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THE SOURCES OF HOUSING PRICES GROWTH IN KENYA

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THE SOURCES OF HOUSING PRICES GROWTH IN KENYA

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Abstract

Purpose: The objective of the study was to analyze the sources of housing prices growth in Kenya

Methodology: The study used time series data for the period 1960 to 2015 and adopted an ARDL modeling approach. The model was useful as housing prices behaves differently from other goods' prices, and as such, previous values of housing prices were necessary in estimations. The model also suited for small sample size and for its capacity to estimate short-run and long-run dynamics. The ARDL model also distinguishes dependent and explanatory variables.

Results: The study findings showed that the sources of housing prices growth included household consumption expenditure, construction cost and property taxes both in the short-run and long-run. Private capital inflows and households' indebtedness have a positive transitory effect to the housing prices. Against the popular view, supply of housing have no effect on housing prices.

Unique contribution to theory, practice and policy: The Kenya National Housing Corporation needs to make public and encourage the use of readily available alternative building material besides the conventional material while not compromising on quality to address the overreaction of housing prices.

Keywords: *Housing Prices, Macroeconomic Stability, Housing Price Boom and Affordability*

1.0 INTRODUCTION

Housing is one of the basic human needs besides food and clothing in a society. It is one of the most basic human rights and an essential component of adequate standard of living (Demary, 2009). Further, adequate and affordable housing is not only necessary for security and comfort, but also critical in fostering social cohesion and development of a nation as it provides independence, privacy and amenity. Moreover, the housing purchase is linked to the purchase of other goods, not just through obvious household items such as furniture and so on, but through the purchase of neighborhood, local government services and workplace accessibility. Beyond its socio-cultural elements, housing is also a critical driver of economic development as a result of its forward and backward linkages with other economic development processes since the purchase of a house is as much an investment decision as well as consumption decision (Stiglitz, 1990). In addition, households with modest means need safe and suitable housing that they can afford. When housing is affordable, low and moderate income families are able to put nutritious food on the table, receive necessary medical care, and provide reliable care for their children (Wardrip, Williams & Hague, 2011).

The distinction in the demand and supply factors that drive real housing prices is between those that have a longer-term influence and those that affect shorter-term dynamics. Factors that are mainly noted to influence the demand for housing over longer horizons include growth in household disposable income, shifts in demographic factors, permanent features of the tax system that might encourage home ownership as opposed to other forms of wealth accumulation, and the availability of credit. In addition, the availability and cost of land, the cost of construction and investments in the improvement of the quality of the existing housing stock are often taken as the longer-term determinants of housing supply (Tsatsaronis & Zhu, 2004). Housing prices, however, are intrinsically local in character (Tsatsaronis & Zhu, 2004). As such, the growth of the housing stock can be constrained in the short-run as a result of a number of factors that may include the length of the planning and construction phases and the inertia of existing land planning schemes.

The foregoing suggests that distinctive national factors can lead to significant differences in the dynamics of housing prices across countries. One set of such factors relates to the prevailing conditions in the provision of financing for the purchase of housing both by local citizens and foreign citizens. Another factor that may affect the housing prices is the specific transaction cost framework such as the level of value added tax, stamp and registration duties and inheritance taxes.

Understanding factors determining housing prices and the volatility is important because the housing prices tend to display boom-bust episodes, which implies above trend growth in prices that is followed by sharp reversal. This has an implication to the macroeconomic variables (Demary, 2009). The macroeconomic variables in return influence macroeconomic stability through their effects on aggregate expenditure (consumption) and performance of the financial system (Tsatsaronis & Zhu, 2004). This was the experiences of the macroeconomic instability in the years 1980s to the year 2009 in developed and developing economies where housing prices were subject to short-run variability rarely matched by prices of other consumer durable goods.

The experience was that housing market can have serious connection with commercial banks' lending, large private capital inflows and aggregate demand (consumption). These connections can have a pronounced impact on the macroeconomic stability (Antipa & Lecat, 2009; Apergis & Rezitis, 2003; Balchin, 2009; Collyns & Senhadji, 2002).

In Kenya, the housing prices have more than tripled between the year 2000 and 2015. Over this period, average prices for 1 to 3 bedrooms rose by a factor of 5 from just below Ksh 2 million to Ksh 10 million. Prices for units with 4 to 6 bedrooms rose from about Ksh 10 million in the year 2000 to Ksh 31 million in the year 2015 (Hassconsult, 2015). The average housing prices growth for all types of residential housing in Kenya from the year 2000 to 2015 are shown in Figure 1
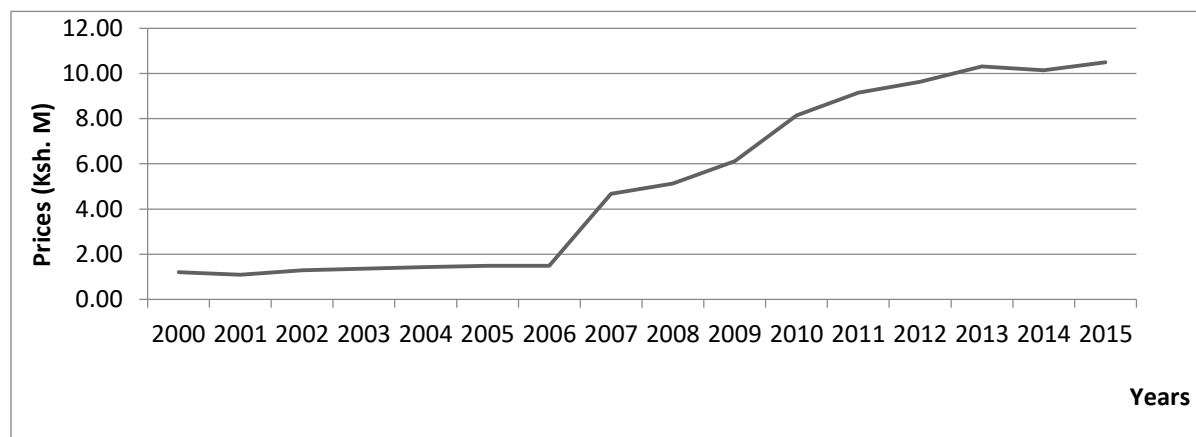

Figure 1: Average Housing Prices Growth in Kenya (2000-2015)

Source: Author's computation using data from KNBS

The figures for the housing measured the average selling price for three types of residential houses for middle and upper sections of the major urban centers in Kenya. The three types of houses included apartments, bungalows and maisonettes. The average selling price was estimated using the year 2000 values as the base year. The figure indicates a rapid growth of housing prices especially after the year 2005. The cause of this growth had not been established. However, popular views have been attributing the growth to the increase in middle income population in the country (Vuluku & Gachanja, 2014).

The possibility of a housing price bubble in the Kenya housing market has been an active topic of discussion in both the popular press and academia. A housing price bubble is defined as a situation when growths of the housing prices are not supported by changes in their fundamentals (Stiglitz, 1990). The main cited fundamentals include inflation, personal income, building costs, demographic changes, housing adjustment costs and lending rates (Apergis & Rezitis, 2003; Antipa & Lecat, 2009). The issue of housing bubble is of interest to Kenya because a bursting bubble in housing prices could lead to a decrease in the value of household wealth and severe negative impact on consumption and national output. A housing price bubble could be in place in Kenya if the housing prices are overvalued. This is the case if: house prices are above their long-term trend level, housing prices cannot be explained by its fundamental factors or/and models of

the housing market predict falling real house prices in the future. Figure 2 shows the relationship between the housing prices and some of the housing price fundamentals in Kenya.
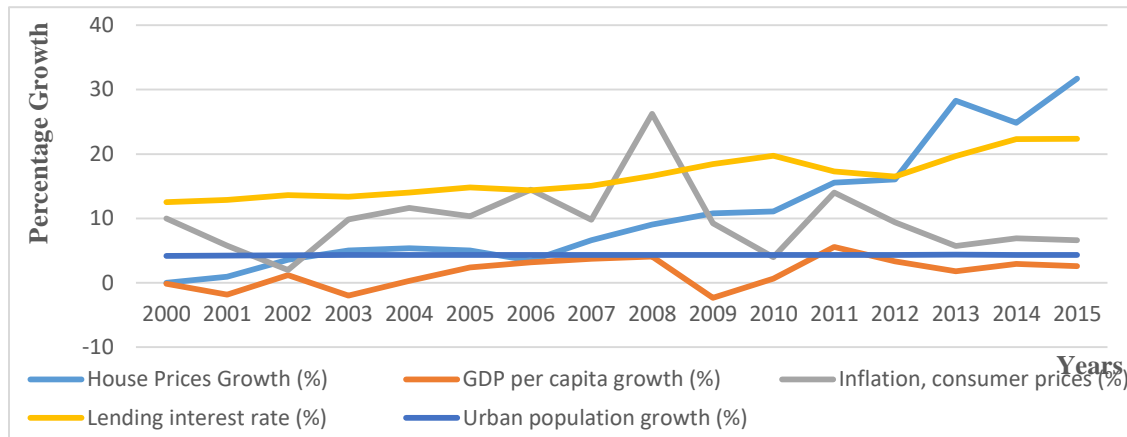

Figure 2: Growth in Average Housing Prices and its Fundamentals (2000-2015)

Source: Author's computation using data from KNBS

Figure 2 shows the trend in housing prices growth and the growth in some of the housing prices fundamentals between the year 2000 and 2015. Between the periods, Inflation Consumer Price Index (CPI) fluctuated between 4 and 27 percent, reaching pick in the year 2008 during the Post-Election Violence (PEV). Other than the PEV period, the CPI was below 15 percent. Urban population growth remained stable and below 5 percent. Over the period, the lending rates remained above ten percent and shown an increasing trend. A low lending rate is necessary so as to create demand for housing both as investment tools and as residential facilities. Growth in population and per capita income, which are expected to increase demand for housing and thereby affect housing prices positively, remained relatively stable and below 5 percent as shown in the Figure 2

Cost of construction is basically guided by availability of funds. This is because the cost of housing is not something that can be raised through households saving (Antipa & Lecat, 2009). A loan from commercial banks and other financial institutions is required. Low lending rates that create demand for housing would therefore be expected to push up the demand and hence the housing construction costs and the adjustment costs (Antipa & Lecat, 2009). As earlier noted, the cost of lending remained well above 10 percent per annum between the year 2000 and 2015. The drivers of the housing prices growth or even their effect on various features of the economy therefore were unclear. The factors pushing up the housing prices and its inter-relation with its fundamentals in Kenya were uncertain and also whether the growth in housing prices is a boom or a bubble.

Like many other emerging markets, Kenya had struggled to provide basic housing for its poor and middle income households (Vuluku & Gachanja, 2014). For the units of housing in the market, the actual prices were way above what the majority of buyers and renters were willing

and able to pay. The implication of this high price was that populations that were not catered for (or could not afford given prevailing prices) had to turn towards informal housing. This had resulted in the burgeoning of slums and the related social ills including insecurity and poor standards of living in the urban centers (Wanyama, 2012).

The affordability of a decent housing remained an elusive dream for majority of Kenyans who could not even afford rent in formal housing systems (Vuluku & Gachanja, 2014). As a result, most urban dwellers resorted to settling in informal settlements which lacked construction fabric, basic infrastructure and security. Consequently, approximately 55 percent of the urban population in Kenya lived in informal settlements with a density of 250 shanties per hectare (Homeless International, 2010). Some of the population chose to settle far away from their places of work, spending long hours in commuting, inadequate social infrastructure and dirty environment (Vuluku & Gachanja, 2014).

Alongside the economic growth rates registered between the year 2000 and 2015, the Kenyan middle class had been growing too. The country's middle class reached 44.9 per cent of the total population by the year 2011, up from 26.2 per cent in 1980 (African Development Bank (AfDB), 2011). This phenomenon was accompanied by strong growth in consumption expenditure and demand for public goods and services. This has exerted more pressure on housing demand. As a result, investment in the housing sector shows high returns and consequently, the areas surrounding urban centers saw a large number of changes of land use from farming to residential centers. This led to a decline in agricultural production as investors took advantage of increasing demand and high returns (Njaramba, 2011). The farms on the outskirts of the major urban centers in the country were giving way to apartment blocks or high-end gated communities. In addition, the development of road bypasses and new highways led to massive subdivision of mainly freehold private, cooperatives and institutional land. High-end market self-controlled housing estates emerged at a fast rate, some with no provision of infrastructural services like access roads and sewer lines and this led to serious challenges especially in densely populated areas. The creation of new housing estates therefore led to constrained provision of public goods (Njaramba, 2011; Wanyama, 2012; Vuluku, 2014; Hassconsult, 2015).

There is broad global acceptance that access to decent, affordable and adequate housing is a human right and an important component of the right to adequate standard of living. In Kenya, this is further reaffirmed by subsequent international instruments that Kenya is party to (Republic of Kenya, 2015). To achieve this, Kenya government has tried to develop policies to address affordability and access. During Kenya's pre-independence period, the government evolved instruments to regulate access to housing resources. The policy aimed, among other things, to enable access to land and provision of adequate housing at the lowest possible cost. It also addressed issues to do with increased research in locally available building materials and construction techniques, mobilization of resources for housing development through aided self-help and co-operative efforts and housing for civil servants (Republic of Kenya, 2013).

The National Shelter Strategy of the Year 2000 advocated for a policy change where the Government facilitated other actors to invest in housing. This was informed by the remembrance

of the international year of shelter for the homeless in the year 1987. The policy necessitated a shift from direct provision to an enabling approach (Republic of Kenya, 2013).

The formulation of Session Paper No.3 of 2004 on National Housing Policy in the year 2004 was intended to arrest the deteriorating housing conditions and to bridge the shortfall in housing stock by clearly identifying key stakeholders and outlining their role towards the housing delivery process. The policy adopted the role of enabling strategy, guided by the principles of partnership and participation by all partners in accordance with their comparative advantages. In this approach, the National and local Governments were to play a central role in provision of affordable social housing for renting to the low-income segments (Republic of Kenya, 2004).

From the year 2003, the Kenyan Government embarked on strengthening the housing sector by increasing its budgetary allocation that made housing development budget move upwards to about Ksh. 4.3 billion in the year 2013 as compared to nearly nil in the year 2003 (Republic of Kenya, 2013). The Government also recognized the private sector as the engine of housing development and continued to play the role of enabler, partner and catalyst in the housing delivery process. In this connection, areas that required intervention by both the public and the private sector were identified in order to make housing more affordable and especially to the low income households. To this end, the following programmes were put under implementation in the Ministry of housing: Kenya Slum Upgrading Programme (KSUP) with the aim of improving the informal settlements; Revamping of National Housing Corporation (NHC) and Rural and Peri-Urban Housing Loans.

The revamping of rural and peri-urban housing programme was in order to give loans to persons in the rural and peri-urban areas who would wish to develop or improve their housing. The Government had also injected additional equity towards better capitalization, cash flows and improving availability of loanable funds; Housing Infrastructure Development Programme (HIDP) which was established to open up new areas for housing development and complement private sector development in reducing the cost of housing delivery; Appropriate Building Materials and Technologies (ABMT) where the Government was promoting use of locally available low cost appropriate building materials and technologies in order to reduce the cost of housing; Civil Servants Housing Scheme Fund (CSHSF) which started in the year 2004 with the aim of providing housing loan facilities to civil servants for the purposes of purchasing or constructing residential houses and developing housing units for sale and for rental by civil servants (Republic of Kenya, 2015).

Kenya Vision 2030, the country's long-term plan, in its economic and social pillars has also recognized the housing sector as a critical component of sustainable development in the country (Republic of Kenya, 2010).

The above policies and programmes were expected to ensure progressive realization of the right to accessible, adequate and reasonable housing for every person as per the Constitution of Kenya (2010). The policies were also intended to arrest the rapid rise in housing prices countrywide by bridging the perceived shortfall in housing stock arising from demand that far surpasses supply particularly for low-income housing in urban areas. However, the housing sector still characterized by unaffordable and indecent housing, low-level of urban home ownership,

extensive inappropriate dwelling units including slums, squatter settlements and above all rapid growth in housing prices (CAHF, 2014; Republic of Kenya, 2015).

The policies and macroeconomic reform that started in the year 2000, together with a focus on infrastructural development and new areas for residential centers opening up, has only served to make demand for housing to increase and the housing prices to experience growth. As CAHF (2014) noted, put against average earnings the price of housing is considered high, and can only be afforded by the top income earners.

1.2 Statement of the Problem

Since the year 2000, housing prices in Kenya increased by over 300 percent in real terms by the year 2015, especially in the urban centers. As a result of the growth, housing ownership was way above the majority of buyers and renters capacity to pay. Consequently, over 60 per cent of the country's urban population lived in slums with no permanent houses, water, electricity, social amenities nor security (World Bank, 2011; Wanyama, 2012).The agricultural lands surrounding urban centers also were converted to residential centers so as to tap from high returns coming from housing investments. This consequently affected agricultural production and public goods provision adversely (AfDB, 2011; Njaramba, 2011).

Theoretically, long periods of historically low nominal interest rates, low supply of housing and demographic changes were often cited as the economic fundamentals that causes the increase in housing prices (Apergis & Rezitis, 2003; Antipa & Lecat, 2009). However, in Kenya, the nominal interest rate remained high and the ratio of the housing stock to population had been relatively stable during the study period (Republic of Kenya, 2016). The growth in housing prices had also outpaced the increase in consumer prices during the study period (Republic of Kenya, 2004, 2009, 2012, 2014, 2015; Hassconsult, 2015). The policies and macroeconomic reforms that started after independence together with infrastructural development that aimed at ensuring accessible and adequate housing in Kenya did not managed to stabilize nor reduce housing prices (Republic of Kenya, 2010, 2013, 2014, 2015; CAHF, 2012). It was therefore not clear how housing prices respond towards the fundamental variables in the short-run and in the long-run, which could inform the policies to reduce the prices and enhance accessibility. It was not clear from any of the previous studies which variables housing prices in Kenya gravitate towards in the long-run which could then inform policies to mitigate instabilities arising from high housing prices. To caution on uncertainty that would come in periods of housing prices instability, there is need for empirical framework to analyze the main forces that drive aggregate housing prices in Kenya.

2.0 METHODS

The housing prices are determined by considering both supply and demand side of the housing market. From housing theories, the housing prices depend on the replacement cost of housing (cost of construction), the property taxes, per capita income, demographic changes, credit facilities (represented by households' indebtedness) and demand by foreign investors/individuals (represented by private capital inflows). The functional relationship for the housing prices was defined as in Equation (2.1)

$$(HP) = f\{(HCEXP), (PCGDP), (UPop), (HStc), (PCI), (CC), (PT), (HHI)\} \quad (2.1)$$

Where; HP stands for real housing price, (HCEXP) is households' consumption expenditure, (PCGDP) is per capita GDP, (UPop) is the urban population, (HStc) is the housing stock, (PCI) is private capital inflows, CC is the construction cost, (PT) represents the property taxes and (HHI) is the households indebtedness.

To analyze the sources of housing prices growth, Equation (2.1) was estimated using Auto Regressive Distributed Lags (ARDL) modeling technique (Pesaran and Shin, 1999; 2001) and as applied in Dritsakis, (2011) and Shrestha and Chowdhury, (2005). The importance of ARDL modeling is in its flexibility. It can be applied when the variables are of different order of integration (Pesaran, 1995). The other importance of this approach is that the model takes sufficient numbers of lags to capture the data generating process in a general to specific modeling framework (Laurenceson & Chai, 2003). Since housing prices behaves differently from other goods, previous values of housing prices, as well as of other variables, were required to explain the current behavior. As such, ARDL modeling was the most appropriate as the estimates from the modeling are unbiased, efficient and free from serial correlation and endogeneity problems (Pesaran, Shin & Smith, 2001).

The selection of ARDL model was also important because it could be applied for small sample size as well as estimate short-run and long-run dynamics. The ARDL methodology is also relieved of the burden of establishing the order of integration amongst the variables. Furthermore, it distinguishes dependent and explanatory variables, and allows testing for the existence of relationship between the variables. Finally, with ARDL, it is possible to use differing optimal number of lags among the variables (Pesaran, 1995). An ARDL model for housing prices with the regressors identified in the functional relationship in Equation (2.1) was expressed as in Equation (2.2)

$$HP_t = \beta_0 + \sum_{i=1}^{K} \beta_{ji}(HP)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(HCEXP)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(PCGDP)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(UPop)_{t-i} +$$

$$\sum_{i=0}^{K} \beta_{ji}(PCI)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(HStc)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(CC)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(PT)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(HHI)_{t-i} + \varepsilon_t \quad (2.2)$$

Where j = 1 to 9 Equation (2.2) gave the general ARDL model which was then rewritten as:

$$HP_t - \sum_{i=1}^{K} \beta_{ji}(HP)_{t-i} = \beta_0 + \sum_{i=0}^{K} \beta_{ji}(HCEXP_{t-i} + \sum_{i=0}^{K} \beta_{ji}(PCGDP)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(UPop)_{t-i} +$$

$$\sum_{i=0}^{K} \beta_{ji}(PCI)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(HStc)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(CC)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(PT)_{t-i} + \sum_{i=0}^{K} \beta_{ji}(HHI)_{t-i} + \varepsilon_t \quad (2.3)$$

Employing a lag operator, the corresponding equation was:

$$A(L)HP_t = \beta_0 + \beta_j(L^i)(HCEXP)_t + \beta_j(L^i)(PCGDP)_t + \beta_j(L^i)(UPop)_{t-i} + \beta_j(L^i)(PCI)_{t-i}$$

$$+ \beta_j(L^i)(HStc)_{t-i} + \beta_j(L^i)(CC)_{t-i} + \beta_j(L^i)(PT)_{t-i} + \beta_j(L^i)(HHI)_{t-i} + \varepsilon_t \qquad (2.4)$$

Where; $(L) = 1 - \sum_{i=1}^{K} \beta_{ji}$, and letting $\beta_j(L^i)$ to represent $\sum_{i=0}^{K} \beta_{ji}$

The distributed lag form of the model that defines long-run relationship was then given as in Equation (2.5)

$$HP_t = \frac{\beta_0}{A(L)} + \frac{\beta_j(L^i)}{A(L)}(HCEXP_t + \frac{\beta_j(L^i)_t}{A(L)}(PCGDP)_t + \frac{\beta_j(L^i)}{A(L)}(UPop)_t +$$

$$\frac{\beta_j(L^i)}{A(L)}(PCI)_t + \frac{\beta_j(L^i)}{A(L)}(HStc)_t + \frac{\beta_j(L^i)}{A(L)}(CC)_t + \frac{\beta_j(L^i)}{A(L)}(pt)_t + \frac{\beta_j(L^i)}{A(L)}(HHI)_t + \varnothing_t \qquad (2.5)$$

Long-run relationship was inferred if $A(L)$ was not equal to zero. The coefficients of Equation (2.5) gave the long-run estimates. The equation was estimated using Ordinary Least Square (OLS) estimation technique after it passed the appropriate diagnostics. In determining the optimal lag length (k), AIC was used.

To analyze the short-run sources of housing prices growth, the general ARDL model given by Equation (2.2) was utilized. The short-run analyses were important since the study needed to make use of time dynamics and also the Error Correction Term (ECT). So as to achieve this, ECT was derived by running a linear regression for Equation (2.6)

$$HP_t = \alpha_1(HP)_t + \alpha_2(HCEXP)_t + \alpha_3(PCGDP)_t + \alpha_4(UPop)_t + \alpha_5(PCI)_t + \alpha_6(HStc)_t +$$

$$\alpha_7(CC)_t + \alpha_8(PT)_{t-1} + \alpha_9(HHI)_t + \varepsilon \qquad (2.6)$$

The residuals (ε) from Equation (2.6) were lagged one period and then used as the ECT series for Equation (2.7). The ECT coefficient was to give the speed at which the housing prices adjust toward the long-run growth path in case of a disturbance. The short-run coefficients were estimated based on ARDL model given in Equation (2.7)

$$\Delta HP_t = \alpha_0 + \sum_{i=1}^{K} \alpha_{1i}\Delta(HP)_{t-i} + \sum_{i=0}^{K} \alpha_{2i}\Delta(HCEXP)_{t-i} + \sum_{i=0}^{K} \alpha_{3i}\Delta(PCGDP)_{t-i} +$$

$$\sum_{i=0}^{K} \alpha_{4i}\Delta(UPop)_{t-i} + \sum_{i=0}^{K} \alpha_{5i}\Delta(PCI)_{t-i} + \sum_{i=0}^{K} \alpha_{6i}\Delta(HStc)_{t-i} + \sum_{i=0}^{K} \alpha_{7i}\Delta(CC)_{t-i} +$$

$$\sum_{i=0}^{K} \alpha_{8i}\Delta(PT)_{t-i} + \sum_{i=0}^{K} \alpha_{9i}\Delta(HHI)_{t-i} + \lambda ECT_{t-1} + \mathcal{E}_t \qquad (2.7)$$

15

Where; α_i gave short-run coefficients, λ was the speed of adjustment parameter and ECT was the residuals obtained from the estimated cointegration regression in Equation (2.6). The equation was estimated using OLS estimation techniques after carrying out the appropriate diagnostics. To determine the optimal lag length (k), AIC was utilized.

2.1 Findings and Analysis

The study used time series data. This data exemplifies the problem of spurious regression (Gujarati, 2004). To check the time series properties of the data, several tests were carried out.

2.1.1 Unit Roots Tests

For stationarity test, Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) were employed. The KPSS was added as confirmatory test due to the fact that ADF and PP statistic have limitations of lower power and successive or persistent unit roots respectively (Gujarati, 2004). ADF and PP tend not to reject the null hypothesis in presence of close to unit roots. Where the results of ADF, PP and KPSS conflicted, KPSS was used to make the decision because of its high power of rejecting the null hypothesis when it is not true. The unit root tests concluded that, Capital inflows series was stationary at level while Housing prices, Households' Consumption Expenditure, Households' Indebtedness, Construction Costs, Property Taxes, Housing Stock and Urban Population series were stationary at first difference. As a result, the series were subjected to cointegration tests.

2.1.2 Cointegration Analysis

Despite the fact that regression of non-stationary series on other non-stationary series may possibly produce spurious regression, there is a possibility that the regression can be meaningful if the variables were cointegrated (Yule, 1989; Ssekuma, 2011). In testing for cointegration, ARDL F-Bound tests ware utilized. This was because the variables were integrated of different order. The study used automatic system generated maximum lag by use of Akaike's Information Criterion (AIC). Following the procedure by Pesaran (1997), estimation was done by use of least square methods. The results were then tested for the joint significance of the parameters of the lagged variables. If the F-statistic was above the upper critical value (upper bound), the null hypothesis of no long-run relationship was rejected irrespective of the orders of integration for the time series. Conversely, if the test statistic fell below the lower critical value (lower bound), the null hypothesis was not rejected. But if the statistic fell between the lower and upper critical values, the test results for cointegration were inconclusive (Pesaran, 2001). The bounds test results are given in Table 2.1

Table 2.1: ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	85.46529	7

Critical Value Bounds

Significance	I(0) Bound (lower Bounds)	I(1) Bound (upper bounds)
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Source: Author's Calculations.

Table 2.1 shows that F-statistic is greater than upper bound values of 4.26 at 1 per cent level of significance. Therefore, concluded that there existed a long-run relationship between the dependent variable and the independent variables. Therefore, ARDL could be employed to derive the long-run and short-run effects.

2.1.3 Diagnostic and Stability Tests

The estimation of the study models was carried out using OLS method. For this method of estimation to give unbiased, efficient and consistent estimates, certain assumption must be fulfilled. Therefore, before the estimated results could be adopted to address the research objective, diagnostic tests were conducted to establish the models statistical appropriateness.

After selecting optimal ARDL model, the model was subjected to diagnostics and stability tests. By employing automatic lags selection by use of Akaike's Information Criterion (AIC), the test adopted lags (3, 3, 3, 0, 3, 3, 2, 3) as the optimal model out of the 20 models considered. The R-squared and Adjusted R-squared for the fitted model were approximately equals to one meaning that the study data set provided a perfect fit. The ability of the model was also confirmed by the standard error, which was 0.06, F-statistic of 5424.854 and its probability value equal to 0.0000 for the joint statistical significance of all the explanatory variables of the model. Therefore, the null hypothesis that the estimated parameters of the explanatory variables are jointly equal to

zero was rejected at one percent level of significance. The model was hence used as the optimal model and was consequently subjected to diagnostics and stability tests.

2.1.4 Multicollinearity Test

The study assessed potential for serious multicollinearity among the variables by developing correlation matrix. The pair-wise matrix was used to determine the degree of correlation among the study's variables to avoid serious multicollinearity problem that could undermine the reliability of the estimates of individual coefficients. The results are given in the Appendix. Urban Population series was observed to be highly correlated (near perfect collinearity) with two other series. The series included household indebtedness and per-capita GDP (correlation coefficients of 0.94 and 0.9 respectively). Urban Population series was also not strongly correlated to housing prices (dependent variable) as compared to household indebtedness. The variable was therefore dropped from the ARDL analysis. In addition, the coefficients estimation from ARDL model improved their significance after dropping urban population variable without significantly affecting the values of adjusted R-squared thereby concluding that multicollinearity was a serious issue when urban population variable was included in the ARDL model.

2.1.5 Normality Tests

Residual based tests were carried out for the residual series of the general equation test. The first test was normality test by use of Jarque-Bera test. This tested whether or not the residual of the model estimated had the skewness and kurtosis that matches a normal distribution. From the histogram for normality tests given in the Appendix, the probability values (P-values) of the Jarque-Bera statistic were greater than 0.01 and the null hypothesis that the residuals were normally distributed could not be rejected at 1 percent level of significance. This ascertained that the data used is from a normal distribution and that estimated coefficients were normally distributed and t and F tests could be used for hypothesis testing as they assumed normal distribution.

2.1.6 Serial Correlation Test

The second test on estimated residuals was Breusch-Godfrey LM serial correlation test. The test is to check for the violation of $Cov(u_t u_{t-s}) = E(u_t u_{t-s}) = 0$ for all $t \neq s$. The test is appropriate when there is a lagged dependent variable on the right hand side of the equation. The results showed no evidence of autocorrelation. The p-value of the LM test X^2 statistic was 0.9043 and therefore the null hypothesis of no serial correlation in the residuals could not be rejected at one percent level of significance.

2.1.7 Heteroscedasticity Test

In presence of heteroscedasticity, OLS estimator is no longer efficient. To test for heteroscedasticity, ARCH test was used. The P-values for ARCH X^2 statistics was 0.2293. Therefore the null hypothesis of homoscedasticity could not be rejected at one percent level of significance. This implied that the standard errors of the estimates are not biased and t and f distributions can be used to draw inferences.

2.1.8 Test of specification error

The study also tested whether non-linear combinations of the independent variables used in the study ARDL model have any power in explaining the changes in housing prices. Ramsey RESET test (see Wooldridge, 2012) was used in this regard. From the results, calculated F-statistic was 0.5008. The null hypothesis of no specification error was not rejected. It was therefore concluded that there was no misspecification in the model. The linear functional form of the ARDL model was correctly specified and appropriate for estimation.

2.1.9 Model Stability Test

In order to test whether the dependent variable reaches its equilibrium value in the ARDL model, stability test was conducted for the model. The results for the estimated general model showed that value of the sum of coefficients for the lagged dependent variable was minus (-) 0.841299. Because this is less than one, it was concluded that the model was stable.

The estimates by use of OLS from the ARDL model also needed to be tested for constancy. This is a test to establish whether or not the ARDL model's coefficients are stable. In testing for parameter constancy, CUSUM stability test was applied to the residuals. The estimates are within the acceptable region at 95 percent level of confidence. This means that the parameters were stable.

2.2 Sources of Housing Prices Growth in Kenya

2.2.1 Short-run Sources of Housing Price Growth in Kenya

The short-run estimates were obtained in two stages. The first stage involved estimating the cointegrating ARDL Equation. The residuals from estimation were then lagged once (ECT-1) and were then used in the second stage to estimate the ARDL model. The short-run results represent the coefficients of the differenced explanatory variables and they gave short-run marginal effect. The coefficients describe short-term effects of independent variables to the dependent variable. The results are presented in Table 2.2

Table 2.2: Short-Run effects of various variables on Housing Price

Dependent Variable Regressors	Housing Prices Coefficients	t-Statistics	Probability value
Δ Housing Price lagged once	[0.888168]***	8.674888	0.0000
Δ Housing Price lagged twice	[0.599538]***	7.617652	0.0000
Δ Private Capital Inflows	[0.035841]	1.534910	0.1379
Δ Private Capital Inflows lagged once	[0.042064]*	2.035855	0.0529
Δ Private Capital Inflows lagged twice	[0.047532]**	2.174568	0.0397
Δ Construction Cost	[0.905366]***	17.327914	0.0000
Δ Construction Cost lagged once	[-0.207837]***	-3.972639	0.0006
Δ Construction Cost lagged twice	[-0.583704]***	-8.152418	0.0000
Δ Households' Consumption Expenditure	[0.770934]**	2.347299	0.0275
Δ Households' Indebtedness	[-0.012584]	-1.549067	0.1345

Δ Households' Indebtedness lagged once	[0.002070]	0.248750	0.8057
Δ Households' Indebtedness lagged twice	[0.019210]**	2.353542	0.0271
Δ Per capita GDP	[-11.577650]	-1.971973	0.0602
Δ Per capita GDP lagged once	[12.367415]**	2.092737	0.0471
Δ Property Taxes	[0.211859]	1.016860	0.3194
Δ Property Taxes lagged once	[-0.073867]	-0.280277	0.7817
Δ Property Taxes lagged twice	[-0.665732]***	-3.093739	0.0050
Δ Stock of housing	[0.514832]***	3.769943	0.0009
Δ Stock of housing lagged once	[1.635073]***	3.854093	0.0008
Δ Stock of housing lagged twice	[-0.790563]***	-3.195367	0.0039
Dummy Variable for the period after 2007	[2.160237]***	18.533548	0.0000
Error Correction Term (ECT)	[-1.841299]***	-16.611926	0.0000

Note: [***], [**] and [*] denote significant at levels 1%, 5% and 10% respectively.

Δ denotes the first difference operator

Source: Author's calculations.

The coefficients of first and the second lags of real housing prices change are approximately 0.9 and 0.6 respectively. The values are positive and statistically significant at 1 percent level of significance. The change in housing price in the current period affects the housing prices in the second year and also in the third year. The indication is that, past changes in housing prices have positive effect to the housing prices up to two years after. Therefore, in Kenya, current period's increase of housing prices, alongside other variables, is a significant driver of the housing prices increase in the future. This is because an increase in current housing prices increases the value of the housing as an investment component (q-value from Tobin's q model). With value of q greater than one, the returns from investment in housing market creates demand for housing as an investment tool in the current period and one period after, thereby pushing up the housing prices.

Private capital inflows' coefficient is not statistically significant in the current period. However, the coefficient becomes significant after two years. In the short-run analysis, percentage private capital inflows affect the housing prices positively in the third year. This is because increase in the private capital inflows lowers the cost of financing housing and consequently increases the q-value of the housing (Tobin, 1972). This leads to an increased demand for housing as an investment vehicle pushing up the growth of housing prices in the consecutive periods. Despite the private capital inflows depressing influence on interest rates, private capital inflows in Kenya increases the growth of housing prices significantly. Many alternative theories that accounted for a positive correlation between housing prices and private capital inflows note that the rise in housing prices during the boom period could be attributed to an overall decline in risk premium and not to a fall in interest rates. Construction cost coefficient is statistically significant at 1 percent level of significance. Its marginal effect to the housing prices is positive in the current period but negative in the following year and after two years. The construction costs included the cost of land, cost of building materials, cost of labor and cost of acquiring finances. It represented the replacement cost in the Tobin's model. The change in the direction of effect means that, a positive change in the cost of construction increases the housing prices in the

current period. This positive change in the cost of construction however has a negative effect on q-value (Tobin, 1972). This affects negatively the demand for housing as an investment tool leading to decline in demand for investments in the following years. Reduced demand for investments in housing leads to reduction in housing prices in the consecutive periods.

Households' consumption expenditure affects the housing prices positively and only in the current period. The coefficient is statistically significant at 5 percent level of significance. When the households' consumption expenditure increases, it raises the housing prices in the first year. These results confirm existence of positive effects of households' consumption expenditure on housing prices in Kenya. One percentage rise in households' consumption expenditure will trigger an immediate increase in the demand for housing, pushing up the housing prices by Ksh. 0.77 million, if other variables remain unchanged.

Household indebtedness does not have an immediate effect on housing prices in Kenya. The coefficients for the household indebtedness in the current year and the following year are insignificant at 5 percent level of significance. The coefficient however is significant and positive in two years after. A rise by 1 percent of household indebtedness in this year increases the housing prices by Ksh. 0.02 million in the third year after the rise. This suggests that an increase in commercial banks credit to households lead to an increase in the housing prices after two years. As was observed in the study by Gimeno and Martinez-Carrascal (2010) in Hong Kong and Hyun et al. (2013) in Korea, this is due to household indebtedness effect on demand side of the housing market where higher level of indebtedness indicates low capital constraint or financial liberalization and therefore increases demand for housing as an investment tool and also for owner occupation purposes. This effect is positive to the housing prices.

Per capita GDP's coefficient is insignificant at 5 percent in the current year. The coefficient however is positive and statistically significant in the following year. A short-run and positive income shock to households will have a positive shock to the housing prices in the following year. This increase in the housing prices result from increased consumption on housing services. Property taxes' coefficient is not statistically significant in the current and following year. The coefficient however is statistically significant and negative in the third year at 1 percent level of significance. If the property taxes increase by 1 percentage point, housing prices reduces by Ksh. 0.67 million in the third year. The results mean that increased user cost of capital reduces demand for housing and hence the reduction in housing prices.

Housing stock coefficient is statistically significant in the current and in the previous periods at 1 percent level of significance. The effect of housing stock to the housing prices is positive in the first and second year but the effect becomes negative in the third year. This implies that when the housing stock rise, the housing prices increase in the current year and the following year before declining in the third year. This is inconsistent with economic theory where increased supply leads to reduction in prices. However the third year period effect conforms to the economic theories. The short-run effects of increased housing supply to the housing prices in the current period and the previous period could be through the effect on demand for housing as a tool for investment. When the return on housing market investment is positive (q-value is positive), the demand for housing as an investment tool increases pushing both the costs and supply of housing

upward (Madsen, 2011; Tobin, 1972). Due to the increased cost of housing supply, the growth in the housing prices increases. The prices however responded to the increased supply after the second year.

The Speed of Adjustment (ECT) indicates the amount of disequilibrium that is corrected in each period. It represents the proportion by which the long-run disequilibrium in the housing prices is being corrected in each period. The coefficient is negative and statistically significant at 1 percent level of significance. This is a support to presence of long-run association between the housing prices and the variables used in the study. However, the coefficient of speed of adjustment is 1.84 which is greater than 1 in absolute term. This indicates an overshooting of economic equilibrium (Ssekuma, 2011). This implies that the housing prices adjust to above the long-run equilibrium early enough before the end of one year. This means that housing prices are above their fundamentally expected growth path every year. Disequilibrium or deviations below expected growth are quickly corrected. This supports the study proposition of continuous conformation to the expected growth in housing prices in Kenya over the study period.

4.5.2 Long-run Sources of Housing Price Growth in Kenya

Long-run coefficients showed how the housing prices reacted to permanent changes in the independent variables. The results were achieved through estimation of equilibrium ARDL model. The long-run results are given in table 2.3

Table 2.3: Long-run ARDL Results

Dependent Variable	Housing Prices		
Regressors	Coefficients	t-Ratio	Probability
Private Capital Inflows	[-0.041209]*	-2.032152	0.0533
Cost of Construction	[1.071151]***	94.415814	0.0000
Households' Consumption Expenditure	[0.418690]**	2.306418	0.0300
Households' Indebtedness	[0.001503]	0.289163	0.7749
Per Capita GDP	[-8.550959]***	3.905354	0.0007
Property Taxes	[0.390509]**	2.642665	0.0143
Housing Stock	[0.000159]	0.003253	0.9974
Dummy Variable for the period after 2007	[1.173213]***	11.693499	0.0000
Intercept	[0.226678]	1.364941	0.1849

Note: [***], [**] and [*] denote significant levels at 1%, 5% and 10% respectively.

Source: Authors calculation.

From the long-run ARDL results in the Table 2.3, the coefficients of construction cost, households' consumption expenditure and property taxes are positive and statistically significant at 5 percent level of significance indicating that the variables have a long-run positive effect on housing prices. The coefficient of dummy for period after the year 2007 is statistically significant indicating that there was a structural break. The coefficient for private capital inflows is negative but statistically significant at 10 percent level of significance. Per Capita GDP coefficient is also negative but statistically significant at 1 percent level of significance. Households' indebtedness and housing stock are not statistically significant in the long-run.

Private capital inflows coefficient is positive and statistically significant in the short-run but becomes negative and statistically significance at 10 percent level of significance in the long-run. When private capital inflows increase by 1 percent, the housing prices increase by Ksh. 0.04 million in the long-run but its effect is negative and insignificant at 5 percent level. Its effect is however positive and significant in the short-run. Therefore, private inflows of foreign money into the domestic markets plays a small role in driving housing prices in the long-run despite its influence on interest rates.

Just as is in the case of short-run, the coefficient of households' consumption expenditure is positive and significant at 5 percent level of significance in the long-run. However, the marginal effect is smaller in the long-run. A one point increase in the ratio of households' consumption expenditure to GDP leads to Ksh. 0.419 million increase in housing prices in the long-run. The marginal effect of households' consumption expenditure is 0.77 in the short-run and 0.42 in the long-run. The long run marginal effect is therefore clearly less compared to the transitory shocks. The long-run effects are smaller due to the higher deposits requirements on housing purchases.

Housing stock does not have a long-run effect on the housing prices. This is due to the fact that increase in housing stock also leads to increase in cost of construction. Construction cost is perhaps the main variable noted to explain the movements of housing prices in the study findings. In the long-run Ksh. 1 million increases in construction cost results to Ksh. 1.07 million increase in the housing prices. The long-run effect, unlike the short-run, is positive and more than proportionate in its marginal effect. Therefore in support of Shiller (2005) for the positive sloping long-run housing supply theory, housing price tend to grow at a faster pace than the construction costs. Again, like the findings of this study, Featherstone and Baker, (1987) in their study for the US housing market found that housing prices overreact to construction costs shocks, and has a propensity to create bubbles in the housing prices. This study results as well shows that construction cost in Kenya housing market causes an overreaction to the housing prices in the long-run. This is explained by the cost of land in Kenya which has been increasing mainly due to speculation and high demand for land in the country. Like in the findings by Dipasquale and Wheaton, (1994) on US housing market, housing prices responds to changes in the cost of construction in both short-run and long-run but the long-run effect is clearly higher than in the short-run.

Unlike the case of short-run, per capita GDP coefficient is negative in the long-run and statistically significant at 1 percent level. An increase in per capita GDP by one percent, housing

prices reduces by 8.56 percent in the long-run. Even though the result did not conform to economic theory, the outcome is consistent with expectations of this study. The negative effect of the per capita GDP on the housing prices means that more individuals are building their own residential houses. This is against purchasing the ones completed and supplied in the market, as their level of per capita income increases. This scenario is explained by the growth of middle income population in Kenya. This group is increasingly building own residential housing. This has created high demand for land, especially agricultural land surrounding urban centers and creating an influx in the supply of new self-constructed housing in Kenya (AfDB, 2011). In the long-run, therefore, supply of new and modern housing in the market will continue as the per capita GDP rises. This will eventually put downward pressure in the housing prices. With housing being illiquid asset, an unexpected negative per capita GDP shock, households may as well need to sell their assets in distress to raise their income and maintain the consumption levels (Bernanke and Lown, 1991).

The property taxes have a positive long-run effect on the housing prices. Unlike the short-run effect that indicates a negative effect of property taxes on housing prices, in the long-run case, permanent property taxes have a positive effect. The coefficient is significant at 5 percent level of confidence. In the long-run therefore, the increase in property taxes increases the cost of capital thereby reducing the q-value of housing investment. The findings support Tobin's (1972) theory on investment and Madsen (2011) theory on housing demand. According to these studies, while the taxes traditionally influenced housing prices through the channel of user costs, in the long-run they influence housing prices through the channel of acquisition costs. The taxes therefore, have effects on housing prices that are quite different from those of user cost based in the short-run.

3.0 CONCLUSION

The study found that the sources of housing prices growth in Kenya include; previous growth in housing prices propagate the growth, household consumption expenditure both in the short-run and in the long-run, construction cost affects housing price in the short-run and in the long-run, property taxes has a positive long-run effect, while the transitory sources of housing prices growth include; private capital inflows, households' indebtedness and per capita income. However, private capital inflows and per capita income affect housing prices negatively in the long-run. The speed of adjustment is greater than one implying that housing prices adjusts to their long-run growth path pretty fast. Based on the findings, it is interesting to note that: housing prices growth reinforces themselves such that, the current increases in housing prices have positive transitory shocks to the housing prices in the consecutive periods as well as permanent positive shocks; household consumption expenditure increases have quicker and lasting effects to the housing prices; housing prices are overreacting to the construction costs increase in the long-run; It is also worth noting that housing stock are increasing at a faster rate in relation to urban population. It is not surprising that the housing supply has mixed transitory effects on housing prices and no permanent effect. This is in contrast to the popular view that low supply of

housing is the reason for high housing prices in Kenya; another observation is that, with increase in per capita income, households construct own residential houses rather than buying the ones in supply. This makes the effect of per capita income on housing prices to be negative in the long-run. Also observed from the study is that, per capita income and private capital inflows influence housing prices positively in the short-run but negatively in the long-run. The magnitudes of effects in the short-run were higher than those of long-run. This means that higher per capita income and capital inflows have possibilities of creating a bubble in the housing prices which is reversible in the long-run. Observed from the findings as well is that, property taxes effect on housing prices growth is negative in the short-run but it is positive in the long-run.

4.0 RECOMMENDATIONS

One of Kenya's government objectives is to guarantee affordable housing as noted by the country's constitution (Republic of Kenya, 2010) and its long term blue print plan, Vision 2030 (Republic of Kenya, 2015). In the struggle to achieve this, encouragement of homeownership has also been a key government policy. However this has not been quite successful as large number of slums and a low home ownership index still exist. The success can be achieved if the growth in the housing prices is managed through the following means: foremost, controlling the high cost of construction brought about by high cost of land, construction materials and land development charges. This can be done through research on cheaper alternative building materials and proper land use planning that discourages destabilizing speculation in land. Also there is need for substituting buildings for land by erecting taller apartment buildings. The Kenya National Housing Corporation needs to make public and encourage the use of readily available alternative building material besides the conventional material while not compromising on quality to address the overreaction of housing prices. Another method of taming growth in housing prices is reducing or doing away with taxation on development and developed land. In lowering or doing away with property taxes, the housing prices will be lowered and thereby making housing affordable.

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APPENDIX

Table A1: Correlation Matrix

	UPop	PT	PCGDP	HStc	HP	HHI	HCEXP	CC	PCI
UPop	1.00	-0.15	0.90	0.86	0.71	0.94	0.66	0.72	0.15
PT	-0.15	1.00	0.11	0.29	-0.34	-0.21	-0.56	-0.32	0.33
PCGDP	0.90	0.11	1.00	0.89	0.65	0.86	0.37	0.66	0.11
HStc	0.86	0.29	0.89	1.00	0.44	0.77	0.33	0.47	0.08
HP	0.71	-0.34	0.65	0.44	1.00	0.76	0.69	0.99	0.51
HHI	0.94	-0.21	0.86	0.77	0.76	1.00	0.71	0.78	0.18
HCEXP	0.66	-0.56	0.37	0.33	0.69	0.71	1.00	0.67	0.29
CC	0.72	-0.32	0.66	0.47	0.99	0.78	0.67	1.00	0.48
PCI	0.15	-0.33	0.11	-0.08	0.51	0.18	0.29	0.48	1.00

Table A2 Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.075462	Prob. F(3,21)	0.9725
Obs*R-squared	0.565259	Prob. Chi-Square(3)	0.9043

Table A3: Heteroskedasticity Test: ARCH

F-statistic	1.429595	Prob. F(1,50)	0.2375
Obs*R-squared	1.445451	Prob. Chi-Square(1)	0.2293

Table A4: Ramsey RESET Test

Specification: HP HP(-1) HP(-2) HP(-3) PCI PCI(-1) PCI(-2) PCI(-3) HHI HHI(-1) HHI(-2) HHI(-3) HCEXP CC CC(-1) CC(-2) CC(-3)   HStc HStc(-1) HStc(-2) HStc(-3) PCGDP PCGDP(-1) PCGDP(-2) PT PT(-1) PT(-2) PT(-3) DUMMY C

Omitted Variables: Powers of fitted values from 2 to 4

	Value	df	Probability
F-statistic	0.813336	(3, 21)	0.5008

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.007756	3	0.002585

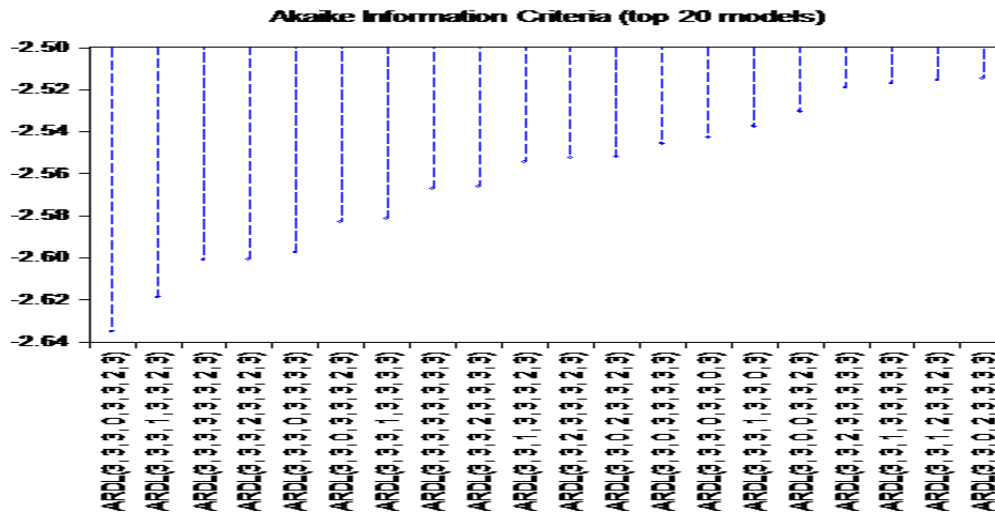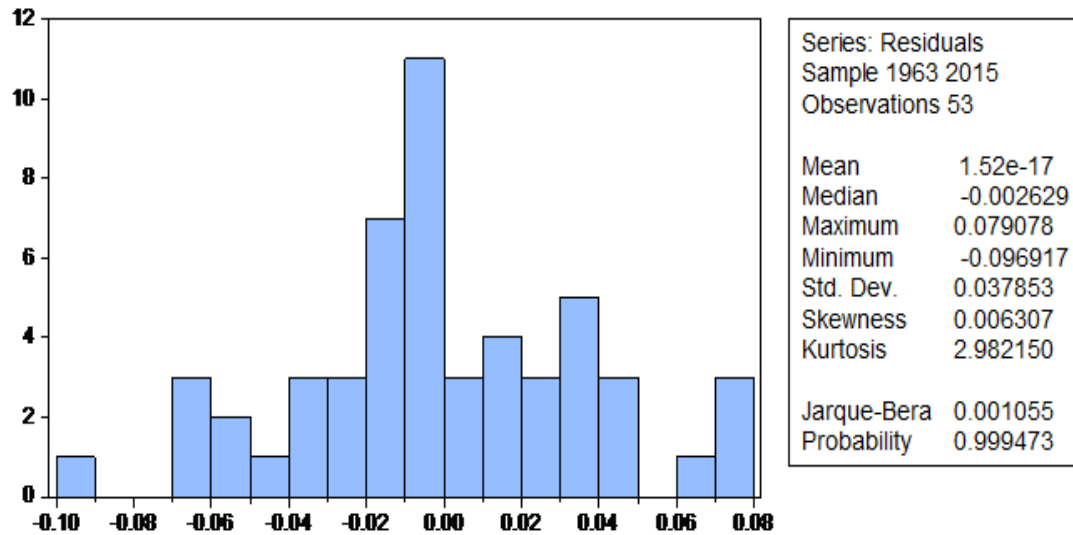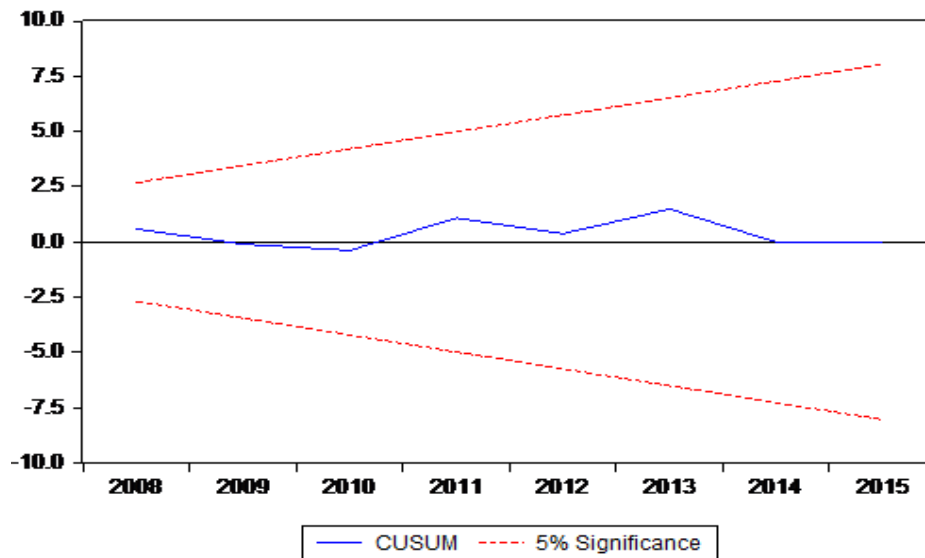|			
Restricted SSR	0.074506	24	0.003104
Unrestricted SSR	0.066751	21	0.003179

Figure A1: AIC Test

Figure A2: Jarque-Bera Histogram Normality Test

Figure A3: CUSUM Stability Test