, real property gains tax and interest rates as some of the main factors which affected investments in housing negatively.

Others like Chesang (1991), Mitullar (1993) and Muthaaka (2001) found that Income, construction costs, credit, housing stock & investments, quality of building materials, occupancy rates, education levels & Sex were all significant factors in housing investment decisions. Male investors takes prominence in housing investment. However the proportion of female investors in housing was found to be related to their education levels. Highly educated female invest more in housing than an average educated female.

Among the studies that have been conducted in Kenya, none has considered factors that affect gross fixed capital formation in dwellings in Kenya, particularly on a macroeconomic approach. This study entails at factoring a large period study in closing this gap of knowledge.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0. Introduction

This chapter discusses the theoretical and conceptual framework and further derives an empirical model that was used to analyze the determinants of capital formation in the housing sector of Kenya.

3.1. Theoretical Framework

Basing on Tobin's Q theory, the underlying assumption is that cost of housing consumption is normally considered the same for investors who invest in houses for renting out purposes and for those who develop or buy for owner occupation. According to the theory home owners incur an opportunity cost for occupying a house instead of renting it out or investing the money elsewhere where it could have been earning income. Moreover to the opportunity cost; there exists depreciation to the housing stock and other costs like servicing mortgages and maintenance costs.

The benchmark of this study borrows from Mankiw (2013), who in his theoretical explanations of investment; he combines an evaluation of the Neo-classical investment model and the Tobin's Q model of investment. In his analysis he begins by assuming a basic production function (Cobb-Douglas) of the form:

$Q=AK^{\sigma}L^{1-\sigma}$ ……..... 1

Where K is capital, L is labor, A is technology level, σ is output elasticity of capital, 1- σ is output elasticity of labor and Q is the total production; the monetary value of all goods produced in an economy in a year. From equation 1, marginal product of capital (MPK) can be derived in the form:

$MPK = \sigma A \left(\frac{L}{K}\right)^{1-\sigma}$……...……...…2

Since in the equilibrium, real rental prices (R/P) are equal to the marginal product of capital, then we have:

$\frac{R}{P}$= σ A $(\frac{L}{K})^{1-\sigma}$……..……3a

$\frac{R}{P}$ = MPK……..…….3b

From equation 3a, it can be revealed that the lower the stock of capital, the higher the real rental prices, this conforms to law of demand, as stock of capital reduces holding other things constant, demand will increase and in return exerting pressure on prices to increase. The same equation (3) implies that the higher the amount of labor employed (employment rates-thus an increase in aggregate demand) and the better the technology levels (for instance scientific discoveries on better houses), the rental price of capital will also be high/increase.

An agent who wants to invest, will have to incur some cost of capital. The model assumes a cost function of the form:

$C = iP_k - \Delta P_k + \delta P_k$……..……4a

$C = P_k(i - \frac{\Delta Pk}{Pk} + \delta)$……..……4b

Where iP_k is a component of the cost which holds the price of capital and the nominal interest rates charged on the capital, ΔP_k is the component of cost which forms the changes in price of capital if the capital is rented out for usage (the component is negative in the equation because it represents a loss and not a gain), and $\delta P_k$is the depreciation cost of the capital good.

The other assumption of the model is that as the price of capital goods increases with the price of other goods, and as such the component $\frac{\Delta Pk}{Pk}$ becomes equivalent to inflation, and since nominal interest rates minus inflation results to real interest rates, then equation 4b becomes:

$C = P_k(r + \delta)$…….5

In expressing the cost of capital relative to prices of other goods in the economy like buildings, then equation 5 becomes real cost of capital (Cr) in the form of:

$Cr = \frac{Pk}{P}(r + \delta)$……..……6

As such an agent who want to change his/her capital stock will only do so if equation 3b (MPK) is greater than equation 6 (Cr), because the profit is the difference between revenue (rental prices

of capital) and real cost of capital, thus the total expenditure on a business fixed investment, for instance gross fixed capital formation on building and structures (fixed investment (FI) in building structures) will be given by:

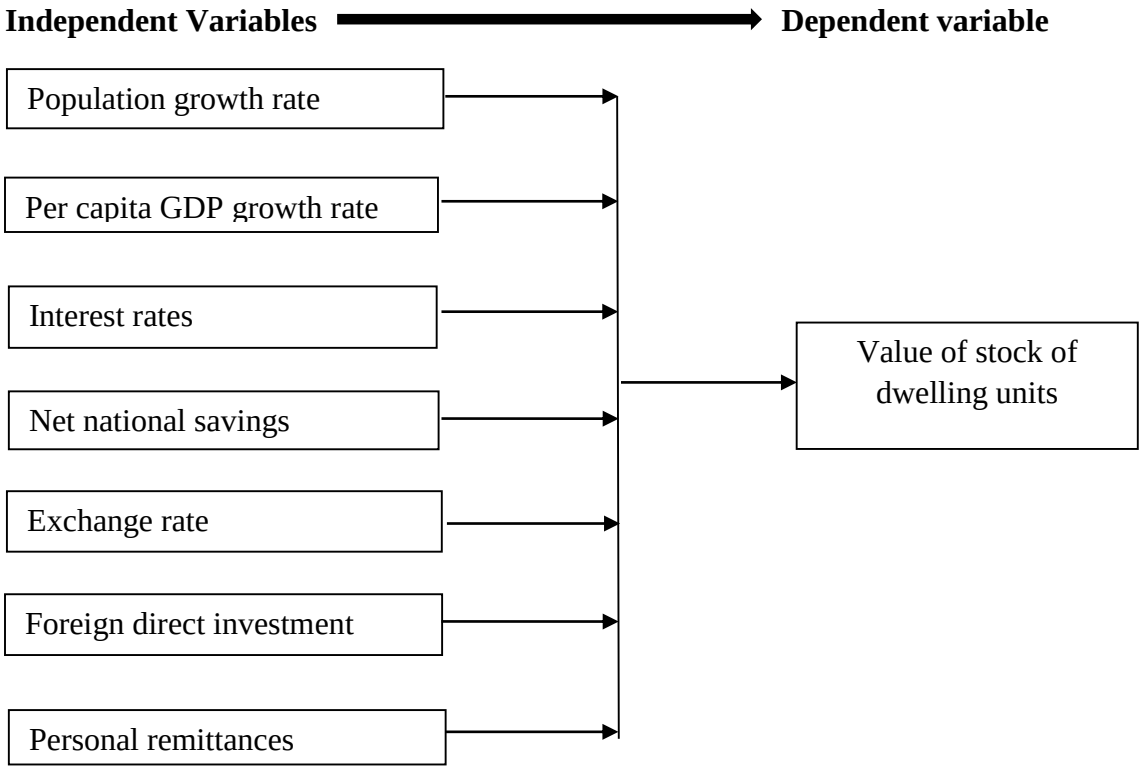
$$FI = I_n \{MPK-(\frac{Pk}{P}) (r+ \delta)\} + \delta k \quad \ldots\ldots 7$$

Where: I_n is the function showing how much net investment will respond to any given incentives to invest. Equation 7 implies fixed investments depends on the marginal product of capital whose components are described in equation 3b, the cost components of capital and the amount of depreciation (amount used to replace depreciated capital), equation also has a direct implication that real interest rates will always rise the cost of capital and will lead to reduction in the rates/levels of investments.

3.2. Conceptual framework

The dependent variable used in the study was the value of stock of dwelling units in Kenya. It was measured as the annual additional value of stock of dwelling units. The variable was explained by a set of independent variables, among them population growth rate, per capita GDP, real interest rates, net national savings, exchange rates, foreign direct investment and personal remittance as shown in Figure 6 below.

Figure 6: Conceptual Framework



3.3. Empirical model

Following the theoretical and conceptual frameworks discussed above, it can be resolved that fixed investment (capital formation) is a function of various factors:

FI= f(Xi), {i=1…..n)……..……..8

The function can be transformed linearly to be in an econometric form of:

GFCF = β0 +β1Pop +β2 PerGdp +β4Ir +β5Sv +β6Exch +β7FDI +β8Rem +e……...9

Where, Pop is population growth rates, PerGdp is real per capita GDP growth rates, Ir is the real interest rates, Sv is savings as a percentage of GDP, Exch is the exchange rate, FDI are foreign direct investments as a percentage of GDP, Rem are personal remittances and e is the error term. The data values are estimated on a time series basis and as such estimating equation 9 without testing for stationarity may give rise to a spurious regression if some or all the variables are non-stationary (Gujarati, 2004). The study carried out a unit root test using the Augmented Dickey-Fuller tests, to verify presence or absence of unit root(s).

In the event that some of the variables are non-stationary but become stationary after the first differencing, then they are confirmed of their integration in order n, I(n). Integrated variables are tested whether they are cointegrated, and at what level of cointegration. In the event of cointegration an error correction mechanism is used to transform equation 9 to the form:

$$\Delta GFCF = \beta_0 + \sum_{i=1}^{n} \beta_{1i} GFCF_{t-i} + \sum_{i=0}^{n} \beta_{2i} Pop_{t-i} + \sum_{i=0}^{n} \beta_{3i} PerGdp_{t-i} + \sum_{i=0}^{n} \beta_{5i} Ir_{t-i} + \sum_{i=0}^{n} \beta_{6i} Sv_{t-i} + \sum_{i=0}^{n} \beta_{7i} Exch_{t-i} + \sum_{i=0}^{n} \beta_{8i} FDI_{t-i} + \sum_{i=0}^{n} \beta_{9i} Rem_{t-i} + \gamma ECM_{t-i} + e_t \quad \ldots\ldots\ldots\ldots 10$$

Where ECM is the error correction term. The ECM is the feedback and adjustment effect which indicates how much of the disequilibrium is being corrected. Theoretically under the Error Correction Model, a larger co-efficient of the parameter implies a high speed of adjustment of the model from the short run to the long-run equilibrium, these individual influence are separated using a Vector Error Correction Model.

3.4. Definition and Measurement of variables

Variable	Definition
Gross fixed Capital formation (GFCF)	This was the dependent variable for the study. It represent value of Stock of residential Houses or dwelling units Supplied in a year. It represents annual additions to existing stock of dwellings. The data for GFCF was obtained from various economic surveys of Kenya reports covering the study period. The variable is measured in Kenya shillings.
Population growth rate (PoP)	Expressed as a percentage, it is the proportionate change of a country's population from year t-1 to t. It represented a measure of annual aggregate demand for dwelling units. It is the number of addition people in a country as a fraction of the existing population; an increase in population is expected to increase demand for housing.

Per Capita GDP growth rate (PerGdp)	Per capita GDP measures a country's economic output per person. It defines an economy's standards of living. The variable measures the purchasing power of an economy. Per Capita GDP growth rate was calculated using real Per Capita GDP data collected from economic surveys of Kenya reports for the study period. The proportionate growth is expressed in percentage.
Exchange rate (Exch)	Exchange rate is the rate of at which a country's currency would be exchanged for against another country's currency. It determines the value of an economy's exports and price of imports. High rates would increase the cost of imported building materials thus suppressing demand. The variable is measured in percentage. Real Exchange rate data was obtained from the Central Bank of Kenya (CBK) statistics.
Foreign Direct Investment (FDI)	The variable represent the sum of equity capital and investments in business enterprises in Kenya by individuals and/corporates based in other countries. It shows net inflows in the Kenyan economy from foreign investors. FDI is measured as the proportion of GDP formed by FDI. The data was obtained from the World Development Indicators (1980-2014).
Remittances (Rem)	The variable comprises of personal transfers and compensation of employees to Kenyans working in foreign countries. The variable present increased resources for supplying more dwelling units. The value of remittances for the study period was obtained from the CBK statistics. It is measured in Kenya shillings
Savings (Sv)	In this study savings represent gross national savings in Kenya. Savings represent GDP net of total consumption in an economy for a particular period. It is a deferred consumption. The forgone consumption increases resources for capital investments in an economy. Saving are expressed as a proportion of GDP for a particular year.
Interest Rates (Ir)	Interest rate is the rate of return from an investment. In this study it acts as an indicator for returns from alternatives assets. Inventors are expected to invest less in housing if returns from other assets are expected to be high and vise versa. Data for real interest rate was obtained from the CBK statistics.

3.5. Type and Sources of Data

The study used secondary time series data mainly from economic surveys of Kenya reports, World Development Indicators and Central Bank of Kenya statistics.

The study covered the periods 1980-2014, the period marked the start of employing social indicators to monitor and evaluate the progress towards attainment of better living standards in Kenya by the Kenya National Bureau of statistics (KNBS) formerly Central Bureau of statistics (CBS). In addition the period captures the Kenya's worsening housing conditions of early 2000, which led to the revision of the housing policy sessional paper No.5 of 1969 that focused on aiding self-help groups and co-operatives in the housing sector to sessional paper No. 3 of 2014 (GoK, 2004).

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.0 Introduction

This chapter presents an analysis of the data used for the study. Throughtout the analysis, the initials Gfcf, Pop, PerGdp, Ir, sv, Exch, Fdi and rem are used to mean gross fixed capital formation of residential houses, population growth rate, per capita GDP growth rate, interest rates, Savings as a perentage of GDP, eaxhange rates, foreign direct investment as a percentage of GDP and personal remitances.

The chapter first presents the summary of the variables used and later the other statistical measures that were done will be discussed.

4.1 Summary Statisctics

The analysis covered the period from 1980-2014, as such 35 observatios of each varibale was made and presented on table1.

Table 1: Summary statistic of the variables under study

Variables	N	Mean	Std. Deviation	Min	Max
PoP (%)	35	3.006933	0.499305	2.461046	3.822744
PerGdp (%)	35	1.093414	2.843473	-3.95296	6.579553
Ir (%)	35	7.50377	6.791486	-8.00987	21.09633
Sv (%)	35	21.36828	6.464839	14.05808	35.56073
Exch (%)	35	51.8264	28.60605	7.420187	88.81077
Fdi (%)	35	0.535481	0.566735	0.004721	2.532351
Gfcf (KES'M)	35	69757.54	46289.17	12450.6	173225
Rem (KES)	35	2.36E+07	3.17E+07	2916520	1.71E+08

Source: Computations using Economic Surveys of Kenya Data

From table 1, in Kenya, the average mean gross fixed capital formation in the housing sector has been around 69,757.54 million with the minimum of 12,450.6 million exhibited in 1980 and the maximum of 173,225 exhibited in 2014, showing a rising trend over the years, the standard deviation of the housing gross fixed capital formation is very large imlying the values of this variable have a large spread. The Per Capita GDP growth rate has standard deviation more than

the mean value implying also a large spread of the values. The other variables are closely clustered around the mean because of their small standard deviation.

4.2 Test for Stationarity

The variables were measured across time as such it was important to carry out a stationarity test, to verify if the data series were stationary or not. Stationary time series are those whose statistical properties like the mean and variance are constant over time properties.

A plot to check on the behavior of the data overtime was carried out and presented in appendix 1: Presence of a trend was observed between population growth rates and exchange rates, gross fixed-capital formation and exchange rates, gross fixed capital formation and population growth rates and between population growth rates and interest rates. As such, it warranted for a formal test for stationarity between the variables. The study used an Augmented Dickey Fuller test to test for stationarity, in which the hypotheses are:

Ho: Unit root (non-stationary)

Ha: No unit root (Stationary)

Where the null hypothesis is accepted if the absolute test statistic is smaller than the critical values.

Table 2: Test for Stationarity

Test of Stationarity (Constant and No trend)						
Variables	Test Statistic	1% Critical value	5% Critical value	10% Critical value	Order of Integration	Conclusion
PoP (%)	-1.963	-3.689	-2.975	-2.619	3rd Diff	Non-stationary
PerGdp (%)	-2.66	-3.689	-2.975	-2.619	2nd Diff	Non-stationary
Ir (%)	-3.953	-3.689	-2.975	-2.619	1st Diff	Stationary
Sv (%)	-2.484	-3.689	-2.975	-2.619	2nd Diff	Non-stationary
Exch (%)	-0.942	-3.689	-2.975	-2.619	2nd Diff	Non-stationary
Fdi(%)	-6.88	-3.689	-2.975	-2.619	1st Diff	Stationary
Gfcf (Millions)	0.434	-3.689	-2.975	-2.619	2nd Diff	Non-stationary
Rem	-1.782	-3.689	-2.975	-2.619	2nd Diff	Non-stationary

Source: Computations using Economic Surveys of Kenya Data.

From table 2, the variables population growth rate, per capita GDP growth rate, savings, exchange rates, Gross fixed capital formation and remittances were all non-stationary, this was also reflected

in appendix 1, where these variables showed signs of a trend amongst themeselves. The variables interest rates and foreign direct investments were stationary.

4.3 Test of Cointegration

Johansen's test of cointegration was carried out to verify if the independent (non-stationary) variables had a long run association with gross fixed capital formation of housing in Kenya.

The study used Johansen Cointegration test to test cointegration and the hypotheses are:

Ho: There is no cointegration (None*)

Ha: There is cointegration at n level.

In order to run the Johansen test, Many of the criteria used to advice for lag selection had a minimum value at lag 2, implying the data values were best appropriate to be analyzed using two lag periods, particularly the Akaike Information Criteria (AIC) and Schwarz's Bayesian Information Criteria (SBIC) were systematically in agreement of the 2 lags to be used as shown in table 3.

Table 3: Lag Selection Criterion

Lag	Log L	LR	FPE	AIC	SBIC	HQ
0	-638.87		3.81E+10	35.7149	35.8908	35.7763
1	-562.42	131.66	1.34E+09	32.3567	33.2364	32.6637
2	-464.54	33.98*	2.39E+10	26.387*	36.898*	30.1814
3	-536.5	38.88	7.98E+08	31.8056	33.3891	32.3583
4	-425.01	46.68	1.25E+33*	27.4284	33.2364	28.4724

Source: Author's Computation

Most of the results advised for a usage of 2 lags in running the Johansen test and the vector error correction model. In running the Johansen test the following results were obtained:

Table 4: Johansen Test of Cointegration

Trace test				**Max Eigen Value Test**			
Hypothesized Cointegration equations	**Eigen value**	**Trace statistic**	**5% Critical value**	**Hypothesized Cointegration equations**	**Eigen value**	**Max-Eigen Stats**	**5% Critical value**
None*	0.85211	159.506	94.15	None*	0.85211	141.963	83.7935
At most 1 *	0.75244	98.345	68.52	At most 1 *	0.75244	87.527	60.9828
At most 2 *	0.56338	53.6696	47.21	At most 2 *	0.56338	47.766	42.0169
At most 3	0.33084	27.151	29.68	At most 3	0.33084	24.164	26.4152
At most 4 *	0.22415	14.2957	15.41	At most 4 *	0.22415	12.723	13.7149
At most 5 *	0.17547	6.1743	3.76	At most 5 *	0.17547	5.495	3.3464

Source: Author's Computation

From table 4, the trace statistic of 27.1513 was smaller than the 5% critical value at the maximum rank of 3 implying there was at least three cointegrating equations among the variables under study, indicating in the long run, gross fixed capital formation in housing, population growth rate, per capita GDP growth rates, saving rate, exchange rates and remittances move together.

Since the variables were non-stationary and had a long run association (cointegrated) Vector Autoregression (VAR) model was not appropriate (Gujarati, 2004). The co-integration relationship implies the existence of the long term equilibrium relationship of the variables and the short term disequilibrium of the generation of dynamic process as such the study establishes a Vector Error Correction Model (VECM) to describe the short-term dynamic disequilibrium among these non-stationary variables.

4.4 Vector Error Correction Model

The presence of cointegration between variables suggests a long term relationship among the variables under consideration, as such VECM was used to verify if there was a long run equilibrium between gross fixed capital formations with population growth rate, per capita GDP growth rate, savings, exchange rate and personal remittances. The results were presented in table 5; the output from Stata was only selected for gross fixed capital formation, as it was the main objective of the study.

Table 5: Vector Error Correction Model Results

EQUATION	PARMS	RMSE	R-SQ	CHI2	P>CHI2		
D_GFCF	16	5248.56	0.9229	179.573	0	**No. of obs**	32
D_ PerGdp	16	2.2354	0.5882	21.42589	0.1627	**Log likelihood**	-949.357
D_POP	16	0.010667	0.9875	1157.318	0	**Det (Sigma_ml**	2.37E+18
D_SV	16	4.95357	0.6484	27.6657	0.0347	**AIC**	65.89734
D_EXCH	16	5.14896	0.6442	27.15967	0.0397	**HQIC**	67.49154
D_REM	16	2.20E+07	0.7732	51.13709	0	**SBIC**	70.70679
D_GFCF		**Coefficients**	**Std Error**	**z**	**P>z**	**[95% Conf. Interval]**	
1st equation	_ce1						
	L1.	0.10497	0.061116	1.72	0.086	-0.01481	0.224754
2nd equation	_ce2						
	L1.	-2578.52	817.7979	-3.15	0.002	-4181.38	-975.67
3rd equation	_ce3						
	L1.	5979.669	25140.36	0.24	0.812	-43294.5	55253.86
GFCF	LD.	0.013257	0.151952	0.09	0.93	-0.28456	0.311078
	L2D.	-0.32763	0.171909	-1.91	0.057	-0.66457	0.009305
PerGdp	LD.	391.3732	782.2685	0.5	0.617	-1141.85	1924.591
	L2D.	1237.21	641.8329	1.93	0.054	-20.7591	2495.18
POP	LD.	223718.8	99180.72	2.26	0.024	29328.22	418109.5
	L2D.	-244530	134630.7	-1.82	0.069	-508402	19340.83
SV	LD.	1428.584	384.7266	3.71	0	674.5339	2182.634
	L2D.	361.0415	449.9884	0.8	0.422	-520.92	1243.003
EXCH	LD.	-1656.02	335.7944	-4.93	0	-2314.17	-997.877
	L2D.	-867.854	355.7426	-2.44	0.015	-1565.1	-170.612
REM	LD.	0.00021	0.000109	1.92	0.054	-3.83E-06	0.000424
	L2D.	-2.5E-05	9.91E-05	-0.25	0.799	-0.00022	0.000169
	_cons	0.002286	3195.76	0	1	-6263.57	6263.577

Source: Author's Computation

Variables in a VECM model are all treated as endogenous variables and as such the output on table 5 shows results for all the variables (D_GFCF, D_ PerGdp, D_POP, D_SV, D_EXCH, D_REM). The D on each variable implies that the VECM model converted all the variables into their 1st differences and thus making them stationary. Amongst all these variables, the difference of GDP (D_ PerGdp) equation was the only one that was not statistically significant because its P value of the CHI statistic was greater than 0.05. All the other equations were statistically significant. Notably the R-squared of 0.9229 for D-GFCG equation implies the independent variables

explained 92.29 per cent of the changes in gross fixed capital formation in the housing sector in Kenya in the long-run, the Chi square statistic of 179.53 was statistically significant implying the lags of the model were all not equal to zero.

The portion L1.ce1, L2.ce2 and L3.ce3 are the lagged error correction terms of the 3 cointegrating equations identified by the Johansen tests in section 4.3 above. According to table 5 a negative and significant coefficient of the Error correction model indicates that any short-term fluctuation between the independent variables and the dependent variable will give rise to a stable long run relationship between the variables. This can be seen on equation 2 (ce2. L2).

Among the variables chosen, the 1st lag of population had a positive and significant relationship with housing gross fixed capital formation. This implied that a one percent increase in lag of population increases investment in housing by around 223,718 annually in Kenya; this could imply an increased demand for housing as the population in the country increase. However two lag period of population growth rate did not have any statistical significant relationship with housing gross fixed capital formation in Kenya.

The 1st lag of savings as a percentage of GDP had a positive and statistical relationship with housing gross fixed capital formation in Kenya, implying a one percent increase in the 1st lag of savings increases investments in housing by close to 1428.584 units annually. This could imply as savings of previous year increased, investments in housing for the current year increased as well. Nevertheless the 2nd lag of savings is not statistically significant in explaining changes in housing gross fixed capital formation in Kenya.

Exchange rates in both the 1st and 2nd lags, had a negative and statistically significant in explaining changes in gross fixed capital formation in Kenya, Exchange rates increase, implies it is expensive importing building materials into the country and as such, the study shows that 1 unit increase in the exchange rate of a previous period reduced investments in housing by at least 1,656 units, and an increase in 1 unit exchange rate within two previous years, reduced the current year's investment in housing by at least 868 units.

The 1st lag of personal remittances had a positive significant relationship with gross fixed capital formation in housing, implying an increase in remittances by 1 million in one year spurred an

increase in value of dwelling units stock by 0.00021 units, on the contrary the 2nd lag of remittances was not statistically significant in explaining the changes in value of dwelling units stock in Kenya.

Growth in per capita GDP were not statistically significant in explaining changes in gross fixed capital formation of the housing sector in Kenya both in 1st lag or the 2nd lag. Similarly the lags of Gross Fixed Capital Formation in housing were also not statistically significant in explaining the changes in gross fixed capital formation for housing in Kenya.

4.5 Short run Causality

Cointegration between two variables does not specify the direction of a causal relation between the variables. Economic theory guarantees that there is always Granger Causality in at least one direction, as such a short run causality test was carried using the langrage multiplier concept to verify if the lags can cause gross fixed capital formation in the short run. The results are presented in table 6.

Table 6: Test for Short run Causality

Test for Short run Causality	
Population growth rate	***Exchange rates***
[D_gfcf]LD.pop = 0	[D_gfcf]LD.exch = 0
[D_gfcf]L2D.pop = 0	[D_gfcf]L2D.exch= 0
chi2(2) = 6.21	chi2(2) = 25.13
Prob > chi2 = 0.447	Prob > chi2 = 0.0237
Remittances	***Savings***
[D_gfcf]LD.rem = 0	[D_gfcf]LD.sv = 0
[D_gfcf]L2D.rem = 0	[D_gfcf]L2D.sv = 0
chi2(2) = 5.53	chi2(2) = 16.42
Prob > chi2 = 0.0429	Prob > chi2 = 0.0003
Real per capita GPD growth rate	
[D_gfcf]LD. pergdp =0	
[D_gfcf]L2D. pergdp = 0	
chi2(2) = 4.18	
Prob > chi2 = 0.1237	

Source: Author's Computation

The null hypothesis tested was

Ho: All the lags are equal to zero.

Ha: All the lags are not equal to zero.

From table 6 above, in the case of Per Capita GDP and population growth rates the Ho can be accepted. The Ho can be rejected for exchange rates, remittances and savings because their Prob>chi2 value is less than 0.05, implying there is a short run causality running from these variables to gross fixed capital formation of housing in Kenya.

4.6 Test for normality

Jarque-Bera test was run to check if the residuals of the equations were normally distributed, the results were presented in table 7:

Table 7: Jarque-Bera test for Normality

Jarque-Bera test for Normality			
Equation	**chi2**	**df**	**Prob>chi2**
D_gfcf	2.033	2	0.36179
D_ PerGdp	0.041	2	0.97978
D_pop	25.287	2	0
D_sv	0.547	2	0.7608
D_exch	4.97	2	0.08332
D_rem	67.132	2	0
ALL	100.009	12	0

Source: Author's Computations

The hypotheses of this test are:

Ho: Residuals of gross fixed capital formation equation are normally distributed
Ha: Residuals of gross fixed capital formation equation are not normally distributed

From table 7, the null hypothesis was accepted because the probability was more than 0.05 significance level, implying the results of the equation were as well accepted in this analysis.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0 Conclusion

The objective of this study was to identify the main factors that determine capital formation in the Kenya's housing sector. The main factors that were studied, having been guided by economic theory were; population growth rate to proxy annual aggregate demands for dwelling units, per capita GDP growth rate to proxy income and purchasing power of Kenyans, interest rates to proxy for the cost of investments, savings as proxy of finance for investments, exchange rates as a proxy for cost of importing construction materials, and both remittances and foreign direct investments as proxy for more resources for investments in housing in Kenya.

The data used for these variables, was secondary time series data and as such had to be subjected to a stationarity test using the augmented dickey fuller test. The results showed that interest rates and foreign direct investments variables were stationary while savings, exchange rates, remittances, population growth rates, per capita GDP and gross fixed capital formation for housing were all non-stationary.

The presence of non-stationary variables called for test of cointegration, in which Johansen criteria was used, and it showed there were at least 3 cointegrating equations amongst the variables. The presence of cointegrating equations called for the usage of the Vector error correction model to analyze the long run association among the variables.

The results showed that the 1st lags of Population growth rates, savings, exchange rates and remittances were statistically significant in explaining the changes in gross fixed capital formation Kenya in the long run. The results of this study are in line with those of Esteban & Altuzarra (2008), Muellbauer & Murphy (2008), Ong (2013), Manheim (2008), Sinai (2005) and Hassanali (2009) & Nabutola (2004); the only difference is that, Per capita GDP growth rate in Kenya was not found to be a significant factor in explaining the changes in gross fixed capital of housing. Short run test among the variables showed that there was also a short run causality running from exchange rates, remittances and savings to gross fixed capital formation of housing in Kenya.

5.1 Recommendations

Housing is important in every economy and as such measures to improve/promote investment in housing in any country are vital. To be able to spur this increase, it is important for policy makers to address the drivers of these investments. Population increase is an important factor in spurring investment in housing, both from the demand and supply side, and as such measures to control population growth rate can be implemented in the country, or perhaps the government should consider giving incentives to the rising population growth rates in order to facilitate them to invest in worthy housing in the country.

Savings have a positive impact on gross fixed capital formation of housing in Kenya, as such the country should consider increasing its savings as a percentage of GDP in order to spur more investments in housing. Deliberate monetary policies interventions should be instituted to check increase in exchange rates as the rate affect gross fixed capita formation negatively in the country.

The value of personnel remittance is largely determined by a country's foreign policy and the level of integration. The government should therefore invest to address all the hindrances to a progressive foreign policy and encourage economic integration both at regional and global level.

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APPENDIX 1

Scatter plot of the variables