

**THE DETERMINANTS OF HOUSE PRICES BY NATIONAL HOUSING  
CORPORATION IN KENYA**

**BY:**

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## DECLARATION

This is to declare that this research project is my original work that has not been presented to any other University or Institution of Higher Learning for examination.

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### DECLARATION BY SUPERVISOR

This is to declare that this project has been submitted for examination with my approval as the university supervisor.

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## **ACKNOWLEDGMENT**

I wish to wholly dedicate this project first and foremost to almighty God whose grace, providence and endless care, I cherish.

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To all others who gave a hand, I say thank you very much and you are assured of God's blessings in abundance.

## **DEDICATION**

To My parents Mr. and Mrs. John Chemase who tirelessly fought against the economic hurdles of this world to see their son attain the greatest gift of all, EDUCATION.

To my wife Emily and my sons Werkech & Boswony, who in the most trying times of this world, remained on my side, encouraging me at all times.

Finally To my brothers and sisters who indirectly paid for all this.

## **ABSTRACT**

This paper studies the determinants of house prices by National Housing Corporation (NHC) in Kenya. The main question addressed is whether the conventional fundamental determinants of house prices, such as GDP per capita, real interest rates, and construction costs, have driven observed house prices in Kenya.

This study relied on secondary data. The research adopted a case study of National Housing Corporation. Regression analysis was used to analyze the data and find out whether GDP per capita, real interest rates and construction costs determined house prices by NHC

The study shows that house prices in Kenya are determined to a large extent by the underlying conventional fundamentals and some transition-specific factors, in particular institutional development of housing markets and housing finance and quality effects.

There appears to be a strong correlation between the house prices and conventional determinants (GDP per capita, real interest rates, and construction costs).

A summary regression showed that the variables considered could explain that house prices were really determined by these variables.

## ABBREVIATIONS

- GLS - Generalized Least Squares.
- GIS - Geographic Information System.
- HUD - Housing Urban Development.
- IRR - Internal Rate of Return
- MPT - Modern Portfolio Theory.
- NGO - Non Governmental Organization.
- NHC - National Housing Corporation.
- NZ - New Zealand.
- PV - Present Value.
- REIT - Real Estate Investment Trust.
- UN - United Nations
- US - United States.
- UK - United Kingdom.
- US - United States.

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

According to Charles and Nearchs (2007) real estate is defined as land and buildings. They further argue that technically real estate consist of physical and land and structures while real property consist of legal interest associated with ownership of the physical real estate. Investors put their funds in real estate for regular income (rent) and or the capital appreciation it affords (Wurtzebach et al, 1995). Investments are generally classified into financial assets and real estates. Financial assets are claims to the company's wealth and determine how ownership of real assets is distributed among investors. Real assets comprises of land, buildings, machines, and knowledge that can be used to produce goods and services. They help in creating wealth and appeal due to rental income, tax write offs and capital gains (Bodie et al, 2008). According to Sharpe (2003) real estate pricing deals with the valuation of real estate and all the standard methods of determining the prices of fixed assets apply. Prices are limited by various factors such as incomes of potential buyers, the cost and ability to construct new property to increase supply and demand for rental units.

Bruno (1999) observes that real estate posses four types of resources that are not found in other investments. He notes that real estate is illiquid in nature than financial instruments, it is difficult to find a buyer and a seller and this raise transaction costs. He adds that there is no continuous auction trading market that exists for real estates and hence the quoted prices may not represent properties intrinsic values. Further he observes that real estates markets are likely to be segmented and therefore not as efficient as markets for other assets thus the cost of acquiring information is greater. Studies of the linkages between real estate prices and general economic conditions have an extensive history, beginning with tabulations suggesting the ways in which long swings in construction and price development were synchronized with long swings in aggregate economic activity

(Gottlieb, 1976). Recent studies have explored the implications of alternative representations of investor expectations upon real estate construction and the cyclical behavior of housing prices and the rents for non-residential properties. These models trace through the effects upon supplier and demander behavior of differing price expectations in the real estate market. The earliest models tease out the dynamic paths of housing prices and commercial rents which arise from exogenous expectations about the future course of prices.

More sophisticated models assume that households and firms have adaptive expectations about the future, assuming, for example, myopic behavior on the part of economic actors in which they forecast that current conditions or current rates of change will continue into the future. In the most modern formulation of market dynamics, actors are assumed to have rational expectations. That is, in response to unanticipated shocks in the housing or property market, economic actors, on average, is able to predict the market response correctly and are able to act upon that knowledge. Models such as these are able to generate patterns of price change over time in response to varying conditions in economic fundamentals and in economic shocks. (DiPasquale and Wheaton, 1992, and Case and Shiller, 1988). There has, however, been little or no research on the opposite line of causation -- the effect of changes in property markets upon subsequent economic conditions.

In his study, Shiller (1989) poses; can market fundamentals alone explain local house price dynamics? It therefore also provides indirect evidence on the role of psychology in house price cycles. To accomplish this, it derives an asset-based housing price model that explicitly incorporates the hypothesis of rational house price expectations and tests its ability to explain observed short-run fluctuations in real house prices. A number of recent empirical studies find that house price expectations may not be rational, in the sense that information available in one period can be used to predict house prices in future periods. Case and Shiller (1989, 1990), Mankiw and Weil (1989), all report that house price movements are positively correlated over the short-run. More importantly, information on

housing market fundamentals and past price increases can be employed to forecast future excess returns. Mankiw and Weil (1989) simulated the effect of demographic factors on real US house prices and found out that a model with myopic expectations does a much better job of matching observed house price dynamics than does an equivalent model with rational or forward-looking expectations. This implies that the price of housing does not anticipate predictable changes in demand.

Demand for housing, particularly in urban areas, has continued to rise without requisite movement on the supply side. This has pushed prices up making the houses affordable to but a few. The Kenyan urban housing sector is characterized by inadequate affordable and decent rental housing options, low-level of homeownership (about 16%) extensive and inappropriate dwelling units including slums and squatter settlements. It is estimated that while a total of 150,000 housing units are required annually in the urban areas to cater for the backlog, only about 30,000 units are developed every year. This scenario creates a great opportunity for investing in housing in our country (Housing Survey, 2012).

The Government through the Ministry of Housing has put great emphasis on the improvement of Housing. This has mainly been influenced by the fact that improvement in housing stock is a strategically important social and economic investment. In addition, well-planned housing and infrastructure of acceptable standards and affordable cost with essential services accords dignity, security and privacy to the individual, the family and the community. Besides this social function, housing is also an investment good contributing both directly and indirectly towards poverty reduction through employment generation, raising of incomes, improved health and increased productivity of the labour force (Housing Survey, 2012). Therefore, it is Government's long term strategy to improve livelihoods of Kenyans through facilitation of access to affordable and adequate housing in sustainable human settlements. The achievement of this goal will contribute to the realization of housing agenda as propagated by the constitution of Kenya 2010 and Vision 2030. This will be attained through:- development of and access to affordable and

adequate housing; enhanced access to affordable finance for developers and buyers; approval of housing sector incentives; enhanced research and development in Appropriate Building Materials and Technologies; and pursuit of targeted reforms to unlock the potential of the housing sector.

### **1.1.1 Brief Overview of the National Housing Corporation**

National Housing Corporation (NHC) is a state corporation body within the Ministry of Housing. It was established in July 1967 by an Act of Parliament which provides the basis for its existence and functioning. The history of NHC dates back in 1953 in colonial era when the Kenyan government created a Central Housing Board through the housing ordinance. In 1965 through the amended Housing ordinance of 1953, the NHC was established thereby replacing the Central Housing Board.

The corporation was mandated to develop decent and affordable housing, facilitating rural housing development, mobilization of local & international capital for housing development, forging partnership with local authorities, cooperatives, private sector and other stakeholders in housing development. Housing development is one of the key contributors towards attaining Vision 2030. NHC among other players play a significant role in ensuring the attainment of the vision by developing decent and affordable housing units. NHC serves a multi-stakeholder community. The stakeholders form strong base in the corporations endeavor to meet its ultimate mandate. These stakeholders include:- individuals, corporations, local authorities, partners and private sector and central government which is the main financier of NHC.

### **1.2 Problem Statement**

In a celebrated article written about two decades ago, Mankiw and Weil (1989) forecast that real house prices in the U.S. would drop by 47 percent by the year 2007. This forecast was based upon the changing demographics in the U.S. population. The model assumed the most myopic of expectations; that market actors did not take into account today the inexorable effect that known changes in demographic conditions would have on



housing prices tomorrow. The response to this article and the recent outpouring of research on the topic underscores the lack of consensus about the correct approach for forecasting housing price changes. Previous studies vary in both their geographic scope and in their attention to the complexity of housing markets. These studies range from detailed analyses of economic fundamentals in the context of aggregate national housing price trends (DiPasquale and Wheaton, 1994) to exploratory research applied to specific regions (Case and Mayer, 1995; Clapp and Giaccotto, 1994; Dua and Miller, 1996; and Smith and Ho, 1995). Only a few models that use economic fundamentals to explain housing price movements have been generalized and applied to explain price movements across local metropolitan areas (Poterba, 1991; Case and Shiller, 1990; and Potepan, 1996).

Housing does not only provide shelter for a family but is seen as a centre of its total residential environment (Wahab, 1991). Housing acts as a focus of economic activity, a symbol of achievement, social acceptance and an element of urban growth. To most individuals, housing represents the largest single investment of a lifetime. However, others see housing as a shelter and to fulfill their fundamental needs only. Kenya has been experiencing a rapid urban growth since the 1990s due to the increasing population and other economic activities. The high rate of urban growth was attributed to migration, increase in population size and income level, which has significantly contributed to housing market. The conditions of housing market have also changed due to increasing demand and fluctuating price. The buying of a residential property became influenced by affordability level. Indeed, the affordability level is important for one to buy and own a residential property (Bujang, 2006). Various factors are responsible for driving the housing price in the local market. Various studies have suggested that there are several factors that determine the prices of housing sector in various economies. However, these factors that affect the house pricing in the local market particularly in Nairobi are still not clear and need to be reviewed. The research seeks to examine the issue and shed more light on determinants of house prices.

Locally, few aspects of real estate have been reviewed. Njiru (2003) examined the performance of real estate markets within the Central business District in Nairobi; Kariuki (2006) carried out research on assessment of viability of real estate securitization in Kenya; Njoroge et al (2006) studied property sector in Kenya and finally Machuki (2011) studied the existence of Real Estate Investment Trusts (REIT's) needs by institutional investors at the NSE. To the best of the researcher's knowledge, there exists no literature on the determinants of house prices by NHC in the Kenyan context. This is the gap the study seeks to address by investigating various factors that influence the pricing of residential and commercial houses in Kenya.

### **1.3 Research Objective**

To establish the determinants of house prices by National Housing Corporation

#### **1.3.1 Specific Objectives**

- To establish whether interest rates determines house prices.
- To establish whether GDP per capital is a determinant of house prices.
- To establish whether construction cost is a determinant of house prices.

### **1.4 Value of the Study**

Government: The findings of this study will benefit a number of stakeholders; the management of NHC will use the information from the study as a reference point, as well as informing improvement on future best practices in pricing of the real estate units based on demographic factors. The study will also benefit the Ministry of Housing in coming up with policies geared towards providing decent and affordable housing and equally coming up with necessary legislation aimed at improving the housing sector in Kenya.

Real estate developers/agents: This study will also benefit real estate developers in the sense that they will understand different demographic aspects and use them as a basic for pricing their properties.

Donors: This study will provide valuable information to donors looking to partner with Kenyan Government in provision of decent housing. Various UN bodies and NGO's which strive to provide better housing for poor populace in slums will use the information in making sound decision as whether or not to fund certain sectors of the society.

Scholars: The findings of this study will also add value to the existing knowledge in the finance discipline. It will also form the basis upon which other related and replicated studies can be based on and also suggest potential research areas for future researchers.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter discusses various theories of real estate, determinants of house prices, empirical review and lastly chapter summary.

#### **2.2 Theoretical and Conceptual Framework**

#### **2.3 Theories of Real Estate**

In the literature of real estate, there is a wide range of theories that have been developed by various scholars. These theories include; portfolio theory of real estate and behavioural theory of real estate. These theories are explained below;

##### **2.3.1 Portfolio Theory of Real Estate**

Mueller, Pauley, and Morrill (1995) explain why institutional investors today must continue to consider both private direct real estate investments, as well as public or securitized forms of ownership, in order to develop an optimal portfolio that includes appropriate subcategories of real estate assets. Market depth, liquidity, asset quality, diversification, and price volatility are all considered strategically used portfolio management criteria in this must primer for the diversified portfolio investor (Mueller, 1995). Institutional real estate investment primarily pension reserve assets grew rapidly in the 1980s. The fiduciary demands of a growing asset pool coupled with disappointing results in the latter half of the decade led to an increasing interest in the application of MPT to the management of large-scale real estate portfolios. The results are similar to a study conducted in mid-1990 that surveyed the 426 largest institutional portfolios on portfolio management practices relating to diversification strategies, risk measurement, and evaluation of investment returns (Louargand, 1992).

The survey replicated several measures gathered by Webb in a 1983 survey to assess the rate of acceptance or utilization of ideas and techniques in the portfolio management community. Results indicate that change is perhaps slower than might be expected. Real estate performance measures have become more sophisticated in the past seven years with a shift away from accounting type measures toward fully discounted measures, including several variations on the IRR. Risk-adjustment techniques have changed to the extent that portfolio managers have a greater likelihood of using sensitivity analysis, but few other innovations are widespread. Only a small percentage of respondents use traditional tools of MPT-based analysis, but the majority are cognizant of recent developments in the literature that attempt to show alternative methodologies for achieving true diversification within real estate portfolios (Louargand, 1992). The results indicate that change is gradual and that some practices that have been discredited in the academic literature for many years may still be evident in the institutional community.

Investment styles and return objectives in real estate portfolio management have focused on higher return strategies: wealth creation, value added, income enhancement, and incremental risk. The ability of the REIT to achieve these goals through direct real estate (active) portfolio management is determined by management skills and experience. Due to real estate's illiquidity and asymmetric information flows, portfolio diversification and optimization strategies are followed over multiple periods. Where it may take a stock managers weeks to adjust the portfolio to new optimal weights based on new return and risk information, it may take the real estate portfolio managers up to three years to adjust the portfolio, depending on size, market conditions, etc. (Stoesser, 2000).

When developing large institutional real estate portfolios, one of the main objectives is to identify and target outperforming markets based on high risk-adjusted rates of return. Factors used in determining target markets are: real estate market opportunities, demographic attributes, and market size. Due to the capital intensity, high transaction and information costs, most direct real estate portfolio managers underwrite properties on a buy and hold basis, extending the investment horizon. This allows the manager to focus

on long-term cyclical labor market and demographic trends. For example, the emergence of the echo-boomer and retirement of the baby boomers are expected to support apartment markets in the future (Han, 1996). There are many factors contribution to the supply of apartments: tax policy, capital availability, estimated demand by developers, etc. Statistically significant variables determining new apartment supplies are: mortgage interest rates, housing affordability index, employment change, vacancy rates, and taxes (Gilberto, 1995).

Historically, real estate has shown negative correlations with financial assets due to lease inflation indexation, and correlations between real estate markets have been low due to industrial concentration by geographic area. The ability to add real estate to a stock or bond portfolio, or diversify across geographic-industrial class, provides diversification benefits to portfolio managers. Volatility in institutional real estate portfolios emanates from two sources; high risk/ return ratios, and capitalization rate pressure due to oversupply conditions or declining effective demand. Allocations to real estate asset portfolios are dependent on contributing returns and perceived risks associated with acquisitions (Bruce, 1991). There are many reasons why institutional real estate portfolio managers dispose of properties. The new institutional imperative for disposition strategies of real estate portfolios is generated by pressures on management in the following areas: re-emphasis on core business, product and geography; reaction to poor performance of real estate portfolios; new risk-based capital standards imposed by banks and institutional equity investors; and rapidly declining property income and asset values. Disposition strategies include: single asset management sales, portfolio auctions, pooled asset portfolio sales, bulk portfolio sales, securitized asset pooled asset sales, or raising REIT's in the portfolio into the public market (Buckley, 1994).

### **2.3.2 Behavioural Theory of Real Estate**

A behavioural framework for the real estate property discipline is provided by the activities model pioneered by Diaz (1993) Basic to this definition of real property are the two modeling components of economic activity i.e. the process of generating the supply

of or demand for some economic good and allocation of markets. Real estate is conceptualized as a space-producing process made up of centers or nodes of economic activity sewn together in a network of markets that allocates goods and services provided within activity centers to other activity centers. Early real property behavioural research examined the valuation processes of professionals. Today the bulk of the investigative product remains in this area although lending activities and negotiation activities have also been studied.

Research into normative versus descriptive processes was initiated by Diaz (1990). In this study, the actual valuation processes of expert residential valuers were found to differ substantially from normative models. Whereas the normative valuation process is fundamentally deductive commencing at the widest possible focus, valuers in this experiment used a more efficient, inductive process that began with the subject property. Adair, Berry, and McGreal (1996) concluded that residential valuers in their UK investigation viewed critical property characteristics differently from actual market participants. This questions both the appropriateness of normative valuation methodologies and positive models of value formation. Diaz, Gallimore, and Levy (2004) extended the study of normative and descriptive valuation behaviour to the UK and NZ. In this cross-culture comparative study, they found that the US normative model was cognitively demanding and departure was common, regardless of culture. The comparable sale selection processes used by experts were described and contrasted with novice selection processes by Diaz (1990).

Expert residential valuers used screening strategies not employed by novices. Experts also tended to consider less data as compared to novices suggesting the potential for sub-optimal and even biased results. The potential for biased results in comparable sales selection was also studied in Wolverton (1996) and by Gallimore and Wolverton (1997). These studies produced evidence that knowledge of subject property transaction prices could bias comparable sales selection as well as final value judgments. Both US appraisers and UK valuers were found to be susceptible to these biases but to differing

degrees; presumably due to differences in valuation culture. Diaz, Gallimore, and Levy (2004) noted that US appraisers and NZ valuers operating in cultures requiring disclosure examined more comparable sales than UK valuers where disclosure in the UK is uncommon.

Inspired by Tversky and Kahneman's (1974) work in heuristic problem solving, investigation into bias in valuation judgment is an important theme within the body of behavioural property research. Gallimore (1994) found that valuers might inappropriately give greatest weight to the most recently considered information. Evidence of a confirmation bias was uncovered by Gallimore (1996) where expert valuers indicated they make early, preliminary value judgments and then seek evidence in support of these early opinions. Havard (1999) found an upward bias among student valuers who were more likely to adjust a low valuation upward than a high valuation downward. Diaz and Hansz (1997) found that experts operating in geographically unfamiliar markets were influenced by anonymous expert opinions, but Diaz (1997) discovered no evidence that expert valuers operating in markets familiar to them were influenced in this manner. Market ambiguity leading to valuation uncertainty appears to be a critical factor triggering these anchoring behaviours. Working with expert valuers in unfamiliar markets, Diaz and Hansz (2001) uncovered other significant reference point anchors including unclosed contract prices on subject and comparable properties. Despite strong anchoring tendencies by novices, Cypher and Hansz (2003) found that expert appraisers disregarded a property's assessed value, an unsanctioned anchor, in forming valuation judgments. With a substantial amount of work undertaken with respect to anchoring behaviours in expert valuation judgment, it does appear that potent anchors require content validity.

As well as in the area of valuation, important behavioural research has been conducted in banking and negotiation. Hardin (1997) applied process tracing techniques to loan officers and found that a lender's perception of the attractiveness of a potential loan was a function of the lender's training and experience. When considering the same loans,



lenders with business lending training and experience consistently made recommendations in direct contrast to those made by lenders with property lending training and experience. The anchoring role that asking price plays in property negotiation was explored in a series of controlled negotiating experiments detailed by Black and Diaz (1996), Black (1997), and Diaz, Zhao and Black (1999). Property professionals as well as real property students gave inappropriate weighting to asking price in these experiments. Aycock (1999) designed a set of experiments to test the relative strengths of asking price versus initial purchase price as anchors in negotiated settlements. Among the property professionals serving as subjects, Aycock (1999) found no evidence that initial purchase price exerts a greater influence on settlement prices than relatively low asking prices, however did find evidence that relatively high asking prices had a greater influence on settlement prices than did initial purchase price.

## **2.4 Determinants of House Pricing**

The literature of international housing pricing suggests that there are number of key variables that are likely to influence the housing prices. These include interest rates, income, affordability, rental incomes, sentiments, wealth effects, crime and cost of construction.

### **2.4.1 Interest Rates**

Meen (1994) suggests that the most important factors affecting residential prices are interest rates. Meen states that since liberalization of mortgage markets in early eighties, the UK economy had become more sensitive to changes in interest rates. Therefore the stance of monetary policy was a central importance to housing. He warned that it did not follow that low interest rates was the answer for a healthy housing market but instead suggested that what was important was the stability of monetary policy.

Jud and Winkler (2002) further corroborated this conclusion in their US study in which they showed that real estate price appreciation between 1984 to 1999 was related to drop in after tax interest rates. Abraham and Handershots (1996) added further weight to this

view through their research which suggested that house price appreciation was negatively related to rise in real interest rates (Jud & Winkler, 2002). Case and Shiller (1999) in their study found that mortgage costs divided by disposable income was an effective prediction of house prices (Moore, 2002)

#### **2.4.2 Employment and Income**

Recent studies have concluded that there is a relationship between house prices and employment and income. Bartik (1991), using a lagged adjustment model to predict price changes, concluded that increases in house prices are directly influenced by employment growth. Furthermore, Abraham & Hendershott (1996) model of housing appreciation was also directly related to increases in employment (Jud & Winkler, 2002). Investigation by Case & Shiller (1999) found that changes in employment levels were effective in predicting house prices.

Gallin (2003) argued against the commonly accepted idea that house prices cannot continue to outpace growth in household income indefinitely. He stated that house prices and income were not cointegrated. He conducted statistical analysis tests using 27 years of national data and he did not find evidence of cointegration (Gallin, 2003). The significance of this is that if prices and income were cointegrated, then the gap between the two would be a useful indicator of when house prices were above or below their national equilibrium levels and would be a useful indicator for future house price changes. This view is supported by Meen (1994) who suggested that there was little validity in the use of house prices-to income ratios as an indicator of future price trends. However, he still cited household income as one of the most important factors influencing residential house prices.

#### **2.4.3 Affordability Levels**

Fife (2003) showed that average homeowners pay less of their salary on their monthly bond installment than they did 20 years ago. He felt that residential home buyers could therefore absorb as much as doubling of average house prices in developing countries. This factor

was highlighted in the review of industry literature. FPD Savills stated that affordability was a strong driver of house prices (Donnel, 2003). He defined affordability levels like previous scholars, in terms of proportion of income used in order to service mortgage payments. He suggested that when a small proportion of income used, the market could expect price increases.

#### **2.4.4 Rental Income**

Meese and Wallace (1994) advocated PV relationship for estimating house prices, namely that the price of a house should be equal to the PV of future rents, just as stock price equal to the PV of the future dividends. They found support of the relationship in data from San Francisco bay area, although they were unable to link the short term changes in house prices to rents (Moore, 2002). This provided some evidence that rent, fluctuations have an effect on the overall price of housing at any one time. Meen (1994) suggested that lack of significant private rental markets increases the sensitivity of house prices to variables such as interest rates and household incomes.

#### **2.4.5 Political Shocks and Sentiments**

The popular press and industry literature suggest that political shocks and sentiments do impact on property prices. Various news channels have highlighted this as a significant factor in influencing house prices. It is documented that the connection between the dramatic drops in activity in UK housing market and the terrorist attack in the US in 2001. Political and other world events were cited as having influence on house prices in developed countries. FPD Savills pointed towards uncertainty over the war in Iraq as a cause of slowing house prices in UK in early part of 2003 (Donnel, 2003)

Porteba (1991) suggested that investors in their owner-occupied houses did not have rational expectations, further complicating the forecasting of residential property prices. He found out that many investors simply extrapolated the past in estimating the prospective capital gains on housing for the future. He suggested that this could explain the relatively robust performance of house prices in 1980's , since investors had not yet

recognized that real user costs were substantially higher than in the 1970's (Porteba, 199). This also implies that the aftermath of declining house prices in many regions during the late 1980's could have been a period of slack housing demand, as many potential homebuyers would have extrapolated recent price reductions and concluded that house prices will continue to fall.

#### **2.4.6 Wealth Effects**

There is a potential that wealth effects can affect property prices. Biz/ed highlighted on the relationship between equities and house prices. There is evidence that US equities would negatively affect UK property prices (Biz/ed, 2002). Catella (2002) argues the opposite and suggests that the persistent falls in the world equity markets had caused the increased capital inflows into real estate, and that these capital inflows had supported further price rise throughout Europe. FPD Savills provided further support for this by suggesting that the poor performance of equities was a driver for residential property prices within the UK in 2002 and early 2003 (Donnel, 2003).

Anari and Kolari (2002) analyzed the relationship between house prices and prices of non-housing goods and services in US. The authors selected this field of research as home-owner equity represented the largest portion of most households' investment portfolios. Movement in real value of homeowner equity may therefore have strong implications for personal wealth, as well as for national economy.

#### **2.4.7 Construction Cost and Crime**

Construction cost is believed to be the major factor influencing house prices in the developing world. Crime was also cited to have an influence on the housing markets in press and in the academic literature. Business day drew attention to the issue of high levels of crime, and its detrimental impact on the property market (Business Report, July 2003). Crime was highlighted by Lynch and Rasmussen (2001) as a factor which can lead to a severe drop in property prices. Their research used data over 2800 house sales in Florida, US to estimate the impact of the crime on home prices. The crime data was

weighted according to the seriousness of offences classified by the cost of crime to victims. They concluded that the actual cost of crime to victims had virtually no impact on house prices in overall although the authors did conclude that homes in high crime areas are highly discounted.

## **2.5 Empirical Review**

For many households, owner-occupied houses do not only offer an alternative for a place to live in. They represent the most important chunk of assets in these household's portfolio. Indeed, in most industrialized countries real estate is the greatest component of private households' wealth. As a consequence, the value of their house has a major impact on households' consumption and savings opportunities (Case et al., 2004). House prices are therefore of great interest to real estate developers, banks, policy makers or, in short, the general public as well as to actual and potential home owners (Schulz and Werwatz, 2004).

The housing market is defined as one where housing services are allocated by the mechanism of supply and demand. One of the characteristics of the housing market that is different from markets of goods and services is the inelasticity of housing supply. Housing services are one of the most expensive household expenditures. Changing housing prices have been of concern to both individuals and governments in that they influence socio-economic conditions and have a further impact on national economic conditions. Expectations of capital gains from housing investments would affect housing prices by increasing the demand for housing; which in turn, would cause high volatility in housing prices. This causes increases in housing prices since the supply of housing cannot adjust in the short run. The housing market can be influenced by macro-economic variables, spatial differences, characteristics of community structure, and environmental amenities (Kim and Park, 2005).

The valuation of real estate is required to provide a quantitative measure of the benefit and liabilities accruing from the ownership of the real estate. Valuations are required, and

often carried out, by a number of different players in the marketplace such as real estate agents, appraisers, assessors, mortgage lenders, brokers, property developers, investors and fund managers, lenders, market researchers and analysts and other specialists and consultants. Market value is estimated through the application of valuation methods and procedures that reflect the nature of property and the circumstances under which the given property would most likely trade in the open market (Pagourtzi et al., 2003). Numerous methods are available to estimate market value in the literature. Pagourtzi et al. (2003) classify these methods into two categories: traditional and advanced. It is stated in the paper that, the majority of all methods will rely upon some form of comparison to assess market value, and this may be done, in its simplest form, by direct capital comparison or may rely upon a range of observations that allow determining a regression model. Any such method in their paper is referred to as 'traditional'. Other models or methods that try to analyze the market by mimicking the thought processes of the players in the market in an attempt to estimate the point of exchange are referred to as 'advanced'. Herein, the traditional valuation methods are comparable method, investment/income method, profit method, development/residual method, contractor's method/cost method, multiple regression method and stepwise regression method. On the other hand, the advanced valuation methods are Artificial Neural Networks, hedonic pricing method, spatial analysis methods, fuzzy logic and autoregressive integrated moving average. In this paper, we employ hedonic pricing method in our analysis.

In property valuation and housing market research, the locational value is usually analyzed by hedonic methods that use multiple regression techniques on large data sets and require a formality based on microeconomic theory in the analyses. Hedonic methodology is mainly used for market valuation of goods for their utility bearing characteristics. The goods under consideration embody varying amounts of attributes and are differentiated by the particular attribute composition that they possess. In most cases, the attributes themselves are not explicitly traded, so that one cannot observe the prices of these attributes directly. In such a case, hedonic pricing models are very essential in order to determine how the price of a unit of commodity varies with the set of attributes it

possesses. If the prices of these attributes are known, or can be estimated, and the attribute composition of a particular differentiated good is also known, hedonic methodology will provide a framework for value estimation (Ustaoglu, 2003).

Hedonic price model is based on Lancaster (1966)'s consumer theory. Since this theory has been extended to the residential market by Rosen (1974), residential hedonic analysis has become widely used as an assessment tool and for property market and urban analysis. The regression of house prices on a variety of property specific and neighborhood descriptors evaluates their marginal contribution, also called implicit or hedonic prices. A comprehensive treatment of hedonic price theory is provided by Rosen (1974). A theory of hedonic prices is formulated as a problem in the economics of spatial equilibrium in which the entire set of implicit prices guides both consumer and producer locational decisions in characteristics space.

Residential housing is an important aspect of quality of life in any community. Therefore, appropriate valuation of specific characteristics of a residential house is in order. To achieve this objective, empirical researchers often specify hedonic price functions or hedonic models (Ogwang and Wang, 2003). Among the researches, Adair et al. (2000) focuses upon factors affecting the price structure of residential property in the Belfast Urban Area, examining the relative influence of property characteristics, socio-economic factors and the impact of accessibility. The analysis highlights the importance of investigation at a sub-market level and draws conclusions regarding the complexity of relationships within an urban area. Janssen et al. (2001) compares the performance of least squares and least median of squares, a robust method, in the estimation of price/income relationships for apartment buildings. Meese and Wallace (2003) compare two methods to evaluate the effect of market fundamentals on housing price dynamics.

The first method follows the traditional two-step procedures found in the literature in which one first estimates a house price index and then uses the estimated index in subsequent structural modeling. The second method applies a Kalman filter strategy that

allows for the simultaneous estimation of the parameters of a dynamic hedonic price model, the price index and the parameters of a structural model for housing prices. Stevenson (2004) re-examines the issue of heteroscedasticity in hedonic house price models. The results largely support previous findings with evidence of heteroscedasticity with respect to the age of dwelling. The iterative GLS (Generalized Least Squares) correction, which is specified in terms of age, eliminates all heteroscedasticity at both aggregate and disaggregates levels. Fletcher et al. (2000) argue that a wider range of diagnostic statistics should be used in the specification search for a good model, in particular, but not exclusively, those concerned with predictive stability.

Recent studies illustrates this approach by examining both in-sample and out-of-sample diagnostic tests of various specifications of a hedonic house price model using data taken from the sale of over 1,600 properties in the Midlands of the UK in 1999/2000. Bin (2004) estimates a hedonic price function using a semi-parametric regression and compares the price prediction performance with conventional parametric models. Data from Geographic Information Systems (GIS) are incorporated to account for locational attributes of the houses. Bao and Wan (2004) illustrate how the technique of smoothing splines can be used to estimate hedonic housing price models. Their illustration takes the form of a rather limited, but very promising, application with Hong Kong data. Kim and Park (2005) identify the spatial pattern of housing price changes and their determinants in Seoul and its neighboring new towns. The results of a cluster analysis show that the spatial pattern of housing price change rates is not correlated with housing prices.

Filho and Bin (2005) model a hedonic price function for housing as an additive nonparametric regression. Estimation is done via a back fitting procedure in combination with a local polynomial estimator. It avoids the pitfalls of an unrestricted nonparametric estimator. They compare their results to alternative parametric models and find evidence of the superiority of our nonparametric model. Fan et al. (2006) utilize the decision tree approach, which is an important statistical pattern recognition tool in examining the relationship between house prices and housing characteristics. Using the Singapore resale



public housing market as a case study, the article demonstrates the usefulness of this technique. Kestens et al. (2006) introduce household-level data into hedonic models in order to measure the heterogeneity of implicit prices regarding household type, age, educational attainment, income, and the previous tenure status of the buyers. Two methods are used for this purpose: a first series of models uses expansion terms, whereas a second series applies Geographically Weighted Regressions.

## **2.6 Chapter Summary**

The purpose of this literature review is to investigate the determinants of house prices by NHC. This study generally highlights the various aspects that effect pricing in real estate sector. The knowledge of this information was used in data collection so as to meet the objective of the study.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter articulated the methodology used in the study to find answers to the research question. In this chapter, the research methodology is presented in the following order, research design, target population, sampling procedure, data collection methods, instruments of data collection and finally the data analysis.

#### **3.2 Research Design**

According to Denvir & Millet (2003), a research design provides glue that holds a project together. A design is used to structure research, to show how all the major parts of the project, which include sample or groups, measures, treatments or programs, and methods of assignment that work together to try to address the central research question. This study adopted a descriptive design that aimed at exploring the determinants of house prices by NHC. This is because the study seeks to establish a relationship between various variables. A descriptive case study was undertaken in this study.

#### **3.3 Population**

According to Mugenda and Mugenda (1999), a population is a well-defined as a set of people, services, elements and events, group of things or households that are being investigated. The population was the National Housing Corporation in Kenya from 2007 to 2011 (being a case study). This period was considered long enough to provide sufficient variables to assist in establishing the determinants of house prices in Kenya. This period was chosen in order to capture the most recent data and to give results that reflect the current trend.

### **3.4 Sample Design**

A case study and judgmental sampling technique was used in this study. Yearly data for the period 2007 to 2011 was used. The study was limited to NHC due to lack of readily available data among the other real estate property financiers.

### **3.5 Data Collection**

The data was collected from secondary sources in this study. The data was obtained from NHC library, organizations records such as in-house magazines, journals, publications as well as NHC website and other resourceful information available at the NHC secretariat for 5 years from 2007 to 2011. The data extracted included Construction costs, interest rates and GDP per capita income.

### **3.6 Data Analysis**

According to Marshall and Rossman (1999), data analysis is a process of bringing order, structure and interpretation of mass collected data. In this study, data was systematically organized in a manner to facilitate analysis. Data analysis involved preparation of the collected data, coding, editing and cleaning of data in readiness for processing and analysis using SPSS package version 20. SPSS was preferred because it is systematic and covers a wide range of the most common statistical and graphical data analysis. Regression model was used to establish the relationship between the variables.

### **3.7 Model Specification**

Multiple regression models were used in this study since it allows simultaneous investigation of the effect of two or more variables Zikmund (2003). The model was used establish the determinants of house prices by NHC. In regression terminology, the variable that is predicted is called dependent variable while the variable used to predict the value of dependent variable is called independent variable. Data collected was analyzed using multiple regressions. The significance of each independent variable was tested at a confidence level of 95%. In this study, dependent variable was pricing and

independent variables being; construction costs, interest rates and GDP per capita income. For the variables in this study, an average was computed for each year and then simple average for all five years computed. The equation representing the algebraic expression of multiple regression model of the form below was applied;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Where **Y**= Pricing (dependent variable).

**$\beta_0$** = Constant which defines pricing without inclusion of independent variables

**X<sub>1</sub>-K**= Independent variables are,

**X<sub>1</sub>** = Costs

**X<sub>2</sub>** = Interest rate

**X<sub>3</sub>** = GDP per capita income

**$\epsilon$**  = Error Term

**$\beta_1$  -K** Regression coefficients- define the amount by which Y is changed for every unit change in independent variables.

## CHAPTER FOUR

### DATA ANALYSIS AND PRESENTATION

#### 4.1 Introduction

This chapter gives the results of the analysis where the researcher has used collected data from the National Housing Corporation. The researcher used computer excels and SPSS in data analysis where the results are then presented inform of charts and tables for easy understanding and interpretation.

#### 4.2 Determinants of house prices by National Housing Corporation

The researcher sought to determine factors that determine house prices at the national housing corporation between periods of 2007 to 2011. Factors that were considered for the study are GDP/Capita income, construction cost and prevailing interest rates.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where **Y**= Pricing (dependent variable).

**$\beta_0$** = Constant which defines pricing without inclusion of independent variables

**X<sub>1-K</sub>**= Independent variables are

**X<sub>1</sub>** = Costs

**X<sub>2</sub>** = Interest rate

**X<sub>3</sub>** = GDP per capita income

**$\varepsilon$**  = Error Term

**$\beta_1$  -K** Regression coefficients- define the amount by which Y is changed for every unit change in independent variables.

The results of the regression equation are as illustrated in table 4.1 below:

**Table 4.1 Model Summary**

Model	R	R <sup>2</sup>	Adjusted R Square	Std. Error of Est
1	.812 <sup>a</sup>	.659	.431	.0467308

a. Predictors: (Constant), GDP per capita income and Costs

The study results in table 4.1 indicate how much of GDP per capita income, costs and interest rates affect house prices. The findings in column R<sup>2</sup> is a measure of how much the variability in the outcome is accounted for by the predictors. In this table its value is 0.659 which means that GDP per capita income and Costs accounts for 65.9% of the level of variability in house prices. The adjusted R<sup>2</sup> gives us how well our model generalizes and ideally its value should be the same or very close to R<sup>2</sup>; from the model in table 4.1, 0.431 is the value for Adjusted R<sup>2</sup> which means that, if the model were derived from a population rather than a sample, it would account for 43.1% less variance in house prices by the housing finance. Interest rates were not considered in this study since it was constant and were therefore deleted from the out-put automatically by the SPSS software.

**Table 4.2 Coefficients<sup>a</sup> of GDP per capita income and Costs**

Model	Unstdized Coefficients		Std Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.010	.021		-.477	.680
Construction Costs	1.150	.000	1.000	7096.411	.098
GDP per capita income	2.790E-7	.000	.000	.501	.666

a. Dependent Variable: price in millions

The study results in table 4.3 indicate that there is a direct relationship between house prices and cost of construction in and GDP per capital income due to the positive values of the coefficients. Testing at 5% (0.05) significance level, all the variables under review are non-significant since their p-values (Sig.) is greater than 0.05 ( $p > 0.05$ ) for all of them. The study used the values under Unstandardized Coefficients B for the coefficients for the variables.

In an attempt to answer the following research question:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

$$Y = -.010 + 1.15CC + 2.790E-7 \text{ per capita income} + .021 \text{ (Standard Error of the Constant)}$$

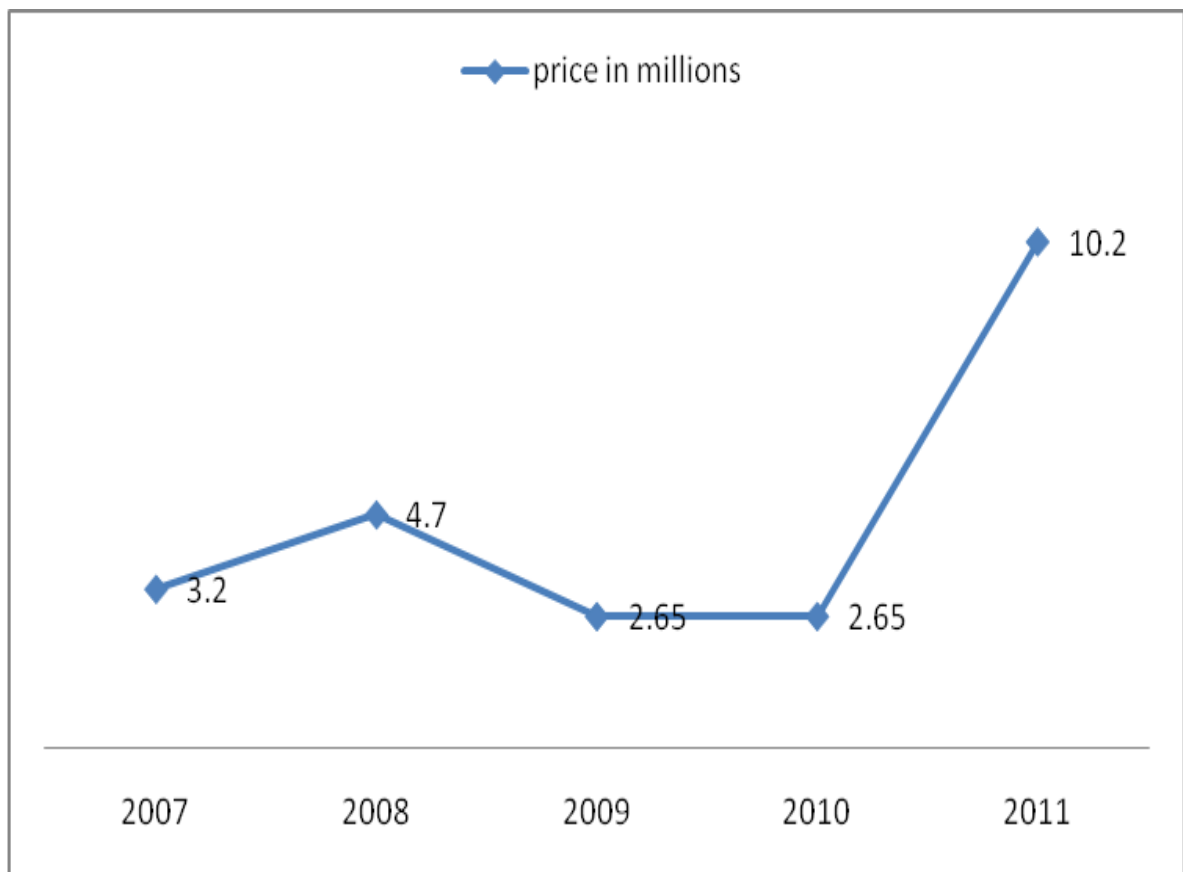
Y= House prices in millions

CC= Cost of construction in millions

### 4.3 Trends of Housing Prices from 2007 to 2011

The study findings in figure 4.1 indicate the trends of housing prices in millions from 2007 to 2008 where it illustrates the movements of prices across the five year period.

**Figure 4.1 Trends of Housing Prices from 2007 to 2011**



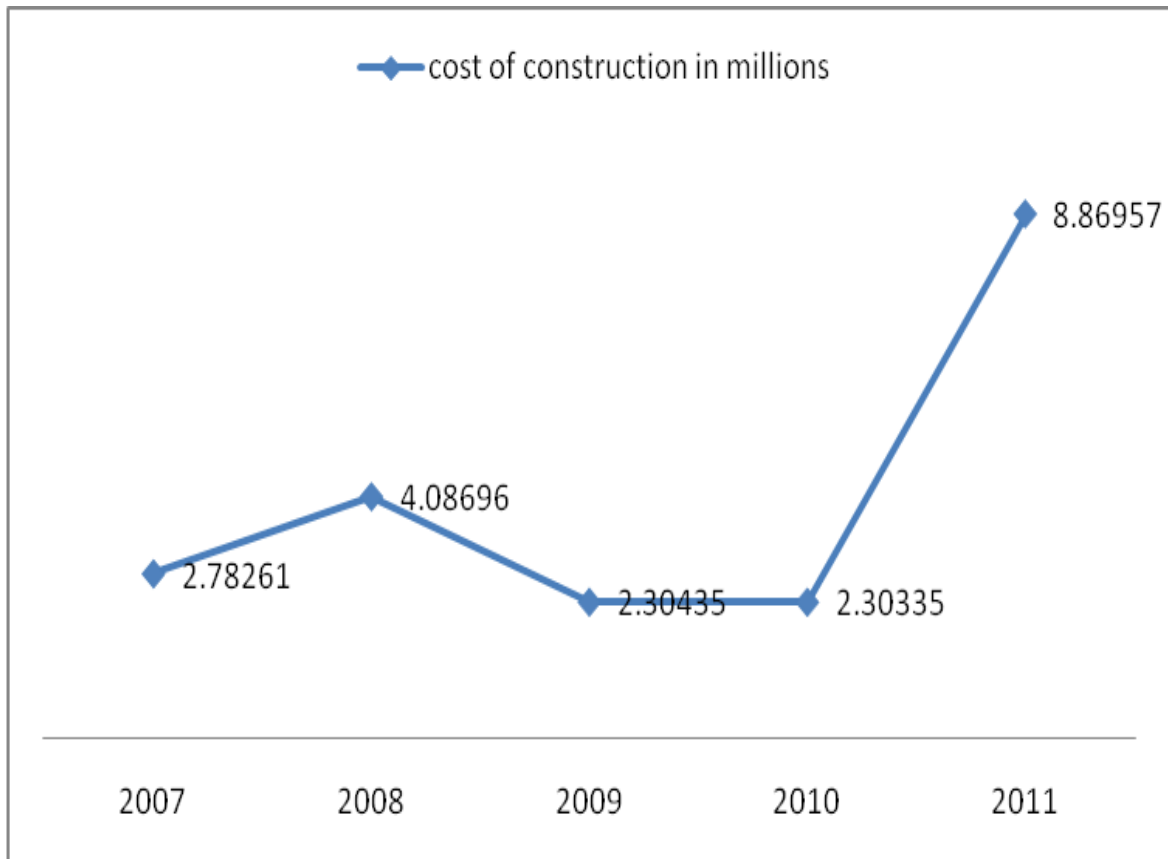
The study results in figure 4.1 indicate that the housing prices from 2007 went up to 2008 after which it decreased to 2009 then it remained constant till 2010 where it again increased from 2010 to 2011. The variation in the movement can be attributed to the changes in the cost of construction and GDP per capita income though the two have not recorded any similar changes and they also have different weights when it comes to the influence on the housing prices as given by the housing finance data. The study results have only indicated the performance for the period of 2007 to 2011 since that is the duration of the study. The prices given are representative of the major housing units that were presented in that year.



#### 4.4 Trends of Cost of Construction from the year 2007 to 2011

The study findings in figure 4.2 indicate the trends of cost of construction in millions from 2007 to 2008 where it illustrates the cost movements across the five year period.

**Figure 4.2 Trends of Construction Cost from 2007 to 2011**

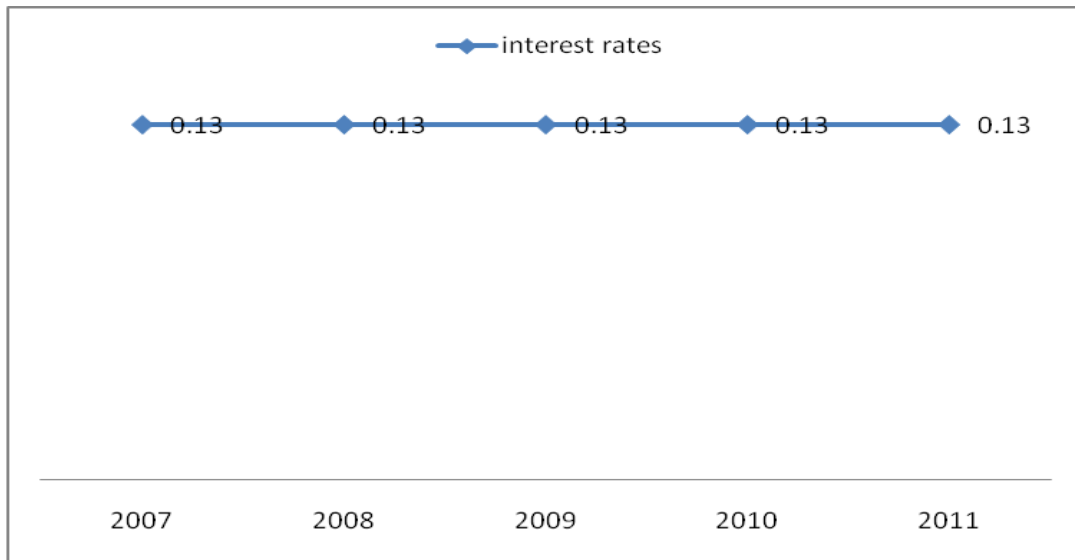


The study findings in table 4.2 indicate that the cost of construction went up soon after 2007 till 2008 after which it went down till 2009 then remained constant up to the year 2010 after which it sharply shot up to 2011. The variation in the movement can be attributed to the changes in GDP per capita income though the cost of construction has different weights when it comes to the influence on the housing prices as given by the housing finance data. The study results have only indicated the performance for the period of 2007 to 2011 since that is the duration of the study. The construction costs given are representative of the major housing units that were presented in that year.

#### 4.5 Trends of Interest Rates from the year 2007 to 2011

The study findings in figure 4.3 indicate the trends of Interest from 2007 to 2008 where it illustrates the cost movements across the five year period.

Figure 4.2 Trends of Interest Rates Cost from 2007 to 2011

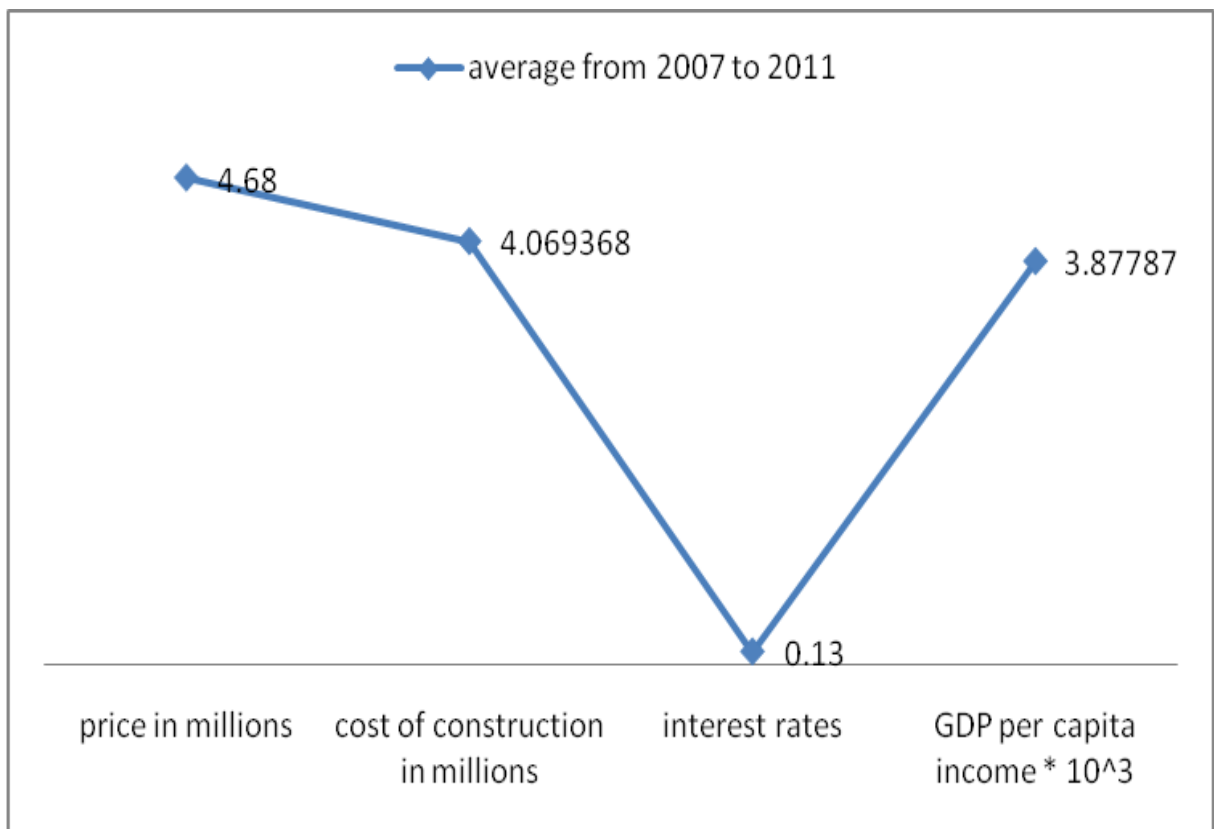


The study results in figure 4.3 indicate that the interest rates have not been changing for the period of five years from 2007 to 2011. This indicates that the study was conducted on a constant interest rate of 13% as illustrated in the study. The variation in the movement of housing prices is attributed by other factors like GDP per capita income other than and cost of construction other than the interest rates. The study results have only indicated the performance for the period of 2007 to 2011 of the interest rates since that is the duration that the researcher felt was best for this kind of study based on the available data. All the variable under review in this study is representative of the major housing units that were presented in that year.

#### 4.6 Trends of Averages from the year 2007 to 2011 of the GDP per Capita, Interest Rates and Cost of Construction

The study findings in figure 4.4 indicate the averages for the GDP per capita, interest rates and cost of constructions for the period of 2007 to 2011. This gives the general summary of the variables under study.

**Figure 4.4 Trends of Averages from the year 2007 to 2011 of the GDP per Capita, Interest Rates and Cost of Construction**



The study results in figure 4.4 has indicated that interest rates were the lowest at 0.13 followed by GDP per capita (3.87) incomes then construction cost and finally house prices was the highest with 4.68.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter gives the summary, recommendations and conclusions that were captured by the researcher. The study further illustrates the recommendations that can be adopted by NHC in improving the sale of their developed housing schemes.

#### 5.2 Summary

The study found out the determinants of house prices by national Housing Corporation in Kenya where the researcher use cost of construction, interest rates and GDP per capita as independent variables against housing prices as the dependent variable. The coefficients of each variable were obtained using regression equation to determine the weight of each of the independent variable in determining the housing prices. The concentration was based on the current housing units that were launched by NHC from the year 2007 to 2011.

The study found out that there other factors influencing housing prices as supported by the column  $R^2$  as given by 65% representation in the model summary under table 4.1. This finding was also supported by that of Kim and Park, (2005) that stated that the housing market can be influenced by macro-economic variables, spatial differences, characteristics of community structure, and environmental amenities. The study also found out that GDP per capita income influences housing prices at a higher rate than cost of construction. This finding is also supported by the study conducted by Pagourtzi et al., (2003) on the estimation of the market value of the housing using GDP per capita income as the only variable. He found out that the change in GDP per capita income has a direct influence on the changes of the house prices and the weight of changes in house prices is significant and can't be ignored in house construction or the development of any housing units.

Finally, the study found out that, interest rates plays a major role in the determination of house prices owing to the coefficients of determinants obtained in table 4.2 for the regression equation results. This finding is also supported by the study conducted by Meen (1994) who observed that the most important factors affecting residential prices are interest rates. Meen illustrated in his observation that since the liberalization of mortgage markets in early eighties, the UK economy had become more sensitive to changes in interest rates. Therefore the stance of monetary policy was a central importance to housing. He went further and warned that low interest rates were the answer for a healthy housing market in the developed world.

### **5.3 Conclusion**

The study concludes by indicating that for the development of any housing scheme, GDP per capita income and cost of construction must be observed. There is heavy dependent of the house prices on the cost of construction and the GDP as indicated in this study findings. The study further concludes that though interest rates tend to remain constant for a longer period of time, they are equally important in determining the housing prices of the study. For the success any housing scheme, the interest rates, cost of construction and GDP per capita must be taken into consideration.

The study also found out though it is believed that housing prices is majorly influenced by the cost of construction and GDP, there are other factors like cost of crime, political environment and employment rates that affect housing prices. The study has clearly indicated in the literature review that the political temperature prevailing in the region is likely to influence the investor's attitude on housing investments thus raising housing demand consequently prices. The rate of crime on a particular region might discourage investment in housing units and might make cost of construction go up since contractors would incur extra security costs in attempt to protect the building materials, plant and equipment to be used in the construction site.

The study finally concludes by stating that for any efficient housing development in the region, the government has to take consideration on the rate of GDP, construction cost

including controlling crime rates in the region and reducing the employment rates. The study findings can then be adopted by the Housing Ministry and organization involved in real estate development. The recommendations given below would be efficiently adopted by any interested party in the property development.

## **5.4 Recommendation**

Based on the study findings, the study makes the following recommendations to the study:

### **5.4.1 Policy Recommendations**

The government should reduce the cost of construction through tax reduction and other measures like subsidies that can reduce construction costs. The current taxation system should be reviewed to avoid the double taxation with particular reference to the construction materials to control the housing prices.

The government should also take proper measures in dealing with the employment rates in the region since this contributes to the increase of housing prices. If the current unemployment rate is not checked, the cost of construction would go up since there would be extra costs in the security of building materials to the contractors.

The government through the Central Bank should control the interest rates since that would allow for more borrowing in the proper development market. The reduction on construction rates has been attributed to high interest rates in the region that discourages individuals from borrowing to aid the property development.

The government should find ways of activating economic activity to raise GDP that would economically empower the public towards property development. Low per capita GDP has been found by the researcher to lower the rate house construction. The government should improve on the measures of economic empowerment to the citizens since this would control the housing prices.

#### **5.4.2 Recommendations for further studies**

The researcher recommends further studies on the determinants of housing prices on other property agents other than NHC.

The researcher further recommends further studies on determinants of housing prices other than GDP per capita income, interest rates and construction cost.

Further research is recommended on the specific effect of demographic factors in the house pricing within the Kenyan property industry.

The variables identified in the study can be tested on property financiers other than NHC. The additional information obtained thereof including the results of this study can be used to draw generalization for the property financiers in Kenya.

Further research should be done on a profit oriented enterprise, NHC is a state corporation thus not fully profit oriented.

#### **5.5 Limitation of the Study**

Although the research has reached its aims, there were some unavoidable limitations. The study mainly relied on secondary data obtained from National Housing Corporation as such the researcher placed high reliability strictly on this data.

The researcher used a case study of NHC. Though useful, the study may not be used to make generalizations about other property financiers in Kenya; thus the variables identified are tentative suggestions of the variables that determine house prices across real estate industry in Kenya.

The study limited to a not fully for profit organization thus should have involved a study on a private financier or profit oriented organization.

The study narrowed to down to test only three variables as determinants of house prices by NHC; the cost of construction, GDP and interest rates. Other determinants were not explored to access their impact on house prices.

The constant rate of interest in the five years of study could not be adequately accommodated in the analysis thus was automatically deleted from the output by the SPSS software.



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#### APPENDIX I

<b>AUTHOR</b>	<b>TITLE</b>	<b>OBJECTIVE</b>	<b>METHODOLOGY OF DATA ANALYSIS</b>
<b>Gitonga</b>	The performance of real	To investigate the	Research design is



<b>Njiru (2003)</b>	estate markets within Central Business District in Nairobi	performance of real estate markets within Central Business District in Nairobi	descriptive in nature and uses primary data in data analysis.
<b>Kariuki (2006)</b>	An assessment of viability of real estate securitization in Kenya	An assessment of viability of real estate securitization in Kenya	Research design is descriptive in nature and uses simple regression model.
<b>Michuki Diana Wambui (2011)</b>	The existence of Real Estate Investments Trusts (REIT's) needs by institutional investors at the NSE	To establish the existence of Real Estate Investments Trusts (REIT's) needs by institutional investors at the NSE.	Research design is descriptive in nature and uses primary data in data analysis.
<b>Kiplimo Sirma (2012)</b>	The relationship between pricing and demographic factors in real estate investments by property financiers; a case study of National Housing Corporation	To establish the relationship between pricing and demographic factors in real estate investments by property financiers; a case study of national housing corporation	The research design is descriptive in nature and uses multiple regression for data analysis

#### APPENDIX II: DATA USED

Years	price in millions	Cost of construction in millions	Interest rates	GDP per capita income
2007	3.2	2.78261	0.13	37525.8

2008	4.7	4.08696	0.13	39144.2
2009	2.65	2.30435	0.13	38748.95
2010	2.65	2.30335	0.13	38739.6
2011	10.2	8.86957	0.13	39734.95