MARKET PRICES, TAX REVENUE AND PERFORMANCE OF THE RESIDENTIAL PROPERTY MARKET IN KENYA

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DECLARATION

This thesis is my original work and has not been submitted for a degree in any other University.

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This thesis has been submitted for examination with our approval as the University Supervisors.

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DEDICATION

To my children, loving wife Josephine and prayerful parents

ACKNOWLEGEMENT

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

xiii

LIST OF APPENDICES

LIST OF ABREVIATIONS AND ACRONYMS

ADF:	Augmented Dickey Fuller Test
AIC:	Akaike Information Criterion
ARCH:	Autoregressive Conditional Heteroscedasticity
ARDL:	Autoregressive Distributed Lag
ARIMA:	Autoregressive Integrated Moving Averages
EGARCH:	Exponential Generalized Autoregressive Conditional Heteroskedasticity
EMH:	Efficient Market Hypothesis
EXR:	Exchange Rate
GDP:	Gross Domestic Product
IFR:	Inflation Rate
INR:	Commercial Bank Lending Interest Rate
JB:	Jarque-Bera
LM:	Lagrange Multiplier
NARDL:	Non-Linear Autoregressive Distributed Lag
NSE:	Nairobi Securities Exchange
PP:	Phillips-Perron Test
PPP:	Purchasing Power Parity
REIT:	Real Estate Investment Trusts
RPM:	Residential Property Market Performance
SIC / SC:	Schwartz Information Criterion
SMP:	Stock Market Price
TXR:	Tax Revenue
VAR:	Vector Auto-Regression
VEC:	Vector Error Correction
VECM:	Vector Error Correction Model

DEFINITION OF TERMS

Exchange Rate As discussed by Organization for Economic Co-operation and Development (2007) and supported by Jochumzen (2010) exchange rate represents the price movements of one nations currency in comparison to that of another nation and is considered to be the price of the exchange market.

House Price Index A statistical device that measures changes in prices of residential houses (Kenya Bankers Association , 2015).

Inflation Rate Gallagher (2011) posits that inflation rate is a representative value that shows the movements of prices of commodities and services in an economy.

Interest Rate As argued by Central Bank of the Republic of Philippines (2014) interest rate is the financial price of interest-bearing markets.

Market Performance As discussed by various researchers including Darmon, Duclos-Gosselin, and Rigaux-Bricmont (2013) market performance simply put is the end result of market conduct.

Market Price This is a value considered too represents the movement of prices within a particular market (Kuroda, 2017). According Jordan and Miller (2009) the market price of an asset is deemed to represent past, present and future information about that market in line with the market efficiency hypothesis.

Residential Property According to Organization for Economic Co-operation and Development (2007) a building should be regarded as residential building/property when more than half of the floor area is used for dwelling purposes.

Stock Market Price   According to Jordan and Miller (2009) stock market prices shows the movements of market prices in a stock market and is well captured using price indices.

Tax Revenue   As argued by Omolo (2012) tax revenue is a stream of government cash inflows receipted after charging tax rates to tax bases and is generally composed of direct tax revenue and indirect tax revenue.

ABSTRACT

The inconsistency of research findings on the market price and performance of residential property market topped by the ever-growing interest on the performance of residential property market by a series of stakeholders including investors and policy makers places the need of this study at a podium of intellectual and academic interest. This study used Kenya's residential property market over a fourteen-year period of January 2005 to December 2018 to assess the effect of market prices on that market. This was critical because existing theoretical and empirical literature was not clear as to how market prices affect performance of residential property market. The specific objectives were to evaluate the effect of inflation, interest rate, stock market price, exchange rate and moderating effect of tax revenue on performance of the residential property market in Kenya. Causal research design was employed in this study. The study led to the formulation of a financial econometric model that embraced the existing financial system and yielded effective and efficient results. The question of this study was; what is the effect of market prices on performance of residential property market in Kenya? Census was employed for the 56-market quarterly observations. The study used secondary data that was accumulated using secondary data collection sheet. The study conducted several test statistics and diagnostic tests in order to achieve the most optimal solution. In particular the study used t-statistics and the p-value to test the significance of the null-hypothesis for any type of individual test. Ninety five per cent confidence interval was employed to test the reliability of the estimated coefficients. Vector error correction model was employed to test the individual hypotheses while autoregressive distributed lag model was employed to test the general hypothesis and the moderated model. The findings of the study indicated that commercial bank lending interest rate, inflation rate, exchange rate and stock market prices had significant negative effect when individually measured to residential property market performance. In the overall model of market prices to residential property market performance commercial bank lending interest rate, inflation rate and exchange rate had long run negative effect to the residential property market performance while stock market prices had a long run positive effect to the residential property market performance. In the cointegrated model there was observed significant lags in adjustment to equilibrium that is interest rate had four lags, inflation rate two lags, stock market price and residential property performance had one lag each while exchange rate had zero lag. Under the moderated model, it was observed that when tax revenue was introduced as a moderating variable the adjusted R-squared increased on the moderated model. Thus tax revenue had a moderating role on the effect of market prices to the performance of residential property market in Kenya. The conclusion of the study is that market prices form an integral part on the performance of residential property market in Kenya. The scope of the study was limited to a time frame of year 2005 to 2018 and the Country of study was restricted to Kenya. The study recommends that investors in the residential property market to be analytic on market prices and make calculated moves with regard to information from market prices while investing in the residential property market in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The 2008-2009 international financial crisis was a series of interrelated events starting with the issues arising from United States subprime loans that resulted in problems with global banking liquidity, recessions in many nations, and eventually fiscal tightening. These events influenced the turning points in the boom and bust of the housing market, but their effects were interwoven with the underlying long-term forces in the housing and related mortgage markets (Jones & Richardson, 2014).

House price indexes are normally used to describe the changes in house prices. The values of indexes indicate the house price movements of certain countries or cities rather than house price levels. Jones and Richardson (2014) defined four models used to analyze the factors which cause dynamics of house prices, namely the fundamental model, the hedonic model, the repeat-sales model and the ripple-effect model. All these models are based on the efficient market hypothesis, which states that the market prices should fully reflect available information. Each model classifies the information and intends to find how a certain category of information attributes to the housing market variations. The fundamental model is based on the idea that the housing market variations are driven by market factors, such as incomes, rents, mortgage rates, inflation rates, exchange rate, stock market prices. The hedonic model focuses on how the structure characteristics and the neighborhood information would drive the movements of house prices in a certain period. The repeat-sales model uses the differences between the initial sale price and the final sale price to construct the dynamics of house price. The ripple-effect model, considers that the housing dynamic in one region is caused by the shocks of house prices in the same and other regions. However, the most controversial issue for those models is whether the models have included sufficient information or excluded the unrelated information (Ma & Liu, 2010).

This study considered the fundamental model approach in particular in an attempt to evaluate the factors that determine the movement of residential market performance in Kenya. The key reason was to assess the effect of the selected variables, that is exchange rate, interest rate, inflation rate, and stock market price on performance of residential property market in Kenya.

1.1.1 Market Prices

The value of assets to those who ultimately consume them is reflected in the price's purchasers are willing to pay. Lothian (2015) noted that market price represents the value of the asset to the investor. While there are various empirical and theoretical approaches of computing the market price of an asset, according to the efficient market hypothesis the market price of an asset is deemed to represent past, present and future information about that market (Jordan & Miller, 2009). There are various types of markets which include but not limited to capital markets, commodity markets, interest bearing market, derivatives markets, futures markets, foreign exchange markets, spot market, interbank lending market. Additionally, Reilly and Brown (2012) defined a market as a means through which buyers and sellers are brought together to aid in the transfer of assets or securities. They further gave attributes of a good market to include liquidity, low transaction costs, accurate and timely information of past transactions and market prices that rapidly adjust to new information. Further, Howells and Bain (2007) defined a market as an organisational framework within which financial instruments/ assets can be bought and sold. Haan, Oosterloo, and Schoenmaker (2009) stated that the functions performed by a market depends on the phase of trading but mainly includes price discovery, providing a mechanisms that facilitate making of agreements, and clearing and settlement arrangements, among many others. A market is coordinated through the price system (Lothian, 2015). The paragraphs below elaborate further on the four market prices that formed part of this research.

First and foremost, an equity market, as explained by Haan, Oosterloo, and Schoenmaker (2009), is part of a capital market that allows firms to raise funds by issuing equity that grants the investor a residual claim on the company's income. The benefits of owning an equity or common stock include the potential for a dividend and

the possible rise of share value (Jordan & Miller, 2009). Common stock for public firms can be traded through the initial public offering also called primary market or through a secondary market where previously issued stocks are traded among investors (Levisauskaite, 2010). Nairobi Securities Exchange (NSE) is an example of an equity market. The movements of market prices in the stock market is captured through prices indices also called stock market indices (Jordan & Miller, 2009). In Kenya the stock market price index that has been in existence for longer period is the NSE 20 share index that has a base year of 1966 (NSE, 2017).

Secondly, as discussed by Faure (2013) foreign exchange markets also termed as forex markets is the mechanisms/conventions for the exchange of one currency for another. The financial price of this market is the exchange rates which are just the expression of one currency in terms of another. An exchange rate thus has two components, the domestic currency and a foreign currency, and can be quoted either directly or indirectly. In a direct quotation, the price of a unit of foreign currency is expressed in terms of the domestic currency (Mongeri, 2011). In an indirect quotation, the price of a unit of domestic currency is expressed in terms of the foreign currency. An exchange rate that does not have the domestic currency as one of the two currency components is known as a cross currency, or cross rate (Kiat, Han, Yet, Hao & Hui, 2015).

The third market is the interest-bearing markets that include the money markets and debt markets. According to Jordan and Miller (2009) this markets have interest-bearing assets. Some pay interest implicitly and some pay it explicitly, but the common denominator is that the value of these assets depends on interest rates. The assets in these markets are debt obligations. Interest rate, therefore, is the financial price a borrower pays for the use of money they borrow on borrowed assets (Muriuki., 2013). Interest can be thought of as rent of money. According to Muriuki (2013) interest rates were fundamental to a capitalist society and were normally expressed as a percentage rate over a period of one year. The Central Bank of Kenya maintains historical interest rates earned/charged on various government debts/stocks and also the commercial banks monthly weighted average lending, deposit, overdraft and savings rates (Central Bank of Kenya, 2017).

3

Last but not least, as explained by Kimani and Mutuku (2013) inflation is the price of the commodity market over a period of time. In the commodities market, consumers depend on the prices of the many goods and services they consume and the share of each good or service in the household budget (Öner, 2018). To measure the changes in the commodities market, government agencies conduct household surveys to identify a basket of commonly purchased commodities and then track the cost of purchasing this basket over time. According to Öner (2018) the price of this basket at a given time expressed relative to a base year is the consumer price index, and the percentage change in the consumer price index over a certain period is consumer price inflation, the most widely used measure of inflation. Central Bank of Kenya (2017) defined inflation as an increase in the general level of prices for commodities in a country over a specific period of time, usually one year. The general level of prices is measured using the consumer price index, therefore the rate of change of consumer price index is the inflation rate. According to Central Bank of Kenya (2017) inflation rate is largely caused by cost-push factors (supply side factors) and demand-pull factors (demand side factors).

1.1.2 Residential Property Market Performance

As researched by Nwankwo, Kalu, and Igwe-Kalu (2018), residential property market investment is considered as a major source of capital appreciation with large share in investor's portfolio as from 1990s in Africa. Previously it was largely considered as a legacy which parents bequeath to their descendants. Since all properties were unique (that is not homogenous), there could not be a standard price in the market that was applicable to all investment units. According to Management Study Guide (2019), real estate investors had to look at a variety of measures just to find out whether the value of their investment was doing well. Management Study Guide (2019) indicated indices, valuations and comparable properties as measures of residential property market performance. According to Management Study Guide (2019) real estate indices provide a reliable way to measure the performance of residential property market. Since these indices are created by corporations who specialized in such transactions, the data provided is considered accurate and reliable. This makes indexes one of the most effective ways for investors to measure performance of residential property

market investments. In Kenya, as pointed out by Global Property Guide (2018) the Hass index is based on 4,000 to 6,000 properties tracked across the Country and covers over 320 sub-burbs and towns across Kenya, which are collected from multiple estate agencies and all publicly available house sales. The Hass indices are published quarterly and utilize residential housing nationwide data throughout Kenya (HassConsult Limited, 2016). Another way of measuring residential property market performance, as stated by Management Study Guide (2019) is by conducting a professional appraisal, though this is a chargeable service. Last but not the least another way to derive the performance of residential property market is to look at the value of comparable properties. This method is easy to use and free. However, the results obtained as a result are not very accurate. This is because the prices of properties within the same area could vary a lot.

Further, as discussed by Karoki (2013) residential property markets are heterogeneous; with a series of geographical and sectorial submarkets that lacks a central trading market. Every property is usually unique and information on market transactions is often not available. The pricing process is usually negotiated and the markets are characterized by large transaction costs. Swings in the property prices are extremely large and noticeable (Muli, 2011). Residential property market had been excluded from most of the empirical literature reviews because of perceived data and measurement problems (Li & Tu, 2011). This study showed, on the contrary, that the available data are sufficient to capture the effect of selected explanatory variable on residential property market performance in Kenya.

Article 43(1b) of the Constitution of Kenya (2010) specifically provides that every person has the right to accessible and adequate housing, and to reasonable standards of sanitation. Kenya's Vision 2030 envisaged an adequate and decent housed nation in a sustainable environment. In the first medium term of Vision 2030, the Kenyan Government planned to produce 200,000 units (Republic of Kenya, 2013). Between year 2017 to 2022 the Republic of Kenya under the "Big four" transformation agenda plannned to deliver 500,000 affordable housing units (Republic of Kenya, 2018). According to the Ministry of Land, Housing and Urban Development (2016) the country has been experiencing an annual shortfall of housing, exceeding 250,000 units

annually. The accrued housing deficit was estimated at over two million units (World Bank, 2017). The escalation of the residential property prices in Kenya has ignited concerns about the affordability of residential property prices (Murungi, 2014). The residential property market theoretical and empirical literature provided diverse and contradictory findings regarding the effects of other markets on property market.

Valuably, Morgan (2009) explained that when housing market declines in value most of the other investment sectors would also decline and unemployment would potentially increase. This was observed following the 2006 crisis that emerged in the subprime segment of United States housing market, housing bubble, and had one of the most destabilizing high-impact events experienced by modern economies. According to Heath (2003) residential property market was previously a neglected area and was treated as an independent sector. Heath (2003) further noted that, the property market is viewed as a significant contributor to the financial position of financial institutions. According to Borowiecki (2009) the consequences of the United States subprime crises included 1.4 trillion dollars losses on American based loans and related securities, highly volatile and dried up security markets, founded fear of recession, and distressed households with burst dreams of home ownership. The housing market is an integral part of finance since changes in housing value or transaction volume has consequences in almost every investment opportunity or asset in an economy (Morgan, 2009).

Uniquely important, Rahman (2008) argued that rising house price increases the wealth of homeowners but reduces the affordability of those households who want to purchase their own homes. First home buyers will need to save more to pay higher initial deposits and higher mortgage payments. As a result, their consumption actually drops when house prices increase. Rahman (2008) further explained that if a housing market burst occurs it will do more harm to other markets than when the stock market collapses. Empirical research confirms the financial intuition that more seriously impacts on the real economy stem from the bursting of property market bubbles than that of stock market bubbles (Kubicova & Kamarek, 2011).

1.1.3 Global Perspective of Market Prices and Market Performance

Existing literature in the global arena was notably conflicting with respect to the effect of market prices and residential property market performance. The dynamics of residential property have been studied extensively under the concept known as the housing bubble especially after the 2008 crisis (Igan & Laungani, 2012). Lind (2009) purposed to clarify the concept of bubble, what it means to explain a bubble and propose a list of bubble indicators. The methodology used was literature review. Lind (2009) noted that price bubble should be defined only in relation to the development of prices that is a dramatic increase in price and immediately followed by a dramatic fall. The traditional definition in terms of prices not determined by fundamentals is problematic primarily because the concept fundamental is vague. According to Lind (2009) a bubble can never be explained by a single factor, but is the result of the interaction of a number of factors.

Equally, Crotty (2009) undertook a study on structural causes of the global financial crisis. Crotty (2009) stated that the collapse of markets in year 2008 was the most severe case since the great depression and subsequently led to housing bubble and global financial recession. After the subprime mortgage crisis in 2008, most of the Asia Pacific countries such as China, Japan, Australia, South Korea, Singapore, Hong Kong, India, Taiwan and Malaysia implemented the macro-prudential policies and focused on the development of real property sectors in order to recover from global financial crisis (PricewaterhouseCoopers & Urban Land Institute, 2015).

Slightly different, Kohler and Merwe (2015) examined the factors driving long-run trends in Australian housing price growth from 1980s to mid-2000s. In their literature review they observed that housing was an important asset to Australian households since it was viewed as an investment vehicle and a durable good. They held the view that residential property market is like any other financial asset, where the price today reflects the sum of expected future discounted cash flows with the only difference being the relatively large transaction costs. Kohler and Merwe (2015) also noted that in the short run, the demand for housing can change more quickly than the supply of housing thus house prices will need to adjust temporarily to equilibrate housing

demand and supply. They observed that, in the 1980s housing prices in Australia grew in line with general price inflation in that market. Then from 1990s until the mid-2000s stronger housing price growth was associated with significant increase in the debt-to-income ratio of Australian households due to low interest rate environment.

Another worthy aspect was given by Klotz, Lin and Hsu (2016) they modeled property bubble dynamics in Greece, Ireland, Portugal and Spain in the period from 2003 to 2014 by building on present value model in conjunction with the rational bubble assumption. The researchers argued that the residential property market was a key sector in most countries and represented a major asset class for households and the economy. As such, even though the performance of real estate prices had been studied there were noticeable research gaps. One such strand of literature focused on the occurrence of real estate bubbles, which can generally be described as the phenomena of asset price deviations from its fundamental value. Klotz, Lin and Hsu (2016) empirical analysis applying vector auto-regression models indicated that monetary variables were a critical determinant of bubble dynamics. At the five per cent level of significance, Granger causality tests suggested that the interbank rate and lending volume for house purchase was Granger causing the bubble indicator across the four countries. The results of the impulse response analysis indicated a lagged and a positive relationship between lending volume and the bubble indicator at the ten per cent level of significance as well as significantly positive relationship between the interbank rate and the bubble indicator at the five per cent level of significance.

A notable input was given by Warisse (2017) who undertook an analysis of the developments in residential property prices in Belgium from 1970s – 2016. As discussed by Warisse (2017), residential property prices in Belgium had been on a clear upward trend since 1970 with only two relatively short downturns that is in 1980s and during the financial crisis in 2008 and 2009. The growth of house prices was observed to be strong in 2015 despite significant reduction in tax deductibility of mortgage loans (housing bonus). The research employed econometric technics that involved comparing property price trends with a number of determinants such as mortgage rates, taxation, among others. The study result showed that the Belgium property market was not overvalued since price movements could be explained by

movements in certain determinants. Lower interest rate was one of the determinants that were credited to improved housing affordability. The study results also showed that house prices have been supported by property taxation among other variables. However, this has been less the case since 2015, with the devolution of more powers to the Regions and successive reforms of the housing bonus system, especially in the Flemish Region. Warisse (2017) concluded that the observed situation where property prices movements are perfectly in line with market fundamentals, in no way implies that there is no risk for the property market. Shocks in either of the determinants could significantly affect the residential property market in Belgium.

A constructive argument was raised by Lee (2017) in Hong Kong who implied that the level of property demand, particularly from the residential property market, was not only affected by the flow of labor income, derived from the stock of human wealth, but also the flow of capital income, derived from the stock of asset wealth, including stock market wealth. For the forward-looking financial agent, calculating their current level of property consumption requires not only the formulation of a theory of expectations with respect to their labor income (human wealth) but also to assess the change in their capital income (asset wealth). This assumption implied that if households anticipated a change in their asset wealth, they were likely to alter their plans to consume or invest. Lee (2017) then proposed that property demand equation to include variables that measure the effect of change in both human and asset wealth.

Amidu, Agboola and Musa (2016) employed Granger causality analysis in an attempt to examine the relationship between property house index and financial growth in the United Kingdom. It was found that a long-run equilibrium relationship existed between housing investment and financial growth and also that the short-run predictability relationship between them runs from property house index to financial growth (uni-directional), not the other way around and not from both sides (feedback causality). The research findings revealed new evidence of long and short run relationships between property house index and financial growth from the United Kingdom perspective, thus contributing to the wider literature on the nexus between housing markets and other market prices. On the flip side, Ley and Judith (2010) showed that financial growth had a negative influence on housing price. They found that

globalization has much stronger effects towards housing price movement. Kiat *et al*. (2015), in contrast, excluded financial growth from their study because the unit root test results showed that financial growth was stationary at level which was not suitable to proceed to Johansen and Juselius co-integration test.

A key discussion was raised by Mallick and Mahalik (2015) research that supported negative relationship between exchange rate and house price and gave an insight that not only the exchange rate will affect house price, house price will cause causality effect on exchange rate too. Mallick and Mahalik (2015) study used quarterly data (2010 quarter one to 2013 quarter four), to explain the housing prices for fifteen major cities of different regions in India. Their overall result demonstrated that there was a dominance of fundamental factors over the non-fundamental factors (speculative factors) in explaining the regional housing prices. Further, among the fundamental factors, they observed that the share price index, non-food bank credit and foreign direct investment positively explained the housing prices, while inflation rate and a partial measure of wealth (that is market capitalization) negatively explained the same.

In contrast, some other researchers argued that exchange rate and house price were positively correlated. Meidani, Zabihi and Ashena (2011) revealed that demand of house price will increase when exchange rate appreciates. They explained that this was because house owners wish to preserve their asset value. Besides, Meidani, Zabihi and Ashena (2011) found that there was no causality relationship between exchange rate and housing price in their research. Meidani, Zabihi and Ashena (2011) study investigated the existence of causality among house prices, financial growth, and inflation in Iran using the Toda and Yamamoto approach during the period 1990:1– 2008:3. Their results showed that there was evidence of a significant multidirectional link between house prices, and other market prices in Iran. Their finding was supported by Glindro, Subhanij, Szeto and Zhu (2011).

Glindro *et al*. (2011) explained that positive relationships between exchange rate and house price can be found in those countries which pay attention on foreign direct investment, for example Asian countries. Glindro *et al*. (2011) investigated the characteristics of house price dynamics and the role of institutional factors in nine

Asia-Pacific economies during 1993–2006. Their study discovered that on average, house prices tend to be more volatile in markets with lower supply elasticity and a more flexible business environment. At the national level, Glindro *et al*. (2011) observed that the current run-up in house prices mainly reflected adjustment to improved fundamentals rather than speculative housing bubbles.

Researchers globally have different perspectives on the effect of interest rate on real estate performance. Craig and Hua (2011) undertook a study on the determinants of property prices in Hong Kong using a co-integration estimation methodology and an error-correction equation. They noted that interest rate significantly influenced the housing prices in a negative way. Their assertion was supported by Glindro *et al.* (2011) who observed that a decline of interest rate will lead to the appreciation of housing prices, as well as housing boom. Furthermore, a rise in interest rate will cause a decline in demand side of housing market, as a result of interest rate and house prices being negatively correlated.

1.1.4 Regional Perspective of Market Prices and Market Performance

Distinctively, Sunday (2015) undertook a study on the impact of risk and inflation on residential property development decision in Nigeria. Sunday (2015) carried out a review of literature as a study methodology. The study observed that residential property development/investment provided significant favorable outcome than other property investments or businesses during inflationary periods. The study recommended that residential property development/investments be incorporated in most investment portfolios to mitigate risks of various categories and hedge inflation.

Ebohon, Field and Mbugua (2002) argue that a freer and more efficient property market offers a sustainable solution and many benefits to Sub-Saharan Africa's grossly inadequate property sector. But for this process to be effective, African financial institutions must play an active role because of the considerable capital outlays and other requirements associated with property development. In other words, indigenous institutional capacity and appropriate financial systems are essential prerequisites. Unfortunately, financial institutions only play relatively minor roles at present, since most of Africa's finances are from donor agencies in the form of multilateral aid or

loans. Such aid, according to Ebohon, Field and Mbugua (2002), has to date been unable to sustain financial development because it is often tied to inappropriate conditions unfavorable to borrowers. These researchers recommended African countries and governments to provide and enforce policies that encourage the expansion of the real property sector, in order to create functional property markets which can more effectively foster the process of property development.

According to the African Development Bank (2016) Africa remained the world's second fastest growing economy after East Asia. In 2015, growth in real gross domestic product - GDP was estimated at 3.6 per cent, higher than the 3.1 per cent for the global economy. In the same year, Sub-Saharan Africa (excluding South Africa) grew faster than the continental average, at 4.2 per cent, with East Africa leading the way at 6.3 per cent. Empirical evidence has shown that the African middle class has been growing too. The continent's middle class was estimated, by the African Development Bank (2011), to have reached 34.3 per cent of the population in 2010, up from 26.2 per cent in 1980. In Kenya, it encompasses 44.9 per cent of the population. United Nation-Habitat (2011) estimates that African cities become home to over 40,000 people every day. Most of the world's largest cities with population growth rates above 5 per cent are in Africa. Such trends foresee immense strains on affordable housing, and exert a strong push or demand for it.

Equally important, Tesfaye (2007) while assessing problems and prospects of housing development in Ethiopia noted that there was a substantial imbalance between the demand for and supply of housing units in Addis Ababa. Accumulated demand for residential housing on the one hand and the low supply of residential land on the other were noted as the key forces that pushed prices beyond the reach of the majority of the residents in Ethiopia including Addis Ababa. Based on the research summary, overcoming the housing problem, requires efforts in three main areas: housing demand; housing supply; and institutional framework. Improving the conditions in these areas, in turn, requires the combined efforts of the Government of Ethiopia, regional administrations and donor agencies taking the view that overall development of the economy is crucial for the housing development in Ethiopia.

According to Ubosi-Eleh (2017) Nigeria's economy and in effect the real estate sector was in recession in the year 2016 and probably in its worst shape in decades. Real estate contracted by 7.37 percent in the third quarter of 2016 as cited by Ubosi-Eleh (2017). Prior to Nigeria's financial gloom, the real estate industry was the fastest growing segment, and even out performed overall GDP growth in 2013. However, the lengthy collapse in oil prices, falling household income, dollar shortages and a weakening Naira strangled the demand for residential and commercial real estate.

1.1.5 Local Perspective of Market Prices and Market Performance

Prevailing literature in Kenya on market prices and performance of residential property market, just as in the case of global arena, found mixed results. Ouma (2011) carried out a study to establish if the residential property prices in Nairobi are consistent with the fundamentals of the business environment in the Country. The study used stepwise regression modelling. A key finding of the study was that the house prices in Nairobi city were not supported by the GDP, interest rate and the costs of construction. Moreover, the results also suggested the possible existence of a bubble and that money laundering could have a role to play in the Nairobi city residential housing sector. Ouma's (2011) study conflicts with both regional and global studies that found a positive significant relationship between GDP and real estate performance such as Theuns (2013) who carried out a research on the financial variables that influence the residential property market in South Africa from 2006 up to 2012. Theuns (2013) research findings were that GDP contributes up-to 69 per cent in the changes that occur in the house price index.

Equally, Oyenga (2013) carried out a study on the relationship between returns of the real estate and stock market return in Kenya between 2008 and 2012. The results of the study showed that there was relationship between real estate returns and stock market returns with inflation as control variable or when both inflation and interest are introduced in the model. The regression test employed showed there was no relationship between real estate returns and stock market returns when there were no variables introduced. On the flip side, Miregi and Obere (2014) carried out a study on the effects of market fundamental variables on property prices in Kenya, a case of

13

Nairobi from year 2001 to 2013. As per the study findings there was no relationship between property and stock prices. To this effect Miregi and Obere (2014) recommend further investigation into the relationship between real estate and stock markets in Kenya.

According to Kenya National Bureau of Statistics (2012) there were 8,767,954 households as per the 2009 census in the Country, this figure increased to 12,143,913 households as per the 2019 census (Kenya National Bureau of Statistics, 2019). According to Nabutola (2012) Nairobi alone, which is entirely urban, will require nearly two million houses to host its population by 2020. The proportion of urban population to the total population rose from eight per cent at the time of Kenya's Independence in 1963 to 19.6 per cent in 1999, 23.2 per cent in 2009 and projected to be at 27.5 per cent in 2019 (Knoema, 2019). It is projected that half of Kenya's population will live in urban areas by 2050 (World Bank, 2016). This rapid rate of urbanization continues to increase pressure on housing demand. As per Kenya National Bureau of Statistics (2012) analytical report on housing conditions, amenities and household assets, Kenya had a housing deficit of 9,877,912 room per person. The urban populations despite having inadequate housing, it is estimated that they contribute a significant amount of the GDP.

Nabutola (2012) examined the Kenyan national uban development policy making process. According to Nabutola, in terms of policy development, the housing sector in Kenya has evolved considerably since pre-independence period to date. In the 1960s up to early 1970s the welfare state was the predominant political/ administrative system where central and local government intervention was regarded as a means of correcting market imperfections (Kenya National Bureau of Statistics, 2012). The 1966/67 National Housing Policy (Sessional Paper Number Five) promoted a strong role for the government in providing affordable housing for the citizens through its parastatal or quasi-government institution - the National Housing Corporation - in partnership with various city, municipal and other local authorities, and through civil service housing. For more than two decades, the National Housing Corporation was the market leader in the housing industry, responsible for development of government-initiated and managed public housing.

This situation changed with the onset of the structural adjustment programmes in the 1980's which persuaded governments to create an enabling environment through pro-market legislation (Kenya National Bureau of Statistics, 2012). In this paradigm, full cost recovery concept was imposed and all subsidies were removed. In the late 1990s, housing policy focus included concerted efforts in the formulation of a new National Housing Policy (Sessional Paper Number three of June, 2004). Apart from the National Housing Policy, Kenya's Vision 2030 envisages "an adequately and decently housed nation in a sustainable environment" (Republic of Kenya, 2013). The first medium-term goal of Vision 2030 was to increase the production of housing units from 35,000 units to over 200,000 units annually.

1.2 Statement of the Problem

Residential property market performance is a critical concern of investors in real estate as well as the economy in general. From the micro-perspective, it reflects the returns to investors in the sector while also being indicator of affordability to the Country's population. At the macro level, it one of the indicators of macro-economic performance and is instrumental in computation of macroeconomic statistics especially gross domestic product.

Despite the aforementioned importance it is not clear how market prices affect the performance of residential property market in Kenya. Some researchers have found that market prices are important in examining the performance of residential property market while other researchers argue otherwise. The empirical findings of these researches have inconclusive, contradictory and fragmented outcomes on the direction of causation or the strength of the relationship that exists between the selected independent variables and residential property market performance.

With regard to inflation rate Mwololo (2014) and Ouma (2011) found a significant positive influence on the effect of inflation rate on residential property market performance. This is in contrast to Makena (2016) who found a negative effect of inflation rate on real estate investment though the effect was insignificant. Also, Karoki (2013) found a symmetric but unconvincing relationship between inflation rate and residential property market prices. On the other hand, Kuang and Liu (2015) panel

data examination gave evidence that the association between housing prices and inflation rate to be negatively correlated. There exist empirical differences on the effect of interest rate on residential property market returns with some studies concluding on positive effects of interest rates (Karamelikli, 2016), some on negative effects of interest rates (Tsatsaroni & Zhu, 2004) while some maintain that interest rate has no significant effect on residential property market performance (Rebi, 2014; Crowe, Dell'Ariccia, Igan, & Rabanal, 2010).

The effect of stock market price on performance of residential property market has a wealth of literature though the findings disagree. Pillaiyan (2015), Oyenga (2013), Okunev, Glindro *et al*. (2011), and Fry, Martin, and Voukelatos (2010) studies indicated a positive relation between stock market price and real estate market performance while Wokker and Swieringa (2016) study observed a negative relation. Miregi and Obere (2014) noted that there was no significant relationship between property performance and stock market prices. Even though it is agreeable among many researchers that exchange rate influences residential property market performance the direction of causation disagrees with some researchers concluding on a positive effect (Meidani, Zabihi, & Ashena, 2011; Glindro *et al*., 2011; Rebi, 2014), while others concluding on negative effect (Abelson *et al*., 2005; Mallick & Mahalik, 2015).

Besides empirical conflicts there is limited incorporation of the selected theories that is fisher's hypothesis of inflation, efficient market hypothesis, loanable fund theory, purchasing power parity theory, wealth effect, and optimal tax theory in a Kenyan context in methodological examination of the time series properties of the variables and relationships in question. In addition, some studies done had methodological challenges including fiting an econometric model without carrying out diagonistics (Oyenga, 2013), and limited sample size (Muriuki, 2013). In addition, previous studies did not examine the moderation effect of tax revenue on market prices on performance of residential property market in Kenya. It is against this gaps that the this study examined market prices and the performance of residential property market in Kenya.

1.3 Objectives of the Study

To carry out this study, the objectives were categorized into two. These are the general objective and the specific objectives.

1.3.1 General Objective

The general objective of this study was to evaluate the effect of market prices and tax revenue on performance of the residential property market in Kenya.

1.3.2 Specific Objectives

This study was guided by the following specific objectives:

1. To determine the effect of inflation rate on performance of the residential property market in Kenya.
2. To establish the effect of interest rate on performance of the residential property market in Kenya.
3. To assess the effect of stock market price on performance of the residential property market in Kenya.
4. To ascertain the effect of exchange rate on performance of the residential property market in Kenya.
5. To establish the moderating effect of tax revenue on the effect of market prices on performance of the residential property market in Kenya

1.4 Research Hypotheses

The study sought to test the following hypothesis:

H_{01}: Inflation rate has no statistically significant effect on performance of the residential property market in Kenya.

H_{02}: Interest rate has no statistically significant effect on performance of the residential property market in Kenya.

H_{03}: Stock market price has no statistically significant effect on performance of the residential property market in Kenya.

H04: Exchange rate has no statistically significant effect on performance of the residential property market in Kenya.

H05: Tax revenue has no statistically significant moderating effect on the effect of market prices on performance of the residential property market in Kenya.

1.5 Significance of the Study

Besides the literature justification, the findings from this study are of practical importance to a variety of stakeholders:

Residential property managers, the study is important in their decision making as it will give additional information on how market prices affect the performance of residential property market in Kenya. They may also be interested to forecast future performance of the residential property market based on estimated variations of market prices and this may form the basis of resource allocation.

Investors both potential and existing, this study is valuable as it will assist them make informed decisions on the choice of their residential property investments in an attempt to maximize their returns on investment. It will also act as a good way of evaluating the performance of the respective residential property market managers and make decisions on their engagement or retention. To investment advisors they will enrich their knowledge and understanding in financing decisions to equip them better in advising their residential property market clients to make prudent investment decisions that maximizes their returns while minimizing risks. To first-time residential property buyers, the study will assist them to gauge the residential property market and be in a position to determine what to expect in the market.

Financial institutions, this study is of benefit since they will be in a position to gauge how the property market is performing and such information may influence their decisions on loan issuance. This study will be beneficial to both the financial institutions and the property investors as it will enhance negotiation for a better interest rate due to knowledge on its influence on performance of the residential property market.

Governments agencies, the study is relevant in coming up with sound policies that will influence performance of residential property market and to a larger extent assist in providing adequate shelter. The high house prices in Kenya create both financial reasons and institutional reasons for studying the causes behind the surge in house prices. This study gives a model on how to solve some of the residential housing problem and gives some countermeasures.

Future researches, this study contributes to knowledge and extends the prevailing literature on market prices and residential property market performance in Kenya. First and foremost, the results are based on a Kenyan context that has its own unique characteristics. Secondly, this study with regard to conceptual significance has used the mentioned market prices that had conflicting and fragment findings on their effect on performance of residential property performance. The results of the evaluated market prices as bivariate econometric model, as a multi-econometric model, and as a moderated multi-econometric model based on a systematic and methodological analysis have indicated a clear direction of influence and significance of relationship between the market prices and performance of residential property market in Kenya during the period of study.

The direction of influence of inflation rate on performance of residential property market in Kenya was similar to Makena (2016) study results while the significance and direction of influence was similar to Lessard and Modigliani (2014) study findings. Nevertheless, the findings of inflation effect differed with findings of other researchers including Mwololo (2014), Ouma (2011), Inglesi-Lotz and Gupta (2011), and Karoki (2013). The direction of influence of interest rate on performance of residential property market in Kenya was similar to Pillaiyan (2015) Malaysia finding while the significance and direction of influence was similar to Tsatsaronis and Zhu (2004) finding on seventeen developed countries between 1970 and 2003. On the other hand, the effect of interest rate on performance of residential property market differed with findings from other researchers including (Karamelikli, 2016; Rebi, 2014; Crowe *et al.,* 2010; Suljoti & Hashorva, 2011).

When considering the time related shocks of stock market price on performance of residential property market this study findings were similar Wokker and Swieringa (2016) Australia findings. The long form equilibrium relationship between stock market price and performance of residential property market had similar findings with Apergis and Lambrinidis (2011) United States of America and United Kingdom research findings. The significance and direction of influence of exchange rate on performance of residential property market performance was similar to Abelson *et al*. (2005) Australia study findings and differed with findings of other researches including Mallick and Mahalik (2015), Meidani, Zabihi and Ashena (2011), Glindro *et al.* (2011), Rebi (2014), and Diala, Kalu and Igwe-Kalu (2017).

This study results led to a research reasoning that tax revenue increases the predictive power of the effect of market prices to the performance of residential property market in Kenya. This means that tax revenue as a moderator enhances the effect of market prices on the residential property market performance. This research has shown that the reviewed markets communicate and influence performance of residential property market in line with efficient market hypothesis as supported by Hjalmarsson and Hjalmarsson (2008). They argued that market efficiency simply put implies that perfect and imperfect information is factored in a market price. This stand was rejected by Herath and Maier (2015) who considered real estate market as inefficient because of its heterogeneous products among other reasons. The study findings were in line with loanable fund theory where the price of the debt market influences investments including the performance of residential property market in Kenya.

Fisher's Hypothesis of inflation simply put is where the current/nominal value of an asset is the real value of the asset plus inflation component that other researcher refers to purchasing power component of that asset. This would imply that if the inflation rate increases the value of assets is expected to increase. This study findings differed with this argument creating room for more research especially on the hedging capability of residential property market in Kenya. With regards to the relationships under this study, it was observed that in Kenya substitution effect is present when time related shocks are factored in an econometric model especially between stock market and residential property market while in the long form equilibrium econometric model

wealth effect is observed. This study has not only contributed to the literature on the effect of market prices to the performance of residential property market but has gone ahead and provided areas of further studies.

1.6 Scope of the Study

The conceptual scope of this study was on the effect of market prices on the performance of the residential property in Kenya. The study was significant as it employed a combination of different variables as compared to previous researchers. Also the time frame of the study that is from 2005 to 2018 gives a reasonably distinctive aspect considering that from year 2010 there has been considerable changes in the Country from the promulgation of the Constitution to the first implementation of devolution in the Country. Still on the time-frame, the study period covers the coming into fore of the current new National Housing Policy (Sessional Paper No. 3 of July, 2004) (Kenya National Bureau of Statistics, 2012). Last but not least, similar studies done in the country were conflicting and inconclusive. This study therefore contributed to the growing knowledge and literature on such areas that were in diagreement. The study choose the specific explanatory variables based on diagreement among researchers on their effect on performance of residential property market so as to reduce the research gap and contributed to the growing knowledge.

1.7 Limitations of the Study

The result of this study was dependent on secondary data analysis and restricted to Country Kenya. The independent variables data were largely obtained from Nairobi Securities Exchange, Central Bank of Kenya, and Kenya National Bureau of Statistics while the dependent variable data was largely obtained from published reports under Hass Consult Limited. However, the secondary data was obtained from credible sources thus reliable in undertaking the study. The conceptual framework was also limited to four market prices that is inflation rate, interest rate, exchange rate and stock market price. Nevertheless, based on empirical reviews, the regressors used had confounding, and conflicting results, thus giving room for research contribution.

There are myriad theoretical theories that could have formed the theoretical framework for this research; nevertheless, this research was limited to loanable fund theory, purchasing power parity, Fisher's hypothesis of inflation, optimal tax theory, efficient market hypothesis and the wealth effect. The theories selected provided good insight in analyzing the relationships under study. In addition, based on empiricals, the theories selected had contradictory application in the residential property arena, thus giving room for knowledge contribution. The methodologies employed in the study were narrowed down to vector error correction and autoregressive distributed lag even. The choice of the financial econometric models was influenced by the characteristic of data and suitability of the econometric model in explaining the relationships under study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Whereas residential property market is crucial in the Kenyan setup it is not clear how it is affected by market prices especially due to the confounding theoretical, conceptual and conflicting empirical literature. It is valuable therefore to examine the philosophy behind market prices and performance of residential property market and empirical significance of the effect of the market prices on performance of residential property markets in a global context and a Kenyan context. This chapter presents a critical assessment of the selected theories. It goes further, and discusses how these theories were applied by previous researchers on a residential property market context and conflicts arising during application of the theories. At the end of the theoretical literature review, the chapter appraises the contextual framework giving a mental picture of relationships under study. The chapter continues to review the previous empirical, clearly showing the variables studied, methodology used, findings, and critics of the findings. The chapter ends with the identification of the literature gap after the evaluation of the theoretical, contextual and empirical literature along the line of the research objectives.

2.2 Theoretical Literature Review

As suitably defined by Kombo and Tromp (2011) a theoretical framework is a collection of interrelated ideas based on theories; derived from and supported by data or evidence. Furthermore, Trochim (2006) explained that a theoretical framework guides research, determining what variables to measure, and what statistical relationships to look for in the context of the problems under study. The theoretical framework is a foundation for the parameters, or boundaries, of a study.

The study anchored its variables on five theories: efficient market hypothesis that is linked to market prices and performance of residential property market; Fisher's hypothesis that is linked to interest rate; loanable fund theory that is linked to interest

rate; wealth effect that is linked to stock market price; purchasing power parity that is linked to exchange rate; and optimal tax theory that is linked to tax revenue.

2.2.1 Theory of Efficient Market Hypothesis

According to Herath and Maier (2015) theory of Efficient Market Hypothesis (EMH) can be credited to Samuelson 1965, and Fama 1970. The EMH assert that asset prices fully reflect all available information. A necessary condition for investors to have an incentive to trade until the prices fully reflect all the information is that the cost of information acquisition and trading be zero. Most test of the EMH deal with how fast information is incorporated, but do not deal with whether it is correctly incorporated in prices. According to the definition of efficient market hypothesis, an efficient market can exist if a large number of rational profits maximizing investors exists who actively participate in the market, also if some investors are not rational their irrational trades are cancelled out by rational arbitrageurs, and lastly information is costless and available (Yalçın, 2010).

The efficient market hypothesis has historically been subdivided into three categories. Weak form tests are tests of whether all information contained in historical prices is fully reflected in current prices (Echekoba & Ezu, 2012). Semi-strong form tests are test of whether publicly available information is fully reflected in current asset prices. Strong-form tests are test of whether all information whether public or private is fully reflected in the asset prices (Degutis & Novickyte, 2014).

Herath and Maier (2015) argued that real estate market is inefficient first and foremost because of the heterogeneous products developed that differ by many aspects, not the least by their location thus the relevant 'information set' can be very complex and often incomplete. Secondly, high transaction costs and infrequent transactions makes the market price inelastic that is cannot react to every new piece of information. Thirdly, regulation and strong role of policies between countries contributes towards the market being less efficient. Also, production lags contribute to sluggish generation of information. Last but not least the use of long-term contracts in real estate limits price adjustments thus contributing towards the market being less efficient. These arguments provided by Herath and Maier (2015) strongly suggest the need to distinguish between

types of real estate and the countries where the markets operated when evaluating efficiency of real estate markets. This is because the result from one country most likely will not be transferrable to another country due to the arguments raised by (Herath & Maier, 2015).

Real estate market inefficiency has been asserted to be consequence of substantial transaction and information cost. Other real estate imperfections such as barriers to entry, indivisible assets and limited liquidity have also been suggested as potential sources of market inefficiency (Hjalmarsson & Hjalmarsson, 2008). It is important though to distinguish between perfect markets and efficient markets, of the two concepts; market efficiency is much less restrictive. It simply requires that market imperfections to be fully and rationally reflected in the market price. Given this, as Hjalmarsson and Hjalmarsson (2008) posit, there is reason to suspect that real estate markets may be efficient. One of the limitations of EMH as per Arvanitidis (2006) is that information is always imperfect and participants enter the property market with only some part of the potentially available market knowledge. Another challenge of EMH is the disagreement on the evidence of the efficiency of markets and on whether rationality, instead of behavioral models, should still be the dominating paradigm of financial models (Hjalmarsson & Hjalmarsson, 2008).

EMH check whether asset prices fully reflect all available information. The analysis of this study sought to establish whether the performance of residential property market in Kenya is influenced by information from the market prices and if so to what extent. The null hypotheses of this study were derived from this theory and assumed that market prices do not influence performance of residential property market in Kenya.

2.2.2 Fisher's Hypothesis of Inflation

Fisher (1930) hypothesized that the nominal rate of interest was equal to the sum of both the real rate of interest and the expected rate of inflation (Tumkou, 2012). The Fisher hypothesis claims a one-to-one relationship between the rate of interest and expected inflation, with the real rate being independent of the rate of inflation. Thus, the hypothesis states that nominal interest rates rise point-for-point with expected

inflation, leaving the real rate unaffected (price puzzle). This is one of the cornerstones of neoclassical monetary theory. The theory is generalized to nominal returns on any asset, which should move one-for-one with expected inflation. Fisher hypothesis can be extended to all investment assets, (Amonhaemanon, Annaert, De Ceuster, & Long, 2014). According to Tumkou (2012) the real rate on interest rate as per fisher hypothesis is determined by the real factors in finance. According to Bekdache and Baum (2000), the application of fisher's hypothesis can be tested when there is existence of a long-run equilibrium relationship between nominal interest rates and inflation that share the same order of integration.

According to Cooray (2002), one problem that arises when testing for the Fisher effect is the lack of any direct measure in inflationary expectations. For this reason, a proxy variable for inflationary expectations must be employed. There are various models developed over time to add this inflationary expectation in time series. Another limitation of fisher's hypothesis is that in period of confidence and rising asset prices, high real interest rates may be ineffective in reducing demand. Also, in a liquidity trap situation reducing nominal interest rates can have no effect on boosting spending that is lower interest rate does not necessarily encourage investment because the financial climate may discourage investment and spending (Pettinger, 2018).

On the other hand, Bekdache and Baum (2000) found that inflation is fractionally integrated, while nominal interest rates have a unit-root process. They concluded that that the concept that nominal interest and inflation share a stochastic trend which represents a long-run relationship is not applicable. With regard to Fisher's hypothesis several key issues are subject to questionable decision such as serial correlation, sample bias, errors-in-variables effects and conducting analysis based on historical data, while the original definition of the hypothesis is based on expectations.

Equally important, Ignatov (2011) carried out a study on the Fisher hypothesis in the short run, the analysis was based on Eastern European Countries. Their study found out a relationship between the nominal interest rates and the inflation only for two countries, namely Bulgaria and Czech Republic thus supporting the Fisher's Hypothesis. Nevertheless, their study also rejected the Fisher Hypothesis for all other

countries; they observe higher p-values in the short run, compared to the long run. Ignatov (2011) concluded that the term spread of the real interest rates is not constant over time for all countries, thus rejecting the strong form of the Fisher's hypothesis.

A valuable contribution was done by Clemente, Gadea, Montanes, and Reyes (2017) who undertook a research on structural breaks between inflation and interest rates for the group of seven countries between 1970 and 2015. They used Bai-Perron procedure to show the existence of structural changes in the Fisher equation. According to their findings there was limited evidence of a total Fisher effect as the transmission coefficient of the expected inflation rates to nominal interest rates was very different from one.

Distinctively constructive input was given by Edirisinghe, Sivarajasingham, and Nigel (2015) who investigated Fisher effect and the dynamic relationship between inflation and interest rate in Sri-Lanka. The main objective of their study was to investigate the existence of short run and long run Fisher effect and price puzzle in Sri Lanka. The results from co-integration technique, Error Correction Model (ECM) which were employed in their study suggested that in Sri Lanka, nominal interest rates fully adjust for expected inflation in long-run. But in short-run, a significant positive association between nominal interest rates and expected inflation is there with absence of full Fisher Effect. Edirisinghe, Sivarajasingham, and Nigel (2015) analysis was extended and identified the existence of the price puzzle both in a short run and long run. Therefore, changes in monetary instruments do not appear to be completely effective in meeting the goal of low inflation. They recommended Sri Lanka to move towards inflation-targeting monetary policy system.

Uniquely important, Bosupeng (2016) did a review on the Fisher effect with a focus on validating the Fisher effect from one country to the other without attempting to find out the adverse effects of factors such as monetary policy on the Fisher hypothesis. Bosupeng (2016) observed that in numerous studies the long run Fisher effect has been proved several times as compared to the short run Fisher effect phenomenon. Bosupeng (2016) observed that in the long run, interest rates exhibit minimum volatility therefore resulting in the long run association. The researcher concluded that

Fisher effect appears to be a long run phenomenon. He also recommended the need to address several factors affecting the Fisher parity such as inflation targeting and monetary policy.

Similar to Bosupeng (2016), Glasner (2008) paper used the Fisher equation relating the nominal interest rate to the real interest rate and expected inflation to provide a deeper explanation of the financial crisis of 2008 and the subsequent recovery than attributing it to the bursting of the housing-price bubble. Glasner (2008) paper interprets the Fisher equation as an equilibrium condition in which expected returns from holding real assets and cash are equalized. According to that study, when inflation expectations decline, the return to holding cash rises relative to holding real assets. If nominal interest rates are above the zero-lower bound, equilibrium is easily restored by adjustments in nominal interest rates and asset prices. But at the zero-lower bound, nominal interest rates cannot fall, forcing the entire adjustment onto falling asset prices, thereby raising the expected real return from holding assets. Glasner (2008) attributes such an adjustment to have triggered the financial crisis of 2008, when the Federal Reserve delayed reducing nominal interest rates out of a misplaced fear of inflation in the summer of 2008 when the economy was already contracting rapidly. Glasner (2008) concluded that the Fisher effect appears to be a long run phenomenon and recommended that several factors affecting the Fisher parity such as inflation targeting and monetary policy to be considered.

Fisher's hypothesis was extended by Piazzesi and Schneider (2007) to real estate whose study was that illusionary and smart investors disagree about real interest rates when smart investors' inflation expectations are either high or low. In either case, disagreement generates increased borrowing and lending among households as well as house price boom. Disagreement about real interest rates generates house price booms if borrowing must be backed by real estate. Indeed, increased credit market activity raises the demand for collateral, which in turn drives up house prices (Piazzesi & Schneider, 2007).

As shown above there are academic papers that support the hypothesis in both the short and the long term while there are others that reject the fisher effect in any duration.

The most common issues were that different countries and different time periods ultimately provide controversial results. Majority of researchers tend to reject the Fisher Hypothesis in the short run, while the longer maturity periods provide evidence in support of the fisher effect. Even more, it is a general trend that the longer the maturity period the stronger the relationship between inflation and nominal interest rates. On the other hand, several researchers are of the opinion that the real interest rate is not constant over time, thus rejecting the strong form of the hypothesis.

Fisher's hypothesis of inflation helps to understand and analyze the effect of inflation on the performance of residential property market in Kenya. This study sought to find more insight by establishing the effect of inflation rate, whether high or low, on residential property market.

2.2.3 Loanable Fund Theory

According to Taylor (2004) loanable fund is a theory of the rate of interest that is mainly attributed to Wicksell (1898). Later on, the theory was considerably improved by economists Ohlin (1937) and Robertson (1934). According to Barbaroux and Ehants (2015) this theory proposes that the rate of interest is determined by the demand for and supply of loanable funds. According to this theory demand for loanable fund arises for three purposes that is investment, hoarding and dissaving that decrease the function of interest rate. The main source of demand for loanable funds is the demand for investment. Investment refers to the expenditure for the purchase of making of new capital goods including inventories. The price of obtaining such funds for the purpose of these investments depends on the rate of interest. The demand for loanable funds is also made up by those people who want to hoard it as idle cash balances to satisfy their desire for liquidity. Dissaving demand comes from the people at that time when they want to spend beyond their current income (Kumar, 2018).

According to Kumar (2018) the supply of loanable funds is derived from the basic four sources, that is, savings, dishoarding, disinvestment and bank credit. Savings constitute the most important source of the supply of loanable funds. Savings is the difference between the income and expenditure. Since, income is assumed to remain unchanged, so the amount of savings varies with the rate of interest. Also, individuals

may dishoard money from the past hoardings at a higher rate of interest. Disinvestment occurs when the existing stock of capital is allowed to wear out without being replaced by new capital equipment. In addition, the banks advance loans to the businessmen through the process of credit creation that increase with interest rate. A basic conclusion of the theory is that falling interest rate will induce greater investments to take place.

Savings, therefore, is either identical or a pre-requisite for credit. The theory proposes an increase in (household and/or government) saving in order to increase investment (Lindner, 2013). The sum of private and government savings are the flows into the financial markets and the investment the flows out of the financial markets. Saving and investment can be interpreted in terms of supply and demand. The good is loanable funds, and its price is the interest rate. Saving is the supply of loans (Mankiw, 2009).

According to Hirai (2005) individuals lend their saving to investors, or they deposit their saving in a bank that makes the loan for them. Investment is the demand for loanable funds that is investors borrow from the public directly by selling bonds or indirectly by borrowing from banks (Mankiw, 2009). At the equilibrium interest rate, saving equals investment, and the supply of loans equals the demand. The theory posits that when all debt markets are aggregated, the risk-free rate of interest is determined by the interaction of demand for and supply of all loanable funds. Therefore, it can be observed that interest rates can dictate the amount of loans that business community is ready and able to borrow at any given time which consequently reflect the profit made by business. Low profits insinuate incapability to repay borrowed funds and vice versa if profit is high due to cheap cost of capital. Businesses borrow to finance working capital needs and capital expenditures (Hirai, 2005).

Loanable funds theory assumes that interest rates are determined by supply of loanable funds and demand for credit (Muriuki, 2013). The many factors considered in loanable funds theory mean that equilibrium will be reached only when each of the factors is in equilibrium. Mortgage rate is one of the key components of housing affordability index, and the rise in mortgage rate decreases the index and vice-versa. A link between low interest rates and house price bubbles is especially tenuous. Standard theory says

that low interest rates should increase house values (or the value of any long-lived asset, for that matter). Consequently, the observation that house prices rise when interest rates fall is not by itself evidence that low interest rates cause bubbles. To make this case, one would have to argue house prices tend to overreact to interest rate reductions, that is, appreciations are larger than warranted by fundamentals. According to McKinnon and Shaw (as cited in Chacha, 2013) increase in demand for investment but not the actual investment can occur, if real interest rates are kept below the market equilibrium. Low interest rates are insufficient to generate savings; it can even reduce savings especially if substitution effects dominate the income effect for households. On the other hand, low rates raise the expected profitability of investment projects by raising the net present value of future earnings from the project.

One of the limitations of the theory as shown by Lindner (2013) is that credit is not limited by anybody's saving and that no one has to abstain from consumption in order for a credit to be provided. Also, financial savings (an increase in net financial assets) through a reduction in expenses reduces another economic units' ability to spend and save. Another challenge is that the theory is based on the unrealistic assumption of full employment. The theory is also indeterminate (Kumar, 2018). Finally, loanable funds theory rests on the assumption that the level of national income remains unchanged. In reality, due to the change in investment, income level also changes accordingly.

The loanable fund theory provides for an explicit understanding of how the interest rates affect the performance of the residential property market. The theory, therefore, helps to analyze the influence of interest rate on residential property market.

2.2.4 Wealth Effect

According to Liu and Shi (2017) the effects of the wealth on consumption can largely be credited to Keynes in 1936. They further state that Haberler in 1939 defined this relationship between consumption and wealth as real-balance effect of wealth effect. Other scholars, as mentioned by Cooper and Dynan (2016) who critiqued the wealth effect included Friedman study in 1957, and study by Modigliani and Brumberg in 1954 among others scholars. The wealth effect proposes that households who realize gains in share prices will have an increased demand for housing (Pillaiyan, 2015).

Thus, a stock market boom will lead to a housing price growth. The wealth effect posits that consumers feel more financially secure and confident about their wealth when their homes or investment portfolios increase in value. They are made to feel richer, even if their income and fixed costs are the same as before. The wealth effect reflects the psychological effect that rising asset values have on consumer spending behavior. The concept hones in on how the feelings of security, referred to as consumer confidence, are strengthened by sizable increase in the value of investment portfolios. Extra confidence contributes to higher levels of spending and low confidence contributes to lower levels of spending (Liberto, 2019).

A weighty contribution was given by Aruoba, Elul, and Kalemli-Ȯzcan (2018) they investigated the effect of declining house prices on household consumption behavior during 2006-2009. They used individual-level data set that had detailed information on borrower characteristics, mortgages and credit risk in the United States. They decomposed the effect of declining house prices on consumption into three channels: wealth effect, household financial constraints and bank health. They found a negligible wealth effect. Tightening household level financial constraints explained 40-45 per cent of the response of consumption to declining house prices. Deteriorating bank health that reduced credit supply to both households and firms explained 20-25 percent of the consumption response. The remaining 35 percent was a general equilibrium effect that worked via a decline in employment. From, their study the wealth effect was negligible.

Substantially valuable, Jansen (2010) carried out a study on wealth effects on consumption in financial crises in Norway. They found that a consumption function including wealth effects in the short and long run explains the quarterly changes in consumption over the years 2006-2008 better than Euler based equations and also better than an alternative consumption function without a long run wealth effect. The wealth effects are shown to be strong enough to lift the savings rate considerably and to counteract the expansive effects of low interest rate, which has both a positive direct effect on consumption and an indirect effect via a marketed increase in real disposable income for the household sector.

Another noteworthy input was researched by Coskun, Atasoy, Morri, and Alp (2018) who explored the linkage between wealth effects arising from stock and housing market channels, and household final consumption for eleven advanced countries over the period from 1970 quarter one to 2015 quarter four. They employed regression analysis through the common correlated effects mean group estimator as well as Durbin-Hausman co-integration and Dumitrescu and Hurlin causality tests. They found that consumption is mostly explained by income and housing wealth is positively and significantly correlated with consumption in advanced countries.

As discussed above, there is considerable debate among market pundits about whether or not the wealth effect truly exists, especially within the context of the stock market and residential property market. Some believe the effect has more to do with correlation and not causation, proposing that increased spending leads to asset appreciation, not the other way around.

2.2.5 Purchasing Power Parity Theory

Henry Thornton, Wheatley, Ricardo, Marshall, Gustav, Cassel von Mises, Keynes, and Viner are the leading theorists who were proponents of the purchasing power parity theory (Humphrey, 1979). These theorists helped to formulate, develop, modify, and refine the central analytical propositions of the purchasing power parity doctrine. Purchasing power parity theory (PPP) proposes that the nominal exchange rate between two currencies should be equal to the ratio of aggregate price levels between the two countries; that is equivalent saying that a unit of currency of one country will have the same purchasing power in a foreign country (Voinea, 2013). According to Borsic and Beko (2018) the purchasing power parity theory implies that exchange rate changes are driven based on the arbitrage, by shifts in relative prices, thus making potential deviations of real exchange rates from the purchasing power parity equilibrium levels only as a short-run phenomenon.

As discussed by Hyrina and Serletis (2010) the theory of PPP has attracted a great deal of attention and has been explored extensively. Based on the law of one price, PPP asserts that relative goods prices are not affected by exchange rate. They note further that the relationship is important not only because it has been a cornerstone of

exchange rate models in international markets, but also because of its policy implications. They conclude that it provides a benchmark exchange rate and hence has some practical appeal for policymakers and exchange rate arbitragers.

A distinctively valuable assertion was made by Horne (2004) that the PPP is simply an empirical proposition that national price levels are equalized when measured in a common currency. Provided goods arbitrage brings about broad parity in prices across a sufficiently large range of individual goods (law of one price), then there will also be a high correlation in aggregate price levels. PPP plays a central role in open-economy by setting an anchor for the long-run equilibrium real exchange rate.

Considering the construction industry worldwide, Langston (2016) notes that perhaps the best way to describe PPP-adjusted values is to say that they express local purchasing power prices by weighting them according to a standard basket of in-country priced construction items (including common materials, labor, and plant items). The higher the PPP-adjusted value, the higher are the relative costs of building in one location over another. The PPP exchange rate alone does not indicate the relative costs associated with a particular venture, just as relative costs are clarified by the United States dollar exchange rate. But if local prices are split, the result is a global comparative cost.

There are several reasons for the divergence between the market exchange rates and the PPP rates (however measured). The short-term factors include the capital movements between countries, interest rate movements, speculation in foreign exchange markets, etc. (Majumder, Ray, & Santra, 2015). The longer-term factors include the fact that the exchange rates are almost exclusively dependent on the relative prices of tradable items, while standard of living comparisons between countries should include both tradable and non-tradable items, especially in the context of developing countries. Consequently, the PPP rates are based on a much wider selection of items than market exchange rates including both tradable and non-tradable items. According to Majumder, Ray and Santra (2015) the PPP rates may deviate from exchange rates much more for developing countries than the developed ones.

Under all financial circumstances the theory of purchasing power parity as discussed by Chand (2014) offers a sensible explanation for long-term shifts in exchange rates. The theory also informs the discussion around balance of payment. However, there are a number of limitations of purchasing power parity that were pointed out by Chand (2014). First, the notion that exports reflect relative price levels; that a country's monetary unit has the same purchasing power both inside and outside the country; it is only valid on the never-existing presumption that all goods and services can be moved from one country to another without additional costs. Secondly the theory overlooks the influence of demand and supply factors in foreign exchange. Thirdly, tradable goods are not always perfect substitutes when they are produced in different countries, for example a housing unit in one country may differ in price significantly when compared to a similar housing unit in another county even if all other factors are held constant. Moreover, the theory unrealistically assumes free trade and lack of exchange control based on a steady exchange rate while in reality governments interfere with free trade flow and or provide incentives, such as government incentives aimed at making available affordable mortgages and or tax incentives to house builders/investors.

This theory provides an unbiased perspective on the relationship between foreign exchange rate and residential property performance. The theory offers a neutral platform to undertake an incisive empirical analysis by providing information on the effects of foreign exchange rates.

2.2.6 Optimal Tax Theory

According to Mankiw, Weinzierly, and Yagan (2009) this theory can be credited largely on the foundational work of Ramsey 1927 and Mirrlees 1971. The theory posits that a tax system should be chosen to maximize a social function subject to a set of constraints. Optimal taxation typically treats the social planner as a utilitarian: that is, the social welfare function is based on the utilities of individuals in the society. Mankiw, Weinzierly, and Yagan (2009) further state that the optimal tax theory aims to determine how government can maximize social welfare through taxes and transfers without increasing the tax payer's sacrifice. Whether conscious or not, optimal tax

theory actually embodies a resource egalitarian view of distributive justice to a large extent. However, the reasoning behind the theory's principles emphasizes incentives, efficiency, and the information that choices reveal about individual well-being. This theory indicates that optimal taxation is a function of tax charge and how this tax is collected to ensure fair redistribution of welfare.

The theory assumes that in society everyone has the same interests about, say, consumerism and leisure (Mankiw, Weinzierly & Yagan, 2009). Sometimes by assuming that the society is dominated by completely identical people, this homogeneity assumption is taken one step further. The social planner's goal is to choose the tax system that maximizes the representative consumer's welfare, knowing that the consumer will respond to whatever incentives the tax system provides. In some studies of taxation, assuming a representative consumer may be a useful simplification. Drawing policy conclusions from a model with a representative consumer can also in some cases lead to trouble.

Optimal tax theory encompasses a range of models that focus on particular aspects of the tax system (Gachanja, 2012). Three features are shared by these different models. First, each model specifies a set of government feasible taxes. Typically, the models excluded lump sum taxes that would cause no financial distortion. Second, each model specifies how to respond to taxes by individuals and companies. Third, the government has an objective function to evaluate various tax configurations. The government's goal in the simplest models is to minimize the tax system excess burden while raising a set amount of revenue. The more complicated models balance considerations of efficiency with concerns about equity. Models that include equity tend to be more about vertical equity rather than either horizontal equity or the benefit principle.

As pointed out by Fleurbaey and Maniquet (2015) many applied economists working for governments and international organization view the theory as highly technical and abstract and hence of little policy relevance thus creates a gap between theorists and practitioners of public finance. Another limitation of the theory is that it assumes individuals have identical preferences. This assumption is made more for analytical

36

simplicity than for realism. Nevertheless, optimal tax theory provides a benchmark against which to evaluate actual public taxation policies.

Optimal tax theory helps to examine the moderating effect of tax revenue on the relationship between market prices and the performance of residential property market in Kenya.

2.3 Conceptual Framework

Mugenda and Mugenda (2003) defined a conceptual framework as a hypothesized model identifying the model under study and the relationships between the dependent variable and independent variables. Kombo and Tromp, (2011) have defined a conceptual framework as a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation. Smyth (2004) posits that a conceptual framework is a research tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny and to communicate it. When clearly articulated, a conceptual framework has potential usefulness as a tool to assist a researcher to make meaning of subsequent findings. The researcher conceptualizes the relationship between independent variables and the dependent variable in the study and shows the relationship graphically or diagrammatically (Smyth, 2004).

The conceptual framework for this study shows the relationship between the current effect and lag time related shock effect of inflation rate, interest rate, stock market price, exchange rate, and the lag time related shock effect of previous performance of residential property market on the dependent variable namely performance of residential property market in Kenya. The conceptual framework goes further and shows how the moderated variable tax revenue and lag time related shock effect of the moderated variable tax revenue influence on the relationship between market prices and performance of residential property market in Kenya. From the conceptual framework it can be clearly observed that the Baron and Kenny (1986) methodology was employed to analyse the moderating effect of tax revenue. The conceptual framework goes further and shows the predictor variables and the explained variable

thereby clearly showing the direction of relationship being studied. Based on the above the conceptual framework is summarized below:

Inflation Rate Including lag-time related shocks of inflation rate	
Interest Rate Including lag-time related shocks of interest rate	**Performance of Residential Property Market** Time related shocks of previous performance of residential property market are treated as predictor variables
Stock Market Price Including lag-time related shocks of stock market price	**Dependent Variable**
Exchange Rate Including lag-time related shocks of exchange rate	
Independent Variables	**Tax Revenue** Including lag-time related shocks of tax revenue
	Moderating Variable

Figure 2.1: The Conceptual Framework

2.3.1 Inflation Rate

Gallagher (2011) describes inflation rate as price paid for the continued variation in prices of goods and services that is it is the price of the commodity market. Variation of commodity market prices influences the value of money. These fluctuations of commodity market price can be measured using various methods, with consumer price index being one of the common measures (Liow, Ibrahim and Huang, 2005). Variation in the commodity market price can influences the performance of other markets (Gokal, 2004). This may prompt more preservationist approaches by investors and low levels of speculation (bearish approach to investment). According to Vena (2014) price variation in the commodity market can generally be classified as either anticipated or unpredictable. Anticipated inflation is preferred as investors can plan for it while unpredictable inflation is not desired as it creates uncertainties in the market, making the market less efficient (Vena, 2014).

Notably pointed out by Oliverboard (2017) causes of inflation can be summarized as either due to demand pull factors that are brought about by general fluctuations in demand for sought after services and products. There are likewise cost push factors that are caused when overall expenses of organizations vary. In addition, there is fiscal variation of commodity prices that is brought about by unreasonable stockpile of cash in business sectors. Oliverboard (2017) further classified inflation into; crawling or mellow variation in commodity prices (below two per cent), strolling increase of commodity prices which is a more grounded variation in commodity prices (three per cent to eight percent), dashing expansion of commodity prices that ascents to ten percent or slightly more, hyperinflation when expansion of commodity prices rapidly escalates out of control, and stagflation when the commodity market stagnates.

2.3.2 Interest Rate

Interest bearing market price is the weighted mean loan fee or premium charged by business upon loans issued during a given timeframe (Central Bank of the Republic of Philippines, 2014). From the above, the price of interest-bearing markets is considered to be interest rate. Monthly information on aggregate interest rate is a proportion of premiums paid to all lending institution vis-à-vis pending loans.

Mutinda (2014) contends that the environment created by the interest rate is significant in influencing the end result of the conduct of some random venture; this means that, the interest rate has a significant effect on saving and utilization practices of investors. Mutinda (2014) valuably expresses that adjustments in the interest rate influences the short or long run equilibrium position of any market. These progressions likewise impact the desires and plans of investors regarding their very own future and the discernment of welfare and redistribution of investments and about the possibilities in the markets. A worthy assertion was made by Ng'etich and Wanjau (2011) that interest rate fluctuations additionally influence investors' behavior that is investors decisions are shaped by variations in the price of money.

2.3.3 Stock Market Prices

Dagar (2014) asserted that a major role of the equity market price is improving trade and other ventures in a nation. Additionally, Oyenga (2013) noted that in the securities market it is easier to liquidate one's investments when compared to property ventures especially in developing economies. Substitutability of investments between property market and security market is arousing interest among researchers especially considering the noticeable market differences. The security markets, world over, have developed indices that measure the performance of their markets. The Nairobi Securities Exchange (NSE), in Kenya has several indices with the NSE 20 share index being the pioneer index in that market that is being computed till date (NSE, 2017). Firms listed in a securities market provide an analogous performance of their markets. As stated by NSE (2017) a key objective of a security market index is to give a fairly accurate illustrative performance of constituent equities with an aim of underlining the overall stock market performance.

2.3.4 Exchange Rate

As defined by Organization for Economic Co-operation and Development (2007) a country's exchange rate is the price of one nation currency in comparison to that of another nation, it can also be termed as the price of the exchange market. As stated by Central Bank of Kenya (2017) market forces of supply and demand determine the equilibrium exchange rate in Kenya. Enterprises that engage in foreign exchange in

Kenya, be they forex bureaus or banks, set they own rate or price based on how they interpret the information in that market. The Central Bank of Kenya only posts indicative or aggregate exchange rates in the country in a given time span.

As discussed by Mongeri (2013) when computing for an exchange rate there are two units, the local currency and foreign currency. Based on these two units, direct exchange rate estimation is when the unit price of the foreign currency is quoted using the local currency. While indirect exchange rate estimation, is when the unit price of a local currency is quoted in terms of the foreign currency. Kiat *et al*. (2015) stated that when the local currency is not used as one of the exchange rate computational units then that exchange rate is termed as a cross rate.

2.3.5 Tax Revenue

Tax is used as a moderator in this study. Economic fiscal policy stipulates that variations in government income and expenditure can be used to stimulate economic growth which has a direct bearing on market performance (International Monetary Fund, 2015). It is therefore critical to evaluate how tax policy indicated by tax revenue moderates the effect of market prices on performance of residential property market.

Omolo (2012) described tax as the charge imposed by the executive of a given nation upon its habitants for its help or enablement of its citizens'. Tax base and rates are approved by the legislative arm and administered by the executive arm. Tax offences are punishable as stipulated in a country's legislations. Kamau (2007) described taxation as the system of receipting money from individuals or entities in a country based on their income, consumption, property or production. Kanyi (2014) described a tax policy as executive mechanism that is developed to impose and receive tax revenue, through various approved levies and rates. Karumba (2016) explained tax capacity as the utmost amount of tax that a state can receive at any given time frame based on its fundamentals.

Government revenues come from various streams including but not limited to debt both local and foreign, taxes, grants or aids, incomes from government investments, and appropriation in aid (Omolo, 2012). Thus, tax revenue is one of the streams of

government revenue and can generally be classified as direct tax revenue and indirect tax revenue. Tax receipted and accounted by persons or firms forms part of direct tax revenue while tax receipted from production and/or consumption forms part of indirect tax revenue. As illustrated by Muyanga (2014), when the government varies its taxes, it negatively or positively influences consumer spending that affects market prices.

2.3.6 Performance of Residential Property Market

Residential property market has attracted all types of investors including but not limited to international investors, institutional investors and private investors (Cushman & Wakefield, 2016). According to Dyer and Blair Investment Bank (2016) Kenya's real estate sector accounted for 7.9 per cent of the Country's GDP and was expected to increase with the ongoing transport infrastructure projects. According to KnightFrank (2014) the real estate industry had dislodged the retail sector as the fourth largest contributor to the economy even as traditional sectors such as agriculture, wholesale and financial services continued to diminish. Nevertheless, as reported by Commission on Revenue Allocation (2019) the real estate sector accounted for seven per cent of the Country's GDP and was the fifth largest contributor to the economy in year 2018.

This study employed the use of house price index as a measure of the performance of residential property market. There are two residential property houses prices indices published in Kenya one by HassConsult and the other by Kenya Bankers Association. The house price index by HassConsult is long standing as it has been published on a quarterly basis from year 2000 while the Kenya Bankers Association house index has been published quarterly from year 2013. The Hass index employees a mixed adjusted methodology (HassConsult Limited, 2012) while Kenya Bankers Association housing price index employees' hedonic function in its computation (Kenya Bankers Association, 2012). The mixed adjusted methodology is also employed by the real estate analysis section of Bank of Greece (2017) and preferred by Eurostat European Commission (2012). The hedonic methodology is also employed in computing house price index as published by the Central Bank of Turkey (Hulagu, Kizilkaya, Ozbekler,

& Tunar, 2016). There are other places where both methods are used in developing residential property house index such as Nationwide Building Society (2017).

2.4 Empirical Literature Review

According to Zikmund, Babin, Carr and Griffin (2010) empirical literature review is a directed search of published works, including periodicals and books that discuss present empirical findings by other scholars that are relevant to the research topic under study. It therefore provides a platform for analyzing the variables, their relationships and to critique the findings where necessary. This section therefore provides a review of such empiricals.

2.4.1 Inflation Rate and Market Performance

Makena (2016) did an examination on effects of economic variables on property market investment in Mombasa County, Kenya between years 2006 to 2015. The examination utilized statistical regression where property market investment was the predictand. The stimuli of this study were interest rate, GDP and inflation rate. The explanatory variables were found to be negatively correlated to the regressand though they had insignificant effect. As discussed by Makena (2016) an increase in inflation led to a decrease in property market investment in Mombasa County. The research was constrained to Mombasa County. In addition, all the predictor variables were insignificant.

Similar to Makena (2016), Mwololo (2014) undertook a study on the effect of economic variables on prices of residential real estate property in Kenya. The review utilized statistical insights, Pearson's technique and common least squares model. The investigation was restrained on yearly information from year 2006 to 2014. The targets of the investigation were to determine the effect of inflation on residential property market in Kenya, to establish the influence of loaning rates on residential property market in Kenya, to build up how pace of joblessness influences residential property market in Kenya, and to access the influence of GDP on the residential property market in Kenya. The examination discovered that business banks' loaning rates had a critical negative influence on property market, while joblessness, expansion of inflation, and

43

GDP had a positive critical outcome on property market in Kenya. The examination uncovered a critical positive influence on explanation of inflation on property market in Kenya. Mwololo (2014) recommended that joblessness and expansion of inflation ought to be controlled at supportable level. The conceptual of this study had a social angle however in the findings and summary there was no mention on the outcome of the same. Besides, the examination utilized common least square strategy without considering whether historical data informs the current data.

Equally important, Ouma (2011) carried out an examination of real estate prices and economic fundamentals, in particular, an empirical investigation of the residential housing market in Nairobi City. The analysis was modeled using stepwise regression method. The researcher unearthed that GDP, interest rate, and cost of construction play no role in the pricing of houses in Nairobi, Kenya. Nevertheless, the examination revealed that inflation has significant one to one relationship with residential property pricing in Nairobi. From the review the researcher was of the opinion that Nairobi residential housing prices are influenced by money laundering and that there are chances of pricing bubble of the properties. The stepwise methodology implemented in this study is considered by Altman and Andersen (1989) to yield coefficient of determination values that are gravely biased to be high. Also, Judd, McClelland, and Ryan (2009) considers this methodology to have a high risk of exploiting on chance features of the data that is the algorithm determines the final model without considering the data or the theoretical framework supporting the model.

Kuang and Liu (2015) modeled the relationship of house prices with inflation by employing a four-sector general equilibrium model on clients, developers, businesses and the central bank. Using a time frame of between 1996 and 2010, their review employed panel database of thirty-five major cities in China. Theoretically the model they employed showed that expansion of inflation and house prices are symmetrically related and established endogenously. In contrast, their panel data examination revealed that house price and expansion of inflation to be negatively correlated. The research reasoning was that the weight of inflation on house prices was higher than that of housing prices on inflation. The researchers' empirical evidence gives ground that the association between housing prices and inflation to be endogenous that is a

digression of house prices from their fundamental value should be addressed by inflation policy by the monetary policy committee of the central bank targeting housing price growth.

Equally, Suhairah and Masih (2019) undertook a research on long and short haul inflation-hedging capability of the Malaysian housing properties using a time frame of 1986 quarter one to 2018 quarter two. The researchers employed both linear and non-linear auto regressive distributed lag models. From the elucidation of their findings the long run equilibrium model between house prices and inflation rate were negatively correlated. In contrast under their short run equilibrium model they were of the opinion that the relationship between house prices and inflation rate was feeble. The researchers importantly noted that house prices can be exogenously impacted by other market prices.

Distinctively, Karoki (2013) employed multi-variable regression model to research on residential prices in Kenya from 2005 to 2012. The regressors were composed of interest rate, inflation rate, money supply and GDP. The finding of this study as interpreted by the researcher was that there was a convincing asymmetric association between interest rate and residential property prices and a significant symmetric correlation between GDP, money supply and the regressand. On the contrary, based on the findings of the research inflation rate was observed to have a symmetric but unconvincing influence on residential property prices. The researcher pointed out an overall increase in residential property prices during the time frame of the study. The research had a behavioral theoretical framework but failed to illustrate the same in the findings and summary.

Somewhat atypical from other empirical reviews, Inglesi-Lotz and Gupta (2011) undertook a research on South Africa on the long-run influence of inflation on residential property in South Africa through house prices and the price of non-housing goods and services. Quarterly data was analyzed for the period 1970 first quarter to 2011 first quarter for luxury, large middle-segment, medium middle-segment, small middle-segment and the entire middle segment of house prices, and consumer prices index excluding housing costs. The model employed in the analysis was autoregressive

distributed lag model. From the researchers summary there was a long-run equlibrium relationship between house prices of all categories and consumer price index. In addition, the identified Fisher coefficients for all the housing categories were not critical. This lead to the research opinon that South Africa's house prices were stable, but provided minimal inflation hedging capability in the long run.

Another distinct research was carried out by Lessard and Modigliani (2014) on the relationship between inflation and housing market. The motivation behind this study was the noticeable variation in construction activity and revenue of the housing market. Also, as narrated by the researchers, there was a developing impression that adequate housing was not affordable to an ever-increasing number of households. The examined nations included United Kingdom and Canada, this Countries used variable-rate mortgage with equal payments. Brazil and Israel were also under review, and they employed price level adjusted mortgages. Also, Sweden was observed and it adopted variable rates with time stream of patterns tailored to eliminate inflationary distortions. Finland, on the other hand, had a hybrid scheme that was somewhat in amid that of price level indexation and variable nominal interest rates. From the study findings, the researchers illuminated that inflation had an asymmetrical association on the need of mortgage backed houses and that inflation vacillation influenced instability in the construction activity. The researchers were of the opinion that inflation and/or inflation expectation influences increase in interest rates by an inflation premium to compensate the investor. This construal equally applied to housing mortgage rates. The increase in interest rate by the mentioned inflation premium ultimately increases the value required to acquire a residential unit.

2.4.2 Interest Rate and Market Performance

Karamelikli (2016) embraced an examination on the linear and nonlinear dynamics of price of homeowner equity in Turkey between the years 2010 to 2016. The researcher, with a motivation to explore the long run equilibrium relationship modeled the study using non-linear autoregressive distributed lag. The results from this study indicated that interest rate and housing price had a symmetric association. To explain this finding, it was argued that inflation ought to be removed from the lending rate so as to

be left with the absolute interest rate variable. Thus, if both the actual lending rate and inflation have unfavorable effect on housing prices and the absolute value of inflation rate is higher than the absolute value of actual lending rate then there is a possibility that the long run relationship between interest rate and housing prices to be symmetric.

Equally valuable, Rebi (2014) carried out a research on price of mortgage and house prices in Albania. The study made use of a vector error correction model cointegration technique. The purpose behind this review was to empirically examine the long run relationship between interest rate and housing price. From this research it was observed that house prices and exchange rate had a convincing favorable relationship. The research outputs also illustrated an unconvincing relationship between interest rate and house prices. This finding between interest rate and house prices was supported by other empirical studies (Crowe *et al.,* 2010; Suljoti & Hashorva, 2011; Ouma, 2011). The discussion by Crowe *et al*. (2010) on the inconsequential relationship between interest rate and housing price in various Countries was because of various dynamics such as international trade integration between countries whether developed or developing influences a decrease in value of imports through offsetting the inflation of untradeable wares thus concealing the influence of interest rate on residential market price that is untradeable wares.

Another weighty empirical research was done by Muriuki (2013) on the relationship between interest rates volatility on the growth of real estate market in Kenya. The scrutiny of this study was between the period 2008-2012. Ordinary least square regression model was employed to examine the variablity of interest rate on growth of residential property market. From the output of the study, it was observed that interest rate had low volatility, from this output, it was discussed that interest rate was forseeble, at minimum in the short run period. The analysis also revealed that volatility in the interest bearing market was non linear. Based on the findings, the researcher was of the view that there was a surge in demand of residential units that goes against a variablitity in interest rates, inflation and strength/weakness of the shilling. The researcher supported this opinion by arguing that the demand for housing was price inelastic due to an ever increasing middle-income population and an escalating uneven allocation of wealth and opportunity between various segments in the Kenyan society.

Following this findings and summary of this examination, the researcher recommended continuous investments in residential property market despite the observed inconsistency between other market prices and residential property price. The model used in Muriuki (2013) analysis failed to consider whether preceding information informed present market prices.

Distintively constructive, Tsatsaronis and Zhu (2004) conducted an investigation to determine drivers of housing price dynamics. The examination was based on assessment of seventeen developed countries between 1970 and 2003. From the analysis it was observed that there was significant asymetric relationship between interest rate and residential property prices. The explanation given by the researchers was that most house purchases are mortgage backed thus lending rate forms part of the cost of buying a residential unit. This implies that the monthly loan payments influences affordability or otherwise of a residential unit. The monthly payments are dependent on period of the loan, principal amount and interest premium. As discussed by Tsatsaronis and Zhu (2004) housing clients investment decision are inclined to the nominal/actual monthly loan payments than to the size of the loan vis-à-vis the household income. The findings of this study on the strongly asymetric relation between interest rate and housing prices was also backed up by other empirical studies (Kim, Lee & Kim, 2011; Muli, 2013; McQuinn & O'Reilly, 2008; Tse, Rodgers & Niklewski, 2014; Sutton, 2002; Egert & Mihaljek, 2007; Ayuso, Perez & Saurina, 2004; Ong & Chang, 2013; Xu & Chen, 2012).

Uniquely, Pillaiyan (2015) carried out a study on what drives house prices in Malaysia. The time frame for this study was 1999 to 2013 and made use of a an error correction cointegrating model. The regressors for this study were tally of approved loans, real GDP, interest rate, supply of money, firm environment, equity market, and consumer price index. From the findings of this study there was a strong and symetric relations between consumer price index, equity market, supply of money, tally of approved loans and residential property prices. The study findings further displayed that commercial bank interest rate had an asymetric but unconvincing relationship with residential property prices. Based on this result, the researcher was of the opinion that there was a possibility of a bubble in the Malaysia's residential property market. The

discussion behind this view was that when the interest bearing market enviornment has a below average lending rates, and when such an environment is prolonged it could lead to a housing bubble. Social financial inequilities that is the ever growing gap between the haves and the have nots was one of the reason that Pillaiyan (2015) stongly noted to have contributed in hiding the influence of lending rate on residential property market prices and lopsidedly affecting housing affordability. A similar discussion was also provided by Muriuki (2013) on the Kenyan residential property market.

Another related and valuable study was that of Karasu (2015). Motivated by the ever-increasing residential property prices in Turkey, the researcher investigated the possibility of a residential property market bubble in Turkey. The research period was from 2005 to 2014. Based on the research output the Turkey residential property market was less exposed to the financial sector in comparison to other developed countries. From the research examination lower lending rates contributed to better loan terms in that Country especially in the late 2000s. The eased lending rate and loan terms was attributed to the increased housing demand. The increase in housing demand, as discussed by Karasu (2015), contributed to a surge of uptake of housing loans as residential property were perceived to have lower risk in comparison to other investments. Ultimately there was a notable buildup of mortgages at lower rates, this was one of the conditions that was also observed by Pillaiyan (2015) that contributes to a bubble when prolonged.

2.4.3 Stock Market Prices and Market Performance

A noteworthy research was carried out by Wokker and Swieringa (2016) on foreign investment and increase in residential property price in Australia. The analysis was modeled using fixed effects panel regression technique. Based on the research examination and output, equity market influences residential property market demand and ultimately price since the two markets are perceived as substitute investments. The research discussion supporting this view is that investors analyze past and present market information as a pointer to prospective market yields. To put it in another way, an increase in equity market yield would increase the prospective equity market yield thus improving the desirability by investors of the equity market opportunities vis-à-

vis residential property market opportunities. Wokker and Swieringa (2016), based on the above argument, concluded that equity market price and residential property market performance have an asymmetric relationship.

Another worthy research was undertaken by Glindro *et al.* (2011) on nine Asia-Pacific nations reviewing the residential property prices dynamics and the function of firm factors. The research examination period was from 1993 to 2006. The research variables were equity price index, house prices, loan to GDP ratios, real interest rate, GDP, real effective exchange rate, population and four firm indices (first principal component). The researchers employed time series of loan to GDP ratios and stock market prices in analyzing their influence on residential property market price. From the study findings it was interpreted that on average residential property prices tend to be more erratic in market environments that are flexible and have lower supply elasticity. Based on the research analysis it was also illustrated that stock market prices have an asymmetric relation with residential property market prices implying that the two markets are viewed by investors as substitutes.

Empirically important, Fry, Martin, and Voukelatos (2010) carried out a research on Australia residential property prices overvaluation modeled using a structural vector autoregression from 2002 to 2008. From the research examination they found that residential property prices in Australia are overvalued with the highest observation on overvaluation being 15 per cent. Based on their research they discussed that the reasons behind the overvaluation in residential property market prices were unforeseeable variation in demand for houses, jerks in the financial environment and wealth effect from the stock market. One of the main conclusions of this study was that increase in equity prices is attributable to increase in residential property prices implying presence of wealth effect between the two markets. Pillaiyan (2015) had a comparable result that is a favorable relationship between stock market price and residential property market performance in Malaysia.

Another valuable research was done by Miregi and Obere (2014) on the relationship between Kenyan residential property prices and market fundamentals. The research period was from 2001 to 2013 and employed an explanatory research design. Based

on the research analysis there was an unconvincing relationship between residential property market prices and stock market prices, notwithstanding tremendous hypothetical and observed findings by previous researchers that equity market and residential property market are alternate investment complicated by the substitute effect. Owing to their findings the researchers strongly suggested further research on the relationship between residential property market and other markets in Kenya.

Distinctively constructive, Apergis and Lambrinidis (2011) reviewed the correlation between the equity market and the residential property market using equity and residential property market data from both United States of America and United Kingdom. The research period was from 1985 to 2006 and the research analysis was modeled using an error correction cointegrating technic. The purpose of the research was to review if equity market and residential property market are alternate investments or similar investments. Based on research analysis it was observed that equity market and residential property market are integrated investments, with the correlation between the two markets increasing when the securitized residential property markets are considered. As discussed by Reilly, Lucey, and Gurdgiev (2009) a worthy difference between residential property market studies done in advanced economies and developing nations was that industrialized countries have a well-developed real estate investment trusts (REIT) or property securities with longer time spans while in growing economies the REITs are either not developed at all or are at their infancy period.

2.4.4 Exchange Rate and Market Performance

Mallick and Mahalik (2015) carried out a research on residential property market prices for fifteen significant urban areas of various regions in India. The research utilized quarterly information from 2010 first quarter to 2013 fourth quarter. Backed-up by the research examination and findings, they observed the supremacy of non-speculative factors (fundamentals) over the speculative factors in describing the regional residential property prices in India. From the research findings they also noted that some of the non-speculative factors they analyzed (equity price index, non-food loans, and foreign direct investments) had a symmetric relation with residential

property market prices. On the other hand, consumer price index and wealth measure (partial) had an asymmetric relation with residential property market prices. Variables that were observed to have an insignificant effect on residential property prices were the gold prices, exchange rate and net portfolio investments. One of the study's conclusions, was that exchange rate had weak relationship with residential property prices. This implied that there was preference in using local currency in property transactions vis-à-vis foreign currency an observation that may vary from one economy to another.

There are other empirical reviews with diverse findings from that of Mallick and Mahalik (2015). One research with a dissimilar finding was that of Meidani, Zabihi and Ashena (2011). They examined the causality between residential property prices, financial growth and inflation in Iran. The research period was from 1990 first quarter to 2008 third quarter and they employed the Toda and Yamamoto approach. Based on the research analysis and summary exchange rate had a strong symmetric relationship with residential property prices. The discussion behind this was that residential property investors aim to maintain the value of their investments and thus will revalue their property units taking into consideration the strength of their local currency vis-à-vis other currencies. In addition, from the research analysis it was observed that there was no causality amid exchange rate and residential property market price in Iran. A similar research summary was noted by Glindro *et al*. (2011) who explained that symmetric relations between exchange rate and residential property market performance can be observed by investors who take notice of their currency strength/weakness.

Empirically constructive, Abelson *et al*. (2005) carried out an investigation that planned to clarify variations in residential property market prices in Australia. The research period was from 1970 to 2003. Employing a long run model, the research analyzed and revealed the long run regressors of residential property market prices. The research also used a cointegrating error correction model to measure the short run equilibrium relationship. From the research findings, a growing demand for residential house units holds a low exchange market price by investors with foreign currencies, more so in developing countries. Based on this opinion, a weakening local currency

52

encourages investors with foreign currency to exchange their foreign cash to local currency and their preferable choice of investment in that country is the residential property market. As emphasized by the researchers, this observation is a long run relationship.

Distinctively valuable, Rebi (2014) carried out a research on the relationship between exchange rate and residential property market price in Albania. The research analysis was modeled with an error cointegrating equation. Based on the research examination and output it was revealed that in Albania there was a strong and symmetric relation between equity market price and residential property market price. The discussion supporting this finding was that when investors in Albania comprehend that a weakening local currency depreciates the value of their investments, owing to this, the investors invest in residential property market which they perceive as worthier way of preserving their wealth than holding cash. A similar study worth discussing was done by Clark and Daniel (2006) who stated that effect of exchange rate on residential property market price could either have a direct or indirect influence. They argued that when the local currency is solid/strong this may directly discourage investors holding foreign currencies to invest in the residential property market. On the other hand, they also explained that local currency stability plays a vital role on investors' confidence in that country that will also indirectly influence residential property market demand.

Another constructive empirical was that of Diala, Kalu and Igwe-Kalu (2017). They researched on the variability of the Niara/Dollar on Nigeria's low income homeownership investement yield. The research time frame was from 2000 to 2010. The research analysis was modeled using exponential generalized autoregressive conditional heteroscedastic time series technique. Based on the research examination it was observed that variability of the Niara/Dollar had a strong symetric influence on low income homeownership. Another way to explain this was that an increase in Niara/Dollar variability leads to an increase in low income homeowerneship yield variability. Another finding from their research was that variability of market yield was relenting and leverage influence was unconvincing.

Equally valuable, Liu and Hu (2012) carried out a research on the correlation between Chinese currency real effective exchange rate and residential property market price. The research period was from 2007 January to 2010 December and research analysis employed was vector autoregression model. Backed-up by the research analysis it was observed that residential property market price and real exchange rate market price had an asymmetric relationship in the short run and a symmetric relationship in the long run. A notable summary of this research was that relationship between exchange rate and residential property market price could differ based on whether the equilibrium equation is short or long.

A comparable study as that of Liu and Hu (2012) and empirically valuable was a research by Liu and Zhang (2013). They investigated the association of exchange rate and residential property price in China. The research analysis employed a vector autoregression model using monthly data from 2005 July to 2012 December. Based on the research examination and findings it was illustrated that exchange rate and residential property market price have a strong favorable association. In the research summary they advised that governments need to keep check on the flow of foreign currencies in their economies since based on the research findings any variability in the exchange rate has a strong influence on the variability of the residential property market price.

Another weighty empirical was that of Kok, Ismail and Lee (2018) on the drivers of residential property market prices in Malaysia. The research period was from 2002 to 2015. The research was modeled using a vector autoregressive technique to analyze the shocks in residential property demand and prices dependent on research theoretical and conceptual framework. Dependent on the research analysis, it was observed that exchange rate had a symmetric relation with the residential property market transaction size. This implies that exchange rate had a convincing favorable influence on the residential property market demand in Malaysia.

2.4.5 Tax Revenue and Market Performance

Best and Kleven (2013) undertook a study on housing market responses to transaction taxes in the United Kingdom from 2004 to 2012. The research examination employed

bunching methodology. From the research output it was illustrated that the effect of transaction taxes on house prices was large (200 to 500 per cent of the tax itself) and that adjustment to changes in transaction taxes was very fast. They also found out that the timing of house transactions responds sharply to anticipated tax increases. Also, they discovered that temporary cuts in transaction taxes successfully stimulated housing market activity in the short run – an elimination of the tax increases transaction volume by about 20 per cent was followed by a slump in activitiy after the policy was withdrawn.

Another valuable research was done by Ondabu, Muturi and Kisaka (2016) who carried out a research on the effects of tax incentives on performance of listed firms in Kenya. The research implemented a descriptive research design with a study population of sixty one listed firms in NSE. The findings from this study revealed that tax incentives have an insiginificant effect on NSE performance. They concluded that the government should put in place predictive, clear tax laws and transparent tax administration that would provide conducive and favourable market opportunities to the investors rather than granting investment incentives.

Equally empirically important was Dachis, Duranton and Turner (2011) research on the effects of land transfer taxes on real estate market by exploiting a natural experiment arising from Toronto's imposition of a land transfer tax. They employed a hybrid of a regression discontinuity design and a differences-in-differences estimation. They found out that Toronto's 1.1 per cent tax caused a fifteen per cent decline in the number of sales and a decline in housing prices about equal to the tax. The associated welfare loss was substantial, about one to eight dollars in tax revenue according to their computation.

Distinctively important examination was undertaken by Njoroge (2009) who assessed how the corporate tax rate affects financing for firms listed at Nairobi Securities Exchange. The research purposed to establish the relationship between effective corporate tax rate and debt ratio. The research employed a survey on thirty-seven companies and concluded that effective tax rate has a negative effect on debt financing this implies that an increase in corporate tax rate lead to decrease in debt financing

hence results being supported by pecking order theory. This study conflicted with Kagoma (2015) research on effect of corporate taxation on the capital structure of firms listed at NSE. Kagoma (2015) employed explanatory research design and target population was nineteen non-financial firms listed in the NSE as at December 2014. The study findings were that there was positive significant relationship between effective tax rate and capital structure of firms listed in the NSE that is a unit increase in effective tax rate lead to increase in capital structure of firms listed in the NSE.

Another valuable empirical was that of Charlot, Paty and Visalli (2008) they carried out a research on the impact of local taxation on property prices in French urban context, using data on property taxation and real estate transactions over the period 1994 to 2004. They employed spatial differencing and instrumental variables methodology that allowed them to compare sales across municipality boundaries and to control for the potential endogeneity of local taxation and public spending. The concluded that local property tax rate has no impact on property prices, while the amount of taxes paid has a negative effect on property prices.

Equally important Kamau (2017) researched on the effect of property taxation on financial growth in Kenya using data from 2007 to 2016. The research analysis was informed by classical growth theory and traditional tax handle theory. This particular research employed descriptive research design. Observation of the correlation analysis illustrated that property taxed had positive and significant relationship with financial growth. The study also noted symmetric relationship between corporate taxes and financial growth. Based on research summary it could by implied that taxes contributed in improving the business environment of the country and also increase in tax without increase in tax rates was one of the indicators that the financial environment of the country was doing well.

Last but not least Kairanya (2016) analyzed the impact of taxation as whole as well as the impact of indirect and direct taxes on financial growth using a simple endogenous growth model. The research made us of time series data from 1975 to 2014. The research employed an endogenous growth model and ordinary least square method to estimate the long-run co-integrating equation. The study results revealed significance

of the explanatory variables in explaining GDP. The coefficient of determination showed that 96.8 per cent of the variation in GDP was explained by the regressors including taxes. This showed that increase in tax collection could strongly lead to the better investment environment in the country.

2.5 Critique of the Existing Literature

Makena (2016) did an examination on property market investment in Mombasa County, Kenya between years 2006 to 2015. The study established a negative correlation between real estate investment in Mombasa County and the selected regressor variables. Whereas this research sheds light on real estate investment the regressors were found to cater for a relatively small percentage of the model variability and thus the need to re-focus on the study variables and employ a different financial econometric model. Furthermore, the study was limited to Mombasa County.

Mwololo (2014) researched on prices of residential real estate property in Kenya using yearly data from 2006 to 2014. The research findings revealed a strong symmetric influence of inflation on prices of residential real estate properties in Kenya. The study findings were that unemployment rate, GDP and inflation had significant positive effect on real estate property in Kenya. The study employed behavioral theoretical framework though in the analysis there was no mention on the behavioral role of various actors on real estate property. Also, the study was based on yearly data that tends to smoothen out quarterly variations.

Karamelikli (2016) undertook an investigation on the linear and nonlinear dynamics of housing price in Turkey between the years 2010 to 2016. The effect of interest rate was found to have a positive sign in the study. The study sheds light on the relationship between linear and non-linear dynamics of housing prices. This study was carried out in Turkey. There is high likelihood of disparities of the residential property market from one country to another. Furthermore, developed Countries tend to have a well-developed market than developing countries. This can be easily be observed since most studies done in developed countries looks at real estate investment trust returns or property share returns (Reilly, Lucey, & Gurdgiev, 2009) unlike developed countries.

Muriuki (2013) carried out a study on the effect of interest rates volatility on the growth of real estate market in Kenya in the period 2008-2012. The research observed that the interest market experienced low volatility. Thus, volatility in the interest market is predictable, at least in the short run. The evidence strongly indicated that the interest rate relationship with property market was nonlinear. Whereas this study sheds light on the relationship between interest rates and growth of real estate market in Kenya, it covers a relatively short period and small sample size both of which may reduce the robustness of the findings.

Omboi and Kigige (2011) did a survey on factors influencing real estate property in Meru municipality and their independent variables included incomes of real estate investors, location of real estate property and its price, and demand on real estate property prices. The descriptive survey of Meru municipality raised pertinent issues on how the selected variables influence real estate property. Even though the time-scope of the study was prior to commencement of devolution in Kenya the study was limited to Meru municipality.

Oyenga (2013) carried out a study on the relationship between returns of the real estate and stock market return in Kenya between 2008 and 2012. Oyenga (2013) used Pearson correlation coefficient and simple regression models, nevertheless, there was no diagnostic study done to determine the characteristic of data thus increasing the risk or wrong data transformation, wrong econometric model, that could lead to wrong interpretation of the relationship under study.

Despite many refutations by various researchers the efficient market hypothesis remains the central concept of market prices and residential property market performance (Herath & Maier, 2015). Its axiomatic definition shows how asset prices would behave under assumed conditions. Nevertheless, it does not provide criteria about what is an efficient and what is not an efficient market. Furthermore, the conditions of markets and especially residential markets are much more complex than the simplified conditions as used in the formulation of the efficient market hypothesis (Hjalmarsson & Hjalmarsson, 2008). Hjalmarsson and Hjalmarsson (2008) argued on the importance to distinguish between perfect markets and efficient markets, of the

two concepts; market efficiency is much less restrictive. It simply requires that market imperfections to be fully and rationally reflected in the market price. Given this, as Hjalmarsson and Hjalmarsson (2008) posit, there is reason to suspect that real estate markets may be efficient.

Loanable funds theory is deemed better as it incorporates real as well as monetary factors in determination of interest rates (Barbaroux & Ehants, 2015). Furthermore, by including the desire to hoard money in the demand for loanable funds, the loanable funds theory is deemed more realistic. In addition, loanable funds theory regards money as an active factor in the determination of the interest rate. Muriuki (2013) argued that many factors considered in loanable funds theory mean that equilibrium will be reached only when each of the factors is in equilibrium. According to Muriuki (2013) mortgage rate is one of the key components of housing affordability index, and an increase in mortgage rate decreases the index and vice-versa. This is in support of the loanable fund theory. One of the limitations of the theory as shown by Lindner (2013) is that credit is not limited by anybody's saving and that no one has to abstain from consumption in order for a credit to be provided. In addition, the loanable fund theory is formulated on assumption of full employment that is not possible in reality; also, the theory does not take national income into consideration (Lindner, 2013).

According to Chand (2014), purchasing power parity doctrine provides a sensible explanation of long-term changes in exchange rates under all monetary condition. Hyrina and Serletis (2010) discusses that based on the law of one price, purchasing power parity theory asserts that relative goods prices are not affected by exchange rates – or, equivalently, that exchange rate changes will be proportional to relative inflation. They note further that the relationship is important not only because it has been a cornerstone of exchange rate models in international markets, but also because of its policy implications. They posit that purchasing power parity theory provides a benchmark exchange rate and hence has some practical appeal for policymakers and exchange rate arbitragers. Langston (2016) by considering the construction industry across the world notes, the higher the purchasing power parity - adjusted value, the higher are the relative costs of building in one location over another. According to Langston (2016) PPP theory helps to compare international housing markets.

There are a number of limitations of purchasing power parity that were pointed out by Chand (2014). First, the conception that the exchanges represent relative price levels; that the monetary unit of a country has the same purchasing power both within the country and outside, it is correct only upon the never existing assumption that all goods and services can be transferred from one country to another without cost which does not hold. Secondly the theory overlooks the influence of demand and supply factors in foreign exchange. Thirdly, tradable goods are not always perfect substitutes when they are produced in different countries, for example a housing unit in one country may differ in price significantly when compared to a similar housing unit in another country even if all other factors are held constant. In addition, the theory unrealistically assumes free trade and absence of exchange control for a steady exchange rate based, while in reality governments interfere with free trade flow and or provide incentives, for example, government incentives geared towards availing affordable mortgages and or taxation incentives to house builders and investors.

Ignatov (2011) study observed higher p-values in the short run, compared to the long run thus rejecting Fisher's hypothesis in the short run, while finding evidence of the hypothesis in the long run. Ignatov (2011) concluded that the term spread of the real interest rates is not constant over time for all countries, thus rejecting the strong form of the Fisher's hypothesis. This was in support of findings of other researchers while in contrast to those who rejected Fisher's hypothesis in any duration. Fisher's hypothesis was extended by Piazzesi and Schneider (2007) to real estate whose study was that illusionary and smart investors disagree about real interest rates when smart investors' inflation expectations are either high or low. In either case, disagreement generates increased borrowing and lending among households as well as house price boom. Disagreement about real interest rates generates house price booms if borrowing must be backed by real estate. Indeed, increased credit market activity raises the demand for collateral, which in turn drives up house prices (Piazzesi & Schneider, 2007). Pettinger (2018) explained that fisher's hypothesis is limited in that the period of confidence and rising asset prices, high real interest rates may be ineffective in reducing demand. Also, in a liquidity trap situation reducing nominal interest rates can have no effect on boosting spending.

Liberto (2019) explained that wealth effect reflects the psychological effect that rising asset values have on consumer spending behavior. The concept hones in on how the feelings of security, referred to as consumer confidence, are strengthened by sizable increase in the value of investment portfolios. Extra confidence contributes to higher levels of spending and reverses on lower levels of spending. On the other hand, Aruoba, Elul, and Kalemli-˙Ozcan (2018) found a negligible wealth effect in their study on the effect of declining house prices on household consumption behavior during 2006-2009. According to their study findings tightening financial constraints explained 40-45 per cent of the response of consumption to declining house prices while deteriorating bank health explained 20-25 percent of the consumption response. On the contrary, Jansen (2010) found that a consumption function including wealth effects in the short and long run explains the quarterly changes in consumption over the years 2006-2008 in Norway better than Euler based equations and also better than an alternative consumption function without a long run wealth effect. This was supported by Coskun, Atasoy, Morri, and Alp (2018) who found that consumption was mostly explained by income and housing wealth was positively and significantly correlated with consumption in advanced countries.

2.6 Research Gaps

Various studies on housing have been undertaken globally such as Rebi (2014) study on a case of Albania, Karamelikli (2016) study case of Turkey, Ooi and Le (2011) study case of Singapore among others. As noted by Zhu (2003), even though residential property is similar to other financial assets, the market is intensively local that is there is high likelihood of disparities of the market from one country to another. Furthermore, developed Countries tend to have a well-developed market than developing countries. This can be easily observed since most studies done in developed countries looks at REIT returns or property share returns (Reilly, Lucey, & Gurdgiev, 2009) unlike developing countries that use house prices as a measure of the property market performance. This study by looking at Kenya's residential property market performance vis-à-vis the selected market prices has identified a specific niche that is uniquely different and empirically important when compared to other studies.

Similar research has been conducted in Kenya under different time frames and most of these studies were limited to the city of Nairobi or previous municipal councils or current county governments. Furthermore, the variables selected differed from one study to another, for example, Koech (2013) did a case of Nakuru Municipality and his independent variables were rate of increasing rent, employee growth, number of properties managed by agents among others. Omboi and Kigige (2011) did a survey on factors influencing real estate property in Meru municipality and their independent variables included incomes of real estate investors, location of real estate property and its price, and demand on real estate property prices. Previous studies done in Kenya tend to be descriptive and lack econometrics analysis. They supported their arguments using descriptive statistics and graphs. The purpose of this paper is to fill the empirical gaps in the literature by using variables that are undeniable unique and important as observed in the review of literature since their effect were either inconclusive or conflicting. The variables as a whole gave this study a distinctive niche. This study sought to use a time frame of 2005 to 2017. The study period covers the coming into fore of the National Housing Policy (Sessional Paper No. 3 of July, 2004) (Kenya National Bureau of Statistics, 2012) and the commencement of devolution in Kenya following the promulgation of the new Constitution in 2010. This study employed time series econometric approach to examine the effect of explanatory variables on the dependent variable. This study extended the conceptual and empirical framework and filled a research gap not addressed by other researches.

The theoretical framework is also confounding, first and foremost there are studies that found a wealth effect between stock market and property market (Pillaiyan, 2015; Fry, Martin, & Voukelatos, 2010) while others studies differed and found a substitution effect (Wokker & Swiering 2016; Aruoba, Elul, & Kalemli-Ozcan, 2018) while some studies still found neither wealth effect nor substitution effect (Miregi & Obere, 2014). With regard to EMH, Herath and Maier (2015) study found real estate market to be inefficient while Hjalmarsson and Hjalmarsson (2008) argued on the importance to distinguish between perfect markets and efficient markets and held the position that residential property markets are efficient though not necessarily perfect. With regard to loanable fund theory, Muriuki (2013) supported the theory with a discussion that a decrease in mortgage rate increases the housing affordability index. On the contrary,

Lindner (2013) discredited the loanable fund theory mainly because of its assumption of full employment that is not a possible reality. Langston (2016) study supports the PPP theory in the construction industry as it helps to compare international housing markets. On the other hand, Chand (2014) discredit this theory especially on its application on goods that are not perfect substitutes such as houses. The confounding theoretical framework provided a gap that was filled through this study.

Last but not least, some studies done had methodological challenges including fiting an econometric model without carrying out diagonistics (Oyenga, 2013). This study purposed and carried out diagonistic test to determine the characteristic of data present. This informed the transformation that were necessary to be carried out and also informed on the type of econometric model to use so as to better explain the relationships under study. Also this study used a wider time frame than previous studies (Muriuki, 2013) thus having a better niche of explaining relationships under study. In addition, previous studies done in Kenya did not examine the moderation effect of tax revenue on market prices and performance of residential property market in Kenya. This study sought not only to increase academic knowledge but value in research by finding out the moderation effect of tax revenue on market prices and performance of residential property market in Kenya.

2.7 Summary of Literature Review

The foregoing chapter has discussed empirical, conceptual and theoretical review. Under the theoretical review several theories were discussed. Under the efficient market hypothesis arguments were given supporting the conversation that the residential property market is inefficient (Herath & Maier, 2015) implying that market prices may not influence the performance of residential property market. On the other hand, there are academic conversations that residential property market is not a perfect market but is an efficient market in line with efficient market hypothesis (Hjalmarsson & Hjalmarsson, 2008) implying that there is a possibility that market price influences the performance of residential property market in Kenya.

Fisher hypothesis of inflation, according to Amonhaemanon, Annaert, De Ceuster, and Long 2014, can be generalized to nominal returns on any asset, which should move

one-for-one with expected inflation. Fisher hypothesis can thus be extended to residential property market (Piazzesi & Schneider, 2007) and assume a one to one relationship between the nominal price of residential property market and inflation rate. There are researches that support this conversation (Mwololo, 2014; Ouma, 2011). Nevertheless, there are other conversations, (Inglesi-Lotz & Gupta, 2011; Lessard & Modigliani, 2014) that posits on an asymmetrical relationship between residential property market and inflation rate while still other researchers (Karoki, 2013) argue on the unconvincing relationship between residential property market performance and inflation rate bring arguments of hedging capability of residential market over inflation rate.

Interest rate as theorized by loanable fund theory, according to Barbaroux and Ehants (2015), has an inverse relationship with demand for loanable funds with investments forming part of the demand of loanable funds. There are empirical that support this argument (Tsatsaroni & Zhu, 2004) while other empirical argue on a positive relationship between interest rate and performance of residential property market (Karamelikli, 2016) while still others researches found unconvicing relationship between interest rate and residential property market performance (Rebi, 2014; Crowe, Dell'Ariccia, Igan, & Rabanal, 2010).

There are considerable arguments among researchers that wealth effect truly exists especially within the context of the stock market and residential property market. These arguments have been supported by various empirical including Pillaiyan (2015), Oyenga (2013), Okunev, Glindro et al. (2011), and Fry, Martin, and Voukelatos (2010) studies that indicated a positive relation between stock market price and real estate market performance. On the other hand, there are other conversations that support the substitution effect between stock market and residential property market (Wokker & Swieringa, 2016) supported by assymetrical relationship between the two variables. There are still other worthy arguments that supports neither wealth effect nor stubstitution effect such as Miregi and Obere (2014) who noted that there was no significant relationship between property performance and stock market prices

With regards to the law of one price as stiputlated under purchaing power parity (Hyrina & Serletis, 2010; Horne, 2004) an increase in exchange rate will influence an increase in residential property price. There are research conversations that supports positive relationship between exchange rate and performance of residential property market (Meidani, Zabihi, & Ashena, 2011; Glindro *et al*., 2011; Rebi, 2014), while others concluding on negative effect (Abelson *et al*., 2005; Mallick & Mahalik, 2015).

Review of recent empirical literature was done cutting across various continents and countries and also within the Kenyan context. Comparisions and conflicts were identified on the empirical findings on the effect of various market prices on residential property market returns. From the review of theoretical, conceptual, and empirical literature, it has come out clearly that there are several research gaps worthy a scholarly research that will be of value to many stakeholders. Furthermore, literature is still in complete darkness with regard to the moderating effect of tax revenue on the performance of resdiental property market in a Kenyan context.The next chapter (three) discusses the research methodology that was employed in this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Following the identification of research gaps after review of theoretical, conceptual and empirical frameworks, there is need for a systematic and methodological approach that will explore the identified gaps with an aim of finding meaning, value, and knowledge. This chapter explores the research philosophy, research design, target population, data collection method, data processing and analytical tools, and model specification. This systematic, methodological and documented approach is purposed to explore the data, transform the data, manipulate the data, fashion the data into a financial econometric model, test the research hypotheses, and ultimately have a research reasoning on the findings.

As defined by Usman (2015) a methodology is the systematic, theoretical analysis of the methods applied to a field of study. Usman (2015) further states that a methodology comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. According to Usman (2015) a methodology is not set to provide solution and thus totally different from a method. Usman notes that a methodology offers a theoretical underpinning for understanding which method, set of methods (best practices) can be applied to specific case. It is therefore an analysis of the principles of methods and rules employed by a discipline.

3.2 Research Philosophy

According to Zukauskas, Vveinhardt, and Andriukaitiene (2017) research philosophy is a system of research that helps obtain new, reliable knowledge about the research object. It encompasses approach to theory development, methodological choice, strategies, time horizon, techniques and procedures (Saunders, Lewis, & Thornhill, 2009). This research employed positivism research philosophy. Gray (2013) posits that in positivism approach inquiry is based upon scientific observation and therefore on

66

empirical inquiry. Hence, ideas should only deserve their incorporation into knowledge if they can be put to the test of empirical experience.

According to Zukauskas, Vveinhardt, and Andriukaitiene (2017) in a positivist research philosophy, the researcher is an objective analyst and, on the basis of it, dissociates himself from personal values and works independently. Flowers (2009) postulates that positivist position is derived from that of natural science and is characterized by the testing of hypothesis developed from existing theory, through measurement of observable social realities. Mariappan (2015) advances that positivism key pillars are that; only research which is quantitative can be the basis for validity generalizations and laws, the aim should be to identify causal explanations and fundamental laws that explain human behavior; concept need to be operationalized in a way that enables facts to be measured quantitatively; the choice of what to study, and how to study it, should be determined by objective criteria rather than by human beliefs and interests; the role of the researcher is independent of the subject under examination and finally problems are better understood if they are reduced to the simplest possible element.

Bevir (2010) observes that positivism is a philosophical attitude. Its features are that the researcher should trust in science, opposition to metaphysics, and unified science. Bhattacherjee (2012) contends that positivism holds that science or knowledge creation should be restricted to what can be directly tested. This study thus reflected the philosophy of positivism which is an approach that seeks facts or causes of social or business phenomena, with little regard to the subjective state of the individual (Saunders, Lewis, & Thornhill, 2009). Considering the purpose of this study, the type of investigation, the extent of researcher involvement, the time frame and the type of analysis, the philosophical foundation guiding this study was positivism. This, in addition, was because the researcher was independent from what was being observed.

3.3 Research Design

Akhtar (2016) considers research design as the structure of research that holds all of the elements of a research together. Akhtar (2016) further describes a research design as a plan of a proposed research work. A design is used to structure the research, to

show how all of the major parts of the research project work together to try to address the central research questions (Kombo & Tromp, 2011). The qualities of an effective research design should effectively address the questions raised in the study. In addition, research design should contribute to accurate and fair interpretation of results. A good research design should also clarify the respondents and the means by which the study will be conducted and provide a deeper understanding of the research topic.

Bhattacherjee (2012) argues that a research design is a comprehensive plan for data collection in an empirical research project. It is the blueprint for empirical research aimed at answering specific research questions or testing specific hypotheses, and must specify at least three process; the data collection process; instrument development process and sampling process. According to Akhtar (2016) a good research design should be theory grounded, flexible, appropriate, efficient and economical.

This study adopted causal research design since the researcher was interested with assessing the effect of market prices on performance of the residential property market in Kenya. Furthermore, causal research design was adopted since it helps to isolate or quantify the effect of different sets of variables influencing the dependent variable (Kumar, 2014). In addition, causal research design was picked since it is known to explore the extent to which changes in one variable are reflected in changes in the other variable (Creswell & Garrett, 2008). Tashakkori and Teddlie (2010) posit that causal research is intended to explain, rather than to simply describe the phenomena studied. Most important, this design does not involve manipulation of the independent variables (Kerlinger & Lee, 2000).

Causal design (nomothetic perspective) was preferred since key information was available about the phenomenon under study (Cooper & Schindler, 2008). It uses quantitative data in most cases as was the case in this study. This design has also been used by Amidu, Agboola and Musa (2016) in analysing the relationship between private housing investment and financial growth in the United Kingdom from 1974 to 2015. Also, Coskun, Atasoy, Morri, and Alp (2018) employed the same research design in analysing the wealth effect on household final consumption for eleven

68

advanced countries over the period from 1970 quarter one to 2015 quarter four. In view of the foregoing, since sufficient data and which cannot be manipulated for ease of validity check was used, the application of the design was justified. This study employed dynamic time series data approach as the aim was to explore, understand, and explain how market prices, and their time related shocks influence performance of residential property market in Kenya.

3.4 Target Population

A population, according to Kombo and Tromp (2011), refers to an entire group of observations that have at least one thing in common. The population is also known as the universe. A universe can be finite or infinite. In finite universe the number of items is certain, but in case of an infinite universe the number of items is infinite (Kothari, 2004).

Sekaran and Bougie (2010) postulates that a population is a group of things of interest or observations for which the researcher wishes to investigate. Pandey and Pandey (2015), argue that population or universe means, the entire mass of observations, which is the parent group from which a sample is to be formed. The term population or universe conveys a different meaning in research than the one in the traditional sense. In particular in research methodology population means characteristics of a specific group of observations.

The population was based on publications by Kenya National Bureau of Statistics, Central Bank of Kenya, Nairobi Securities Exchange, and Hass Consult between years 2005 and 2018 on; tax revenue, Nairobi Securities Exchange 20 share index, commercial banks' lending rate, consumer price index, Kenya Shilling to United States Dollar exchange rate, and House price Index. The target population for this study was then composed of fifty-six market quarter observations from 2005 to 2018 of each of the selected market prices and quarterly house price index of residential property market.

Table 3.1: Target Population

Year	No. of quarter observations of tax revenue, Nairobi Securities Exchange 20 share index, commercial banks' lending rate, consumer price index, Kenya Shilling to United States Dollar exchange rate, and House price Index
2005	4
2006	4
2007	4
2008	4
2009	4
2010	4
2011	4
2012	4
2013	4
2014	4
2015	4
2016	4
2017	4
2018	4
Total	56

Sample and Sampling Techniques

3.5.1 Sampling Framework

Sampling framework is a list of all observations where a representative sample is pulled from for a research study (Kothari, 2004). The sampling framework for this study was composed of fifty-six market quarter observations of each of the selected market prices and performance of residential property market. The sampling framework ensured that the quarterly market observations were accurately captured.

3.5.2 Census

Census entails a thorough review of all the observation constituting the target population (Kothari, 2004). Census method, as argued by Mugenda and Mugenda (2003), is ideal when the population practicable to apply in a research study. Moreover, Saunders, Lewis, and Thornhill (2009) posits that census method augments reliability

and validity of the assembled data by reducing errors related with sampling. Census method was employed in collecting the data of the market quarterly observations for the entire period as the sampling technique. In particular the data covered the period from first quarter of year 2005 to fourth quarter of year 2018. The way in which the researcher selects subjects for a study determines how one is able to generalize the result of the study. Pandey and Pandey (2015) note that, census method deals with the investigation of the entire population. Here the data are collected for each and every unit of the universe. This method provides more accurate and exact information as no unit is left out.

3.6 Data Collection Instruments

The study employed secondary data that was obtained from Nairobi Securities Exchange, Central Bank of Kenya, HassConsult Limited and the Kenya National Bureau of Statistics. Collection of data was accomplished by means of the secondary data collection instrument specified in Appendix II.

3.7 Data Collection Procedures

Daniel and Sam (2011) argue that secondary data means data that are already available that is data that has been collected by another entity. Secondary data may either be published or unpublished. Usually published data are available in public records and statistics, historical documents, and other sources of published information, technical trade journals among other sources (Mohajan, 2017). Pandey and Pandey (2015) notes that, research should identify schedules and procedures to be used for acquiring data and recording it accurately. If they are lengthy, they should be placed in an appendix and reference be given in the body of the research.

The actual secondary data was acquired from the Nairobi Securities Exchange, obtained from Central Bank of Kenya website and extracted from published data from Kenya National Bureau of Statistics and HassConsult Limited. A data collection sheet was further used to organize the data that was collected. The data was authentic and reliable since it was secondary data that was collected by credible agents and published

reports. Table 3.1 presents the name of the variable, the variable measure, data, and the source of data.

Table 3.2: Variables and secondary data sources

Dependent Variable	Variable Measure	Data	Source
Residential Property Market Return	Quarterly house price index.	Quarterly house price index percentage change.	Published reports (Hass consult).
Independent Variable	**Variable Measure**	**Data**	**Data Source**
Exchange Rate	Quarterly exchange rate	Quarterly Exchange rate in Kenya Shillings per United States Dollar.	Central Bank of Kenya database
Inflation Rate	Quarterly inflation rate	Quarterly percentage change of consumer price index.	Kenya National Bureau of Statistics
Interest Rate	Quarterly interest rate	Quarterly commercial banks' lending rate per quarter	Central Bank of Kenya database
Stock Market Price	Quarterly stock market index	Quarterly NSE 20 - share index.	Nairobi Securities Exchange
Tax Revenue	Quarterly tax revenue	Quarterly tax revenue collected.	Financial reports from Central Bank of Kenya and Kenya National Bureau of Statistics.

3.8 Data Processing and Presentation

According to Daniel and Sam (2011) data processing implies editing, coding, classification and tabulation of collected data so that they are amenable to analysis. The term analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data-group. Kombo and Tromp (2011) assert that data analysis refers to examining what has been collected in a survey or experiment and making deductions and inferences.

Data was transformed into natural logarithmic form where appropriate for secondary data to allow for ease estimation of parameters, reduce it into manageable form and stabilization of the variance. The research used EViews econometrics software for analysis of the data. The data analytical techniques that were used were quantitative techniques in nature.

3.8.1 Model Specification

In order to analyze the relationships between the regressors and the regressand, dynamic multivariate time series regression models were employed. In addition, dynamic bivariate time series regression models were employed to measure each explanatory variable against the regressand. Regression methods are integral components of any data analysis concerned with describing the effect of a response variable and one or more regressor variables (Gujarati & Porter, 2009). Dynamic econometric time series models were employed to analyse the secondary data collected over the study period. In addition, Baron and Kenny (1986) methodology was employed to analyse the moderating effect of tax revenue. The dynamic bivariate models employed to test the individual hypotheses between each predictor variable and explained variable were:

$$RPM_{it} = \gamma_i IFR_t + \sum_{m=1}^{p} \varphi_m RPM_{t-m} + \sum_{j=1}^{k} \delta_j IFR_{t-j} + \mu_{it} \ldots equation\ 3.1$$

$$RPM_{it} = \gamma_i INR_t + \sum_{m=1}^{p} \varphi_m RPM_{t-m} + \sum_{j=1}^{k} \delta_j INR_{t-j} + \mu_{it} \ldots equation\ 3.2$$

$$RPM_{it} = \gamma_i SMP_t + \sum_{m=1}^{p} \varphi_m RPM_{t-m} + \sum_{j=1}^{k} \delta_j SMP_{t-j} + \mu_{it} \ldots equation\ 3.3$$

$$RPM_{it} = \gamma_i EXR_t + \sum_{m=1}^{p} \varphi_m RPM_{t-m} + \sum_{j=1}^{k} \delta_j EXR_{t-j} + \mu_{it} \ldots equation\ 3.4$$

The overall dynamic multivariate model employed without moderation was:

$$RPM_{it} = \beta_0 + \sum_{i=1}^{k} \gamma_i X_{i,t} + \sum_{m=1}^{p} \varphi_m RPM_{t-m} + \sum_{i=1}^{k}\sum_{j=1}^{p} \delta_{ij} X_{i,t-j}$$
$$+ \mu_{it} \quad \ldots\ equation\ 3.5$$

The overall dynamic multivariate model employed after moderation was:

$$RPM_{it} = \sum_{i=1}^{k} \gamma_i X_{i,t} + \sum_{m=1}^{p} \varphi_m RPM_{t-m} + \sum_{i=1}^{k}\sum_{j=1}^{p} \delta_{ij} X_{i,t-j} + \sum_{j=0}^{p} \omega_j TXR_{t-j}$$
$$+ \sum_{j=0}^{p} \omega_j TXR_{t-j} \sum_{i=1}^{k} \delta_{ij} X_{i,t-j} + \mu_{it} \ldots equation 3.6$$

Where $RPM_{i,t}$ is the performance of residential property market in Kenya at period t,

IFR_t is the inflation rate in Kenya at period t

INR_t is the interest rate in Kenya at period t

SMP_t is the stock market price in Kenya at period t

EXR_t is the exchange rate in Kenya at period t

$X_{i,t}$ are the market prices at time t, that is, IFR_t, INR_t, SMP_t, EXR_t

$\mu_{i,t}$ is the error term, (disturbance term),

$\varphi_m, \delta_j, \beta_0, \gamma_i, \omega_j, \delta_{ij}$ are the associated regression coefficients,

k is the number of independent variables,

j, m are the lag periods.

3.8.2 Variables Operationalization

Table 3.3: Variables operationalization

Dependent Variable	Variable Measure	Data
Residential Property Market Performance (RPM)	Quarterly residential property performance	Quarterly house price index.
Independent Variable	**Variable Measure**	**Data**
Inflation rate X_2 (IFR)	Quarterly inflation rate	Quarterly consumer price index.
Interest rate X_3 (INR)	Quarterly interest rate	Quarterly commercial banks' lending rate
Stock Market Price X_4 (SMP)	Quarterly stock market index	Quarterly NSE 20 share index.
Exchange rate X_1 (EXR)	Quarterly exchange rate	Quarterly Exchange rate in Kenya Shilling per United States Dollar.
Tax Revenue X_5 (TXR)	Quarterly tax revenue	Quarterly tax revenue collected.

3.8.3 Descriptive Statistics

Descriptive statistics are, according to Gujarati and Porter (2009) methods for arranging, presenting, explaining, and characterizing data. The first form of analysis, also termed as the first moment or measures of central tendencies, gives measurements or statistics that characterizes the middle point or expected value of a data set (Frost, 2019). Researchers have observed a tendency of data to cluster around a middle value. Measures employed in this study to characterized the central tendency of data included mean (arithmetic average) and median (middle value).

The second form of analysis, also termed as second moment or measure of variability provides measurements or statistics that characterizes the dispersion in a dataset (Frost, 2019). Little dispersion signifies that data points tend to be clustered closely near the middle, while high dispersion implies that the data points tend to move away from the middle. Thus, similarity or dissimilarity of values in a dataset can be explained using the measures of dispersion. Measures employed in this study to measure variability included maximum, minimum and standard deviation.

The third moment measures skewness, that is, measure of symmetry or lack of symmetry (Frost, 2019). This study employed skewness to measure the third moment. If skewness ranges between positive to negative 0.5 the distribution is fairly symmetric (Brown, 2011). If skewness ranges between 1 to 0.5 or -1 to -0.5 then the dataset is moderately skewed. If skewness is more than 1 or less than -1 then the data set is highly skewed. According to Ivanoski, Stojanovski, and Narasanov (2015), skweness shows the likelihood or probability of a particular measure being either more likely or less likely or fair.

The fourth moment, that was employed in this study, measures the peakedness of a dataset or kurtosis. It is a measure of whether the data are heavy tailed or light tailed relative to a normal distribution (Frost, 2019). Datasets with high kurtosis tend to have heavy tails or outliers while dataset with low kurtosis tend to have light tails or lack of outliers. The size of the tail is considered by financial researches as an indication of the risk in a particular market being studied relative to a normal market (Ivanoski, Stojanovski, & Narasanov, 2015).

The last descriptive statistic employed, called the Jarque-Bera statistic, is a goodness of fit test measuring whether the dataset is approximately normal or otherwise (Forsberg, 2014). This study used five per cent level of significance for the Jarque Bera test

3.8.4 Diagnostic Tests on Assumptions of Linear Regression

The following diagnostic tests were employed in the study.

3.8.4.1 Pair-Wise Multicollinearity Test.

According to Daoud (2017) multicollinearity, or near-linear dependence, is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated. If there is no linear relationship between predictor variables, they are said to be orthogonal. Daoud (2017) further clarifies that multicollinearity is a phenomenon when two or more predictors are correlated, if this happens, the standard error of the coefficients will increase. Increased standard errors means that the coefficients for some or all independent variables may be found to be significantly different that is multicollinearity makes some variables statistically insignificant when they should be significant.

According to Williams (2015) multicollinearity is a matter of degree. There is no irrefutable test that it is or is not a problem, nevertheless, the greater the multicollinearity, the greater the standard errors. Brooks (2002) argues that, an implicit assumption that is made when using the least square estimation method is that the explanatory variables are not correlated with one another. Brooks (2002) notes further that, if there is no relationship between the explanatory variables, they are said to be orthogonal to one another. If the explanatory variables are orthogonal to one another, adding or removing a variable from a regression equation does not cause the values of the coefficients on the other variables to change.

According to Gujarati and Porter (2009), if the pair-wise multicollinearity test was below 0.8 then the multicollinearity level was not very high and was at acceptable level. Nevertheless, if the test result was above or equal to 0.8 but less than one, then

multicollinearity level was high and there was need to address multicollinearity through: appropriate transformation of variable data; increasing the sample size; pooling the data; or ridge regression. If the multicollinearity was perfect, the test result was equal to one, the decision criteria was to omit one of the variables.

3.8.4.2 Stationarity Tests

The concepts of integration and stationarity were the building blocks of this research. These concepts were used since empirical literature has suggested that most financial market time series data are integrated of order one I (1) which is greater than order zero I (0). According to Diebold (2019) when a series mean, variance and covariance structure are stable over time the series is said to be weakly stationary. Kennedy (2008) further asserts that there are several fundamental differences between a stationary and an integrated (non-stationary) series. A stationary series has a mean of zero and there is tendency for the series to return to that mean, whereas an integrated series tends to wander widely. Stationary series tend to be erratic, whereas integrated series tend to exhibit smooth behavior. A stationary series has a finite variance, shocks are transitory, and its autocorrelations ρ_k die out eventually, whereas an integrated series has an infinite variance (variance that grows over time), shocks are permanent, and its autocorrelations tend to one. These differences suggest some casual means of testing for stationarity. Kennedy (2008) further claims that for stationary data a plot of the series against time should cross the horizontal axis frequently and the autocorrelations should decrease steadily for large enough lags. For non-stationary data the estimated variance should not cross the horizontal axis often, and the autocorrelations should tend to die out.

Gujarati and Porter (2009) notes that there are tests developed to test for presence of stationarity in variables. One of them is the Augmented Dickey and Fuller test (ADF) that takes care of possible serial correlation in the error terms by adding the lagged difference terms of the regressed. Phillips and Perron (PP) is another test that uses non-parametric statistical methods to take care of the serial correlation in the error terms without adding lagged differences terms. Both of the methods have asymptotic distribution.

In the latest literature however more, robust tests have been proposed which include Levin, Lin & Chu t* test, ADF- Fisher Chi-square and PP-Fisher Chi-square some of which are the modification of the traditional ones (Borsic & Beko, 2018). These Levin, Lin & Chu t* test considers test of stationarity among variable in a group setting rather than individual variables. This study used Levin, Lin & Chu t* test, ADF- Fisher Chi-square and PP-Fisher Chi-square since they are the most recent to be developed unit root tests and considered to be the most robust (Hlouskova & Wagner, 2005).

Levin, Lin & Chu t* test assumes common unit root process, thus using probability results and the desired significance level (this study used the 5 per cent significance level) the decision criteria was to reject common unit root process if the probability was less than or equal to 5 per cent or fail to reject common unit root process if the probability was more than 5 per cent. ADF- Fisher Chi-square and PP-Fisher Chi-square assumes individual unit root process, thus using probability results and the desired significance level (this study used the 5 per cent significance level) the decision criteria were to reject the individual unit root process if the probability was less than or equal to 5 per cent or fail to reject individual unit root process if the probability was more than 5 per cent. If all the variables were stationary, then the decision criteria were to proceed with other tests other than cointegration test, nevertheless, if one or more variables were not stationary then the decision criteria were to carry out cointegration test.

3.8.4.3 Pair-Wise Granger Causality Test

As clearly stated by Anderson, Deistler and Dufour (2018) Granger causality is one of the most important concepts for the analysis of the structure of time series. The term causality was first formalized in econometrics by Orcutt (1952). Orcutt defined causal relations as an asymmetrical or unidirectional relation such as, if A, then B. The study noted that causal relations are taken to be unidirectional, and that they are more restricted in nature than relations which are understood to be of a symmetrical or non-directional in nature. Granger (1969) notes that on some occasions there occurs a difficulty in deciding the direction of causality between two related variables and also whether or not feedback is occurring. This problem of apparent instantaneous causality

79

occurs due to slowness in recording information or because a sufficiently wide class of possible causal variables has not been used.

This study employed pairwise Granger causality in order to determine the direction of causality. Granger causality also helps the researcher to know whether there is need to introduce a lag structure in the final regression model or not (Gujarati & Porter, 2009). The null hypothesis of Granger causality assumes no Granger causality between two variables being measured, thus using probability results and the desired significance level the decision criteria was to reject the null hypothesis if the probability was less than or equal to 5 per cent or fail to reject the null hypothesis if the probability was more than 5 per cent

3.8.4.4 Co-integration Test

Engle and Granger (1987), assert that, if each element of a vector of time series first achieves stationarity after differencing, but a linear combination is already stationary, the time series are said to be co-integrated with co-integrating vector α. Gujarati and Porter, (2009) assert that two variables are said to be co-integrated if they have a long-term, or equilibrium, relationship between them. Financial theories are often expressed in equilibrium terms, such as fisher's quantity theory of money or even the purchasing power parity. Pesaran, Shin and Smith (2001), propose a new approach on modeling time series regressions that test for the existence of a long-run relationship which is applicable irrespective of whether the underlying regressors are, $I(0)$, $I(1)$ or mutually co-integrated.

Gujarati and Porter (2009) argue that, the valuable contribution of the concepts of unit root and co-integration is to force us to find out if the regression residuals are stationary. Co-integration tests have therefore been used for a wide variety of problems, such as testing the permanent income hypothesis, testing rationality of expectations, testing market efficiency in different markets, and testing purchasing power parity.

This paper tested for the existence of co-integration in the process of coming up with the model to eliminate the problem of spurious regression. Spurious regression leads

to misleading regression coefficients in the model (Binh, 2013). This study employed the Johansen and Juselius unrestricted co-integration rank test (trace). Using the null hypothesis of no cointegration or long-term equilibrium equation, the decision criteria was to reject the null hypothesis for all equations with probability results less than or equal to 5 per cent or fail to reject the null for all equations with probability results more than 5 per cent. The tally of all equations whose decision criteria was to reject the null, informed on the number of cointegrating equations available. If there was no available cointegrating equations then the way forward was to differentiate all the regressors until they were stationary and thereafter form an equation of the differentiated regressors.

3.8.4.5 Autocorrelation Test

Akter (2014), argue that in time series or econometric analysis, the aim is to forecast or predict future behavior of variables. The estimates of the parameters may be inefficient if the error term of the model does not follow certain assumptions. Akter (2014), assert that if the usual testing procedure is executed despite autocorrelation problem whatever the conclusions is made may be misleading. De-Carlo and Tryon (1993) note that autocorrelation is the correlation of the observations obtained at time t with that obtained at time t-1(first order autocorrelation), or at earlier times (higher-order autocorrelations). Breusch-Godfrey serial correlation Lagrange Multiplier test was employed to test for the presence of autocorrelation of the error terms in the overall model while vector error correction residual serial correlation Lagrange multiplier test was employed in the individual models.

Vector error correction residual serial correlation Lagrange multiplier test null hypothesis assumes no serial correlation at a specified lag level. Thus, using the probability results and significance level (this study used 5 per cent significance level) the decision criteria was to reject the null hypothesis if the probability results was less than or equal to 5 per cent and fail to reject the null if the probability results was more than 5 per cent. Breusch-Godfrey serial correlation Lagrange Multiplier test null hypothesis assumes no serial correlation. The decision criteria were similar to that of vector error correction residual serial correlation Lagrange multiplier test. If serial

correlation was observed remedial measures available included: addressing mis-specification of the model; transformation of the original model so that the transformed model does not have serial correlation; or use of Newey-West method to obtain standard errors of ordinary least squares estimators that are corrected for serial correlation (Gujarati & Porter, 2009),

4.8.4.6 Heteroskedasticity Test

Breusch and Pagan (1979) noted that in some applications of the general linear model, the usual assumptions of homoscedasticity disturbances and fixed coefficients may be questioned. When these requirements are not met, the loss in efficiency in using ordinary least squares may be substantial and, more importantly, the biases in estimated standards errors may lead to invalid inferences. Engle (1982) notes that the problem caused by heteroskedasticity is that it causes the mean and the variance of a variable to evolve over time. This makes any inference from such variable to be erroneous. Engle tag this special kind of heteroskedasticity of variance in time series as Autoregressive Conditional Heteroskedasticity (ARCH).

According to Knaub (2018) heteroskedasticity is part of the natural error structure in regression, and not a problem to be removed or addressed as an anomaly. However, as noted by Chown and Muller (2018), heteroscedastic errors can lead to inaccurate statistical conclusion if they are not properly handled. Researchers, as noted by Dobriban and Su (2018), try to identify and address heteroscedastic errors. Rana, Midi and Imon (2008), argued that heteroskedasticity often occur when there is a large difference among the sizes of the observations. They noted that it is important to detect this problem because if this problem is not eliminated the least squares estimators would still be unbiased, but they no longer have the minimum variance property. This would consequently lead to large standard errors than necessary.

Heteroskedasticity ARCH test was executed to assess the level of heteroskedasticity in the overall model. This test was chosen since it most appropriate for the time-series data. Its primary intention was to assess the fitness of the model. Vector error residual heteroskedasticity test was employed for individual models. The null hypothesis of both Heteroskedasticity ARCH Test and Vector error residual heteroskedasticity test

assumes no heteroskedasticity. Using significance level of 5 per cent, the decision criteria was to reject the null hypothesis if the probability result was less than or equal to 5 per cent and fail to reject the null hypothesis if the probability result was more than 5 per cent. According to Gujarati and Porter (2009), heteroscedasticity has never been a reason to throw out a good model, nevertheless if heteroskedasticity was observed various measures were available including: transforming the original data in such a way that in the transformed data there is no heteroscedasticity; obtain White's heteroscedasticity corrected standard errors of ordinary least square estimators and conduct statistical inference based on these standard errors; or use of weighted least squares method.

3.8.5 Hypothesis Testing

Kumar (2014) asserted that hypothesis is an assumption, suspicion, assertion or an idea about a phenomenon. Creswell (2013) noted that hypotheses are predictions the researchers make about the expected outcomes of relationship among variables. Testing hypothesis on the other hand employs statistical procedures in which the investigator draws inferences about the population from the study sample.

This study tested both the individual hypothesis for each variable and all variables jointly. In particular the study ran individual regressions of the dependent variable on each independent variable in order to test individual hypothesis. The researcher then ran a multi regression in order to explain the joint effect of all the independent variables on the dependent variable.

Several criteria are used for selection of a model, according to Gujarati and Porter (2009). These include R-squared, adjusted R-squared, F-statistic, information criteria for Akaike, information criterion for Schwarz and information criteria for Hannan-Quinn. None of these requirements is necessarily higher than the others.

Consequently, the study used these statistics to arrive at conclusive inference. In particular the study used t-statistics and the p-value to test for any type of individual test the significance of the null-hypothesis. Certain statistics related to the choice of models are Durbin-Watson, R-squared modified, and likelihood ratio. Confidence

intervals have also been used to check the calculated coefficients' accuracy. Most studies such as Amatete (2016), Mwangi (2016) and Gatuhi (2015) have used a five per cent level of significance in the past, hence a good benchmark. The selected confidence interval was compared to the p-value of the predictor variable(s) and a decision made based on the comparison (Filho *et al*., 2013). P-value is the exact lowest probability of rejecting the null hypothesis when it is true (Gujarati & Porter, 2009).

CHAPTER FOUR

RESULTS, FINDINGS AND DISCUSSION

This chapter presents the results on the effect of market prices on the performance of the residential property market in Kenya. All the variables were first transformed into natural logarithm to stabilize the variance and ease the interpretation of the coefficients. The second goal was to test the time series variables for stationarity, cointegration, and Granger causality. The data was then assessed for multi-collinearity using pairwise correlation test. Finally, the data was used to estimate the regression equation.

4.1 Findings of Descriptive Statistics

The population consisted of quarterly time series data collected using a data collection sheet from 2005 quarter one to 2018 quarter four. Actual secondary data was purchased from the Nairobi Securities Exchange, obtained from Central Bank of Kenya website and extracted from published data from Kenya National Bureau of Statistics and HassConsult Limited. Data obtained was complete for the study period with no missing data. The data was transferred to EViews econometrics software for analysis.

According to Gujarati and Porter (2009) descriptive statistics consist of methods for organizing, displaying, and describing data by using tables, graphs and summary measurers. Descriptive statistics was presented to show the normality of the data. The tests employed were estimation of mean, medium, maximum, minimum, skewness, kurtosis and Jarque-Bera.

Table 4.1: Summary statistics for the secondary data set

	RPM	INR	IFR	EXR	SMP	TXR
Mean	1.18	2.70	1.99	4.41	8.29	12.51
Median	1.25	2.66	1.94	4.40	8.29	12.52
Maximum	5.10	3.06	2.95	4.63	8.61	15.05
Minimum	-3.10	2.50	0.96	4.13	7.89	10.55
Std. Dev.	2.13	0.13	0.50	0.13	0.20	0.93
Skewness	-0.09	0.65	0.24	0.10	-0.21	0.01
Kurtosis	2.23	2.46	2.26	2.17	1.96	2.93
Jarque-Bera (JB)	1.48	4.66	1.84	1.68	2.93	0.01
JB Probability	0.47	0.09	0.39	0.43	0.23	0.99
Observations	56	56	56	56	56	56

4.1.1 Residential Property Market Performance

Table 4.1 presents some elementary tests of normality. Residential property market performance (RPM) was measured by the percentage change in quarterly house price index. The measures used were mean, median, maximum and minimum value, standard deviation, skewness, kurtosis and Jarque-Bera (JB). The positive mean of 1.18 shows that on average there was an increase in residential property market prices by 1.18 per cent over and above the previous quarter price. The standard deviation of 2.13 was associated with the high volatility of the series when compared with the mean. The standard deviation value together with the observed data span of 8.20 shows that even though there was a noticeable increase in residential property prices over time, the fluctuations in percentage change between one period and another were considerable. This is an indication of risk in the performance of the residential property market over time.

Residential property market performance portrays a negative skewness of 0.09 indicating a left tail of distribution that is approximately symmetric (Brown, 2011).

This also explains why the mean was smaller than the median of 1.25 per cent. According to Ivanoski, Stojanovski, and Narasanov (2015) the bias towards positive or negative is represented by the skewness of the distribution. If distribution is positively skewed, there is higher probability of large positive returns than negative returns and the reverse of the same holds. The negative skewness of 0.09 is approximately symmetric, that is, it is near zero thus the possibility of getting positive or negative returns in residential property prices is almost equal with a slight bias towards the negative returns.

Kurtosis value was 2.23 which is less than 3, which shows that the variable is platykurtic. The shape of the tails (outliers or extremes) of the distribution is measured by the kurtosis of the distribution with lower values leading to lower kurtosis. According to Ivanoski, Stojanovski, and Narasanov (2015) kurtosis as statistical measure has significant importance for investors because it represents the posibility of price changes from the current levels (up-down changes). This also shows that the value distribution of the series has less outliers or extreme variables than does a normal distribution. Thus platkurtic observation of residential property market performance shows that this market was considered less risky than would be a normal market. This observation also shows that random or unpredictable events are less likely to occur in a residential property market in Kenya.

According to Dettling (2017) the Jarque Bera test (JB) checks whether the series is normal (Gaussian) or not. This series has a JB value (1.48) and its p-value of 0.47 shows that the residential property market performance had no significant departure from normality using five per cent level of significance. Thus, residential property market performance using JB test was considered to be fairly normally distributed.

4.1.2 Interest Rate

Commercial bank lending interest rate (INR) was measured by natural log of the commercial banks' weighted average interest rates over the period of study. As observed in Table 4.1, the measures used were mean, median, maximum and minimum value, standard deviation, skewness, kurtosis and JB. Positive commercial bank lending interest rate mean of 2.70. Doing an antilogarithm of this value shows that the

mean interest rate for the period under study was averaging to 14.88 per cent. It is good to note that the period under study covers both pre-interest rate capping period in Kenya and post interest rate capping. According to Ochieng (2018) the interest rate cap law came into effect in Kenya on 14th September 2016 with an aim of making credit affordable to the 'common man'. The interest rate cap law helped to reduce the volatility of the lending interest rate and this can be observed by the standard deviation of 0.13 that was associated with this series. The interest rate cap was removed via finance act 2019 that repealed section 33b of the banking act (Republic of Kenya, 2019). Nevertheless, the span of 0.56 between maximum and minimum value of commercial bank interest rate indicates that there is a less likelihood of outliers in changes in interest rate values.

Commercial bank lending interest rate portrays a positive skewness of 0.65 indicating a right tail of distribution which indicates that variable is moderately skewed (Brown, 2011). According to Ivanoski, Stojanovski, and Narasanov (2015) the bias towards positive or negative is represented by the skewness of the distribution. Since this distribution is positively skewed, there is higher probability of large positive increase in commercial bank lending interest rate than negative decreases in interest rate. Thus, the price of lending finances (money) was bound to increase in Kenya over time.

Kurtosis value was 2.46 which is less than three, which shows that the variable is platykurtic. According to Ivanoski, Stojanovski, and Narasanov (2015) kurtosis as statistical measure has significant importance for investors because it represents the posibility of price changes from the current levels (up-down changes). This also shows that the value distribution of the series has less outliers or extreme variables than does a normal distribution. Thus platkurtic observation of commercial bank lending interest rate shows that the price of lending finances (money) has less random or unpredicatble events and this can be explained by the interest rate cap law of 2016 that has eased the predictability of commercial lending interest rate in Kenya (Ochieng, 2018).

Furthermore, JB value (4.66) and a p-value of 0.09 shows that the variable had no significant departure from normality as explained by Dettling (2017). Commercial bank lending interest rate in Kenya was considered to be fairly normally distributed.

4.1.3 Inflation Rate

Table 4.1 presents some elementary tests of normality. Inflation rate (IFR) was measured by the natural log of average quarterly percentage change of the consumer price index. The measures used were mean, median, maximum and minimum value, standard deviation, skewness, kurtosis, and JB test. Positive inflation rate mean of 1.99 is slightly larger than its median of 1.94. Doing an antilogarithm of the mean gives the inflation during the period of study to be 6.95875 per cent. The inflation rate in Kenya had fair volatility rate with an observed standard deviation of 0.50 and a data span of 1.99. The series showed that there were considerably high rates of inflation during electioneering periods and violent post electioneering periods. Kenya National Bureau of Statistics (2018) pointed out that favorable periods with low inflation rate in the Country were partly due to improved global financing conditions nevertheless depressed rainfall at various seasons coupled by the sluggish growth in the manufacturing sector increased inflationary pressures.

Inflation rate portrayed a positive skewness of 0.24 indicating a right tail of distribution which indicates that the variable is approximately symmetric (Brown, 2011). According to Ivanoski, Stojanovski, and Narasanov (2015) the bias towards positive or negative is represented by the skewness of the distribution. Since inflation rate is positively skewed, there was higher probability of large positive increases than negative decreases in inflation rate in Kenya. Thus, the price of commodity market was bound to increase over time.

Kurtosis value was 2.26 which is less than three, which shows that the variable is platykurtic. According to Ivanoski, Stojanovski, and Narasanov (2015) kurtosis as statistical measure has significant importance for investors because it represents the posibility of price changes from the current levels (up-down changes). This shows that the series has fewer extreme outliers than a normal distribution would have. According to Dettling (2017) the JB test checks whether the series is normal (Gaussian) or not. This series has a JB value (1.84) and a p-value of 0.39 shows that the variable had no significant departure from normality using a five per cent level of significance.

4.1.4 Exchange Rate

Exchange rate (EXR) was measured by the natural log of average quarterly exchange rate in Kenya shilling per United States dollar. As shown in Table 4.1 the measures used were mean, median, maximum and minimum value, standard deviation, skewness, kurtosis and JB. Positive exchange rate mean of 4.41 is almost the same to its median of 4.40 a good indication of normality of the series when measures of central tendency are approximately the same. The standard deviation of 0.13 is associated with volatility of the series. This standard deviation coupled with a data span of 0.50 shows less likelihood of outliers in the series.

Exchange rate portrays a positive skewness 0.10 indicating a right tail of distribution which indicates that the variable is approximately symmetric (Brown, 2011). According to Ivanoski, Stojanovski, and Narasanov (2015) the bias towards positive or negative is represented by the skewness of the distribution. Since the distribution is positively skewed, there is higher probability of positive increase in exchange rate than negative decrease.

Kurtosis value was 2.17 which is less than three, which shows that the variable is platykurtic. This shows that the series has fewer extreme outliers. According to Ivanoski, Stojanovski, and Narasanov (2015) kurtosis as statistical measure has significant importance to investors because it represents the possibility of price changes from the current levels (up-down changes). The observed kurtosis shows that the series has fewer extreme outliers than a normal distribution thus the risk of a random change in the exchange rate in Kenya was slightly minimal than would be normally expected. This can be explained by the role the Central Bank of Kenya and the Monetary Policy Committee plays in checking excesses in exchange of currencies.

According to Dettling (2017) the JB checks whether the series is normal (Gaussian) or not. This series has a JB value (1.68) with a p-value of 0.43 that shows that the variable had no significant departure from normality using the 0.05 significance level.

4.1.5 Stock Market Prices

Table 4.1 presents some elementary tests of normality. Stock market prices (SMP) was measured by the natural log of quarterly NSE 20 share index. The measures used were mean, median, maximum and minimum value, standard deviation, skewness, kurtosis and Jarque-Bera. Positive stock market price mean of 8.29 is similar to its median of 8.29 a good indication of normality of the series when various measures of central tendency are approximately equal. The standard deviation of 0.20 is associated with volatility of the series which is relatively small when compared with the series mean. The standard deviation together with a data span of 0.72 implies that there is less likelihood of outliers in the series.

Stock market price portray a negative skewness -0.21 indicating a left tail of distribution which indicates that the variable is approximately symmetric (Brown, 2011). Using the Ivanoski, Stojanovski, and Narasanov (2015) discussion on skewness, this stock market price is more likely to give negative returns than positive returns. Kurtosis value was 1.96 which is less than 3, which shows that the variable is platykurtic. Applying the Ivanoski, Stojanovski, and Narasanov (2015) discussion on Kurtosis the stock market has less random or unpredictable events that would influence its price than would be a normal market. Furthermore, JB value (2.93) and a p-value of 0.23 shows that the variable had no significant departure from normality (Dettling, 2017).

4.1.6 Tax Revenue

Table 4.1 presents some elementary tests of normality. Tax revenue (TXR) was measured by the natural log of quarterly tax revenue collected. The measures used were mean, median, maximum and minimum value, standard deviation, skewness, kurtosis and JB. Positive tax revenue mean of 12.51 is almost close to its median of 12.52. This is a clear indication that the measures of central tendency have approximately the same value. The standard deviation of 0.93 together with a data span of 4.5 indicates less likelihood of outliers in the series.

Tax revenue portrays a positive skewness 0.01 indicating a right tail of distribution which indicates that the variable is approximately symmetric (Brown, 2011). This skewness is approximately equal to zero thus the series has equal chances of getting a positive increase or negative decrease in tax revenue (Ivanoski, Stojanovski, & Narasanov, 2015). Kurtosis value of 2.93 which is approximately equal to 3, which shows that variable is approximately mesokurtic. Thus, tax revenue has a near normal chance of getting random or unpredictable events like any normal distribution would. Furthermore, JB value of 0.01 with a p-value of 0.99 shows that the variable had no significant departure from normality (Dettling, 2017).

4.2 Diagnostic Tests

4.2.1 Pair-Wise Multicollinearity Test

Multicollinearity is the problem that occurs when the explanatory variables are very highly correlated with each other and it causes the variables to deviate from the principle of orthogonality. Brooks (2002) argued that, an implicit assumption that is made when using the ordinary least square estimation method is that the explanatory variables are not correlated with one another.

Table 4.2: Pair-wise multicollinearity test for the secondary data set

Correlation	RPM	INR	IFR	EXR	SMP	TXR
RPM	1.000000					
INR	-0.317176	1.000000				
IFR	-0.078887	-0.007468	1.000000			
EXR	-0.075450	0.435402	-0.010348	1.000000		
SMP	0.401732	0.152617	-0.404953	-0.242242	1.000000	
TXR	0.050664	0.322476	-0.022945	0.539174	0.067513	1.000000

Table 4.2 shows the pair-wise correlation matrix. The result for pair-wise correlation, shows that there is no serious multicollinearity problem since the highest correlation between the independent variables was 0.539174 approximately 53.9174 per cent between exchange rate and tax revenue. The interpretation was that all the independent variables were orthogonal to each other. Also, according to Gujarati and Porter (2009) to minimize dependence on time series data, transformation of variables may be considered that is transforming the time series variables to their first difference form reduces the severity of multicollinearity. In addition, according to Ghouse, Khan, and Rehman (2018) use of autoregressive distributed lag model minimizes the gravity of multicollinearity.

From Table 4.2 it can also be observed that INR, IFR and EXR are negatively correlated with RPM while SMP and TXR are positively correlated with RPM. This shows that interest rate, inflation rate, and exchange rate move in opposite direction with the performance of residential property market in Kenya. Stock market prices on the other hand have a positive correlation with residential property market performance thus the prices of this market move in the same direction.

4.2.2 Stationarity Tests

This study used Levin, Lin & Chu t* test, ADF- Fisher Chi-square and PP-Fisher Chi-square since they are the most recent to be developed unit root tests and considered to be the most robust (Hlouskova & Wagner, 2005).

Table 4.3: Unit root test at level for the secondary data set

Group unit root test: Summary: Series: RPM, INR, IFR, EXR, SMP, TXR: Sample: 2005Q1 2018Q4: Automatic selection of maximum lags: Automatic lag length selection based on SIC: 0 to 3: Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	1.51073	0.9346	6	324
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	18.0565	0.1140	6	324
PP - Fisher Chi-square	18.1928	0.1100	6	330

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

The time series data was subjected to stationarity test as a test of the stability of the variables. The null hypothesis of common unit root was not rejected for the variables at level. This was because the p-values of the critical value of test statistics were greater than 0.05 level of significance. The result therefore shows that the time series were not integrated of order zero. Table 4.3, presents the stationarity tests of all the six variables. From the test results the Levin, Lin & Chu t* test was 1.51073 and the associated p-value was 0.9346, ADF- Fisher Chi-square test was 18.0565 and the associated p-value was 0.1140, and the PP - Fisher Chi-square was found to be 18.1928 and the p-value was 0.1140 the interpretation was that given these three tests of stationarity, the variables had unit root at level.

Table 4.4: Unit root at first difference for the secondary data set

Group unit root test: Summary: Series: RPM, INR, IFR, EXR, SMP, TXR: Sample: 2005Q1 2018Q4: Automatic lag length selection based on SIC: 0 to 4: Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-12.2741	0.0000	6	318
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	212.085	0.0000	6	318
PP - Fisher Chi-square	531.766	0.0000	6	324

** Probabilities for Fisher tests are computed using an asymptotic Chi
    -square distribution. All other tests assume asymptotic normality.

As shown in Table 4.4, the null hypothesis of common unit root was rejected for the variables at first difference. This was because the p-values of the critical values of test statistics were less than 5 per cent level of significance. The result therefore shows that the time series were stationary after first differencing (integrated of order one). From the test results the Levin, Lin and Chu t* test was -12.2741 and the associated p-value was 0.0000, ADF - Fisher Chi-square test was 212.085 and the associated p-value was 0.0000, and the PP - Fisher Chi-square was found to be 531.766 and the p-value was 0.0000. The interpretation was that given these three tests of stationarity the variables were stationary after first differencing.

4.2.3 Pair-Wise Granger Causality Test

This study employed the pairwise Granger causality in order to determine the direction of causality. Granger causality also helps the researcher to know whether there is need to introduce the lag structure in the final regression model or not (Gujarati & Porter, 2009).

Table 4.5: Pair-wise Granger causality test

Pairwise Granger Causality Tests: 2005Q1 2018Q4: Lags 4			
Null Hypothesis:	Obs	F-Statistic	Prob.
INR does not Granger Cause RPM	52	1.04179	0.3969
RPM does not Granger Cause INR		0.99553	0.4204
IFR does not Granger Cause RPM	52	0.95637	0.4411
RPM does not Granger Cause IFR		0.74413	0.5673
EXR does not Granger Cause RPM	52	0.20231	0.9357
RPM does not Granger Cause EXR		1.35535	0.2653
SMP does not Granger Cause RPM	52	1.50625	0.2173
RPM does not Granger Cause SMP		3.24021	0.0207
TXR does not Granger Cause RPM	52	1.24136	0.3078
RPM does not Granger Cause TXR		0.98201	0.4274

From Table 4.5 it can be seen that the issue of Granger causality was present. The table shows that there was statistically significant Granger causality among some of the variables. The null hypothesis that RPM does not Granger-cause SMP was rejected since the test statistic was 3.24021 and the associated p-value was 0.0207. This implies that property market performance in Kenya Granger causes the price of the equity market. The remaining Granger causality tests between the RPM and the regressors and vice-versa were not rejected implying that there was no feedback Granger causality between them. Thus, inflation rate, interest rate, exchange rate, stock market price and tax revenue does not Granger-cause residential property market performance in Kenya.

4.2.4 Co-Integration Test

Engle and Granger (1987), asserted that, if each element of a vector of time series first achieves stationarity after differencing, but a linear combination is already stationary, the time series is said to be co-integrated with co-integrating vector α. Pesaran, Shin and Smith (2001), propose a new approach on modeling time series regressions that test for the existence of a long-run relationship which is applicable irrespective of whether the underlying regressors are, *I (0), I (1)* or mutually co-integrated. Gujarati and Porter (2009) argued that, the valuable contribution of the concepts of unit root and co-integration is to assist the researcher to find out if the regression residuals are stationary.

Table 4.6: Unrestricted co-integration rank test (trace) for the secondary data set

Sample (adjusted): 2006Q2 2018Q4: Included observations: 51 after adjustments: Trend assumption: No deterministic trend: Series: RPM, INR, IFR, EXR, SMP, TXR: Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.640534	167.1902	83.93712	0.0000
At most 1 *	0.538781	115.0103	60.06141	0.0000
At most 2 *	0.522647	75.54229	40.17493	0.0000
At most 3 *	0.416640	37.82789	24.27596	0.0006
At most 4	0.178956	10.34139	12.32090	0.1050
At most 5	0.005579	0.285306	4.129906	0.6542

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

This study sought to test for the existence of co-integration in the process of coming up with the model to eliminate the problem of spurious regression. Spurious regression leads to misleading regression coefficients in the model (Gujarati & Porter, 2009). Two test statistics (trace test and maximum Eigenvalue) were statistically significant as depicted by their respective p-values which were found to be highly statistically significant. In particular, the trace test indicated four co-integrating equations at the 0.05 level of significant. In other words, the results denoted the rejection of the null hypothesis of no co-integration at the 0.05 level. The interpretation was that there was evidence of the long-run relationship among the variables since the probability of drawing test statistic greater than one observed was very high after the fourth equation. The conclusion was that the variables could be used in the same regression since they had several long-run equilibriums (long-run relationship). The study used the first co-integration equation after employing restrictions.

4.3 Individual Hypothesis Testing

This study ran individual regressions of the dependent variable on each independent variable in order to test individual hypothesis using vector error correction model (VECM). According to Baum (2013) VECM are employed when the time series appear to be first-difference stationary with their levels exhibiting unit root or nonstationary behavior. Conventional regression estimators, including VARs, have good properties when applied to covariance-stationary time series, but encounter difficulties when applied to nonstationary or integrated processes. Baum (2013) further stated that the VECM has an advantage as the resulting VAR from VECM representation has more efficient coefficient estimates. Further, according to Tserkezos (2013) it has a better interpretation of short run relationship between variables that have a co-integration relationship. The researcher then ran a joint regression in order to explain the joint effect of all the independent variables on the dependent variable using auto-regressive distributed lag model.

4.3.1 Effect of Inflation on Performance of the Residential Property Market in Kenya

Table 4.7: VEC residual serial correlation LM test of inflation and residential property market performance in Kenya

VEC Residual Serial Correlation LM Tests, Null Hypothesis: no serial correlation at lag order h, Sample: 2005Q1 2018Q4, Included observations: 52		
Lags	LM-Stat	Prob
1	5.295092	0.2583
2	1.644580	0.8008
3	1.136427	0.8885
Probs from chi-square with 4 df.		

Table 4.7 presents the results for the test of serial correlation. The test results rejected the hypothesis of serial correlation in the model. The null was not rejected on the basis that the p-value of the chi-square (langrage-multiplier-LM) were statistically insignificant for all the quarters. In particular for lag one the LM-Stat 5.295092 and p-value was 0.2583. This shows that there was no serial correlation at lag one since the p-value was above 0.05 level of significance. For lag two the LM-Stat 1.644580 and p-value was 0.8008. This shows that there was no serial correlation at lag two since the p-value was above 0.05 level of significance. For lag three the LM-Stat 1.136427 and p-value was 0.8885. This shows that there was no serial correlation at lag three since the p-value was above 0.05 level of significance.

Table 4.8: VEC residual heteroskedasticity test of inflation and residential property market performance in Kenya

VEC Residual Heteroskedasticity Tests: No cross terms (only levels and squares) Sample: 2005Q1 2018Q4, Included observations: 52

Joint test:

Chi-sq	df	Prob.			
53.56857	42	0.1087			

Individual components:

Dependent	R-squared	F(14,37)	Prob.	Chi-sq (14)	Prob.
res1*res1	0.26382	0.947123	0.5213	13.71885	0.4709
res2*res2	0.39525	1.727320	0.0917	20.55309	0.1136
res2*res1	0.30131	1.139732	0.3589	15.66812	0.3341

The test regression is run by regressing each cross product of the residuals on the cross products of the regressors and testing the joint significance of the regression. The no cross terms option uses only the levels and squares of the original regressors. The test regression always includes a constant term as a regressor. The first part of the output displays the joint significance of the regressors excluding the constant term for each test regression. The method uses each of the test regression as testing the constancy of each element in the residual covariance matrix separately. Under the null of no heteroskedasticity or (no misspecification), the non-constant regressors should not be jointly significant. From the above results the presence of heteroskedasticity was rejected since the p-values for the joint were statistically insignificant.

Table 4.9: Regression result of inflation and residential property market performance in Kenya

Cointegrating Eq:	CointEq1
RPM (-1)	1.000000
IFR (-1)	-0.722168
	(0.17524)
	[-4.12098]
Error Correction:	D(RPM)
CointEq1	-0.553909
	(0.16752)
	[-3.30658]
R-squared	0.411188
Adj. R-squared	0.332680
F-statistic	5.237515
Akaike AIC	4.037781
Schwarz SC	4.300449

As shown in Table 4.9 this study used vector error correction model (VECM) over the period 2005 first quarter to 2018 fourth quarter. From Table 4.9 the regression coefficient of inflation rate was found to be -0.722168. This value shows that holding other variables in the model constant, an increase in inflation rate by one percent causes the performance of residential property market to decrease by 0.722168 percent. This value had an associated t-statistic value of -4.12098 which was statistically significant. The result also shows the error correction term value of -0.553909. This value shows the speed of adjustment toward equilibrium value was 55.3909 per cent. The associated t-statistic value of -3.30658 was statistically significant. The R-Squared of the model also known as coefficient of multiple determination was 0.411188. This shows that model explains 41.1188 per cent of the variability of the response data around its mean. The F-Statistic was 5.237515 whose probability was less than 0.05 significance level implying that the model was statistically significant. Akaike information criterion

(AIC) of 4.037781 was lower than Schwarz information criterion implying that AIC criterion was used in the model selection.

Similar results were observed Makena (2016) who undertook an examination on property market investment in Mombasa County, Kenya between years 2006 to 2015. The examination utilized statistical regression where property market investment was the predictand. The stimuli of this study were interest rate, GDP and inflation rate. Makena (2016) study established a negative correlation between inflation and real estate investment implying that an increase in inflation leads to a decrease in real estate investment. Comparable findings were also noted by Lessard and Modigliani (2014) who carried out a research on inflation and housing market. Lessard and Modigliani (2014) study was driven by the wide swings in construction activity and in the turnover of the existing stock of housing as well as a growing feeling that adequate housing is out of the reach of an increasingly large number of households. The countries studied by Lessard and Modigliani (2014) included the United Kingdom and Canada, that employed variable-rate mortgages with level money payments, Brazil and Israel that adopted price level adjusted mortgages, Sweden that had a combined variable rate with a time stream of patterns tailored to remove inflationary distortions, and Finland that had a hybrid scheme lying somewhere between that of price level indexation and variable nominal interest rates. Lessard and Modigliani (2014) concluded that inflation had an unfavorable effect on the demand for houses financed by mortgages and that fluctuations in the rate of inflation tend to lead to corresponding fluctuations in construction activity.

The study findings differed with Mwololo (2014) who undertook a study on prices of residential real estate property in Kenya. Mwololo (2014) study employed descriptive statistics, Pearson's correlation analysis and ordinary least squares regression model. Mwololo (2014) study revealed a significant symmetric influence of inflation on prices of residential real estate properties in Kenya. Mwololo proposed that unemployment and inflation should be controlled at a sustainable level. Ouma (2011) also found a positive influence of inflation on residential property market prices in Nairobi similar to Mwololo (2014) and hinted presence of money laundering in the Country.

4.3.2 Effect of Interest Rate on Performance of the Residential Property Market in Kenya

Table 4.10: VEC residual serial correlation LM test of commercial bank interest rate and residential property market performance in Kenya

VEC Residual Serial Correlation LM Tests, Null Hypothesis: no serial correlation at lag order h, Sample: 2005Q1 2018Q4, Included observations: 52		
Lags	**LM-Stat**	**Prob**
1	2.678694	0.6129
2	1.672175	0.7958
3	5.018963	0.2854
4	4.387033	0.3562
Probs from chi-square with 4 df.		

Table 4.10 presents the results for the test of serial correlation. The test results failed to reject the null hypothesis of the model. The null was not rejected on the basis that the p-value of the chi-square (langrage-multiplier-LM) was statistically insignificant for all the four quarters. In particular for lag one the LM-Statistic was 2.678694 and p-value was 0.6129. This shows that there was no serial correlation at lag one since the p-value was above 0.05 level of significance. For lag two the LM-Statistic was 1.672175 and p-value was 0.7958. This shows that there was no serial correlation at lag two since the p-value was above 0.05 level of significance. For lag three the LM-Statistic was 5.018963 and p-value was 0.2854. This shows that there was no serial correlation at lag three since the p-value was above 0.05 level of significance. For lag four the LM-Statistic was 4.387033 and p-value was 0.3562. This shows that there was no serial correlation at lag four since the p-value was above 0.05 level of significance.

Table 4.11: VEC residual heteroskedasticity test of commercial bank interest rate and residential property market performance in Kenya

VEC Residual Heteroskedasticity Tests: No cross terms (only levels and squares), Sample: 2005Q1 2018Q4, Included observations: 52

Joint test:

Chi-sq	df	Prob.			
44.76823	42	0.3564			

Individual components:

Dependent	R-squared	$F_{(14,37)}$	Prob.	Chi-sq(14)	Prob.
res1*res1	0.11575	0.345954	0.9819	6.018981	0.9660
res2*res2	0.23727	0.822152	0.6416	12.33818	0.5792
res2*res1	0.37409	1.579628	0.1317	19.45316	0.1483

The test regression is run when the squared residuals from the original regression are regressed on the original regressors, their squared, and cross values of the regressors and testing the joint significance of the regression. The first part of the output displays the joint significance of the regressors excluding the constant term for each test regression. Under the null of no heteroskedasticity, the non-constant regressors should not be jointly significant. From the above probability results of 0.3564 the presence of heteroskedasticity was rejected since the p-values for the joint test were statistically insignificant. Also, under the second part of individual components, the probability results were above 0.05 per cent thus we failed to reject the null of no heteroskedasticity.

Table 4.12: Regression result of commercial bank interest rate and residential property market performance in Kenya

Cointegrating Eq:	CointEq1
RPM (-1)	1.000000
INR (-1)	-0.506656
	(0.12894)
	[-3.92936]
Error Correction:	D(RPM)
CointEq1	-0.648197
	(0.16655)
	[-3.89191]
R-squared	0.438843
Adj. R-squared	0.364022
F-statistic	5.865242
Akaike AIC	3.989675
Schwarz SC	4.252343

Vector error correction model over the period 2005 first quarter to 2018 fourth quarter was employed to measure the effect of commercial bank lending rate to the performance of residential property market in Kenya. From Table 4.12 the regression coefficient of commercial bank lending interest rate was found to be -0.506656. This value shows that holding other variables in the model constant, an increase in commercial bank lending interest by one per cent causes the performance of residential property market to decrease by 0.506656 per cent. This is in support of the loanable fund theory that was also supported by Muriuki (2013) who stated that low interest rates should increase the value of any long-lived asset. This value had an associated t-statistic value of -3.92936 which was statistically significant. The result also shows the error correction term value of -0.648197. This value showed that the speed of adjustment toward equilibrium value was 64.8197 per cent. The associated t-statistic value of -3.8919 is also statistically significant. The R-squared of the model was

0.438843. This shows that model explains 43.8843 per cent of the variability of the response data around its mean. The F-statistic was 5.865242 whose probability was less than 0.05 significance level implying that the model was statistically significant. Akaike information criterion of 3.989675 was lower than Schwarz information criterion implying that Akaike information criterion was used in the model selection.

Similar results were observed by Tsatsaronis and Zhu (2004) who carried out a study to determine what drives housing price dynamics. Tsatsaronis and Zhu (2004) study was a cross-country empirical evidence of seventeen industrialized economies between 1970 to 2003. Tsatsaronis and Zhu (2004) found that there was a strong inverse relationship between interest rates and house prices. That is, house prices rise when interest rates drop. As most purchases are done on credit, interest rates are an additional cost to home buyers. The monthly loan installment amount generally determines the amount a house buyer can afford. The monthly installment is of course governed by the loan amount, interest rate and duration of the loan. A lower loan interest rate will result in a lower monthly payment. Consumer's purchasing decisions are more sensitive to the nominal amount of monthly payments than to the size of the loan in relation to household income. There are also other researches that found a significant negative relationship between interest rates and housing prices, (Kim, Lee & Kim, 2011; Muli, 2013; McQuinn & O'Reilly, 2008; Tse, Rodgers & Niklewski, 2014; Sutton, 2002; Egert & Mihaljek, 2007; Ayuso, Perez & Saurina, 2004; Ong & Chang, 2013; Xu & Chen, 2012).

Also, similar results were observed by Karasu (2015) who carried out a study to determine whether there was a real estate bubble in Turkey where house prices were increasing rapidly. Karasu (2015) study used a ten years long data set (2005-2014). Karasu (2015) observed significant decreases in housing interest rates could be credited to the eased condition of credit in Turkey in the late 2000s. This deregulation seemed to strengthen the demand for housing. This led to increase in housing loans in Turkey as houses seemed to be less risky compared to other alternative investment instruments.

Slightly different from the findings of this study was Pillaiyan (2015) study that investigated on the drivers of house prices in Malaysia using vector error correction model over a fifteen year period 1999-2013. Research regressors investigated were real GDP, bank lending rate, consumer sentiment, business condition, money supply, number of loans approved, stock market and inflation. Pillaiyan (2015) found that bank lending rate had a negative but insignificant effect. The results hinted at the potential of a housing price bubble in Malaysia.

This study result differed with Muriuki (2013) who carried out a study on the effect of interest rates volatility on the growth of real estate market in Kenya in the period 2008-2012. Muriuki (2013) sort to show case this effect by showing how growth of real estate market is affected by the interest rates volatility by use of a regression model. Muriuki (2013) found out that the demand for real estate in Kenya was growing exponentially defying fundamentals such as high interest rates. The study owed this situation to the price inelastic demand for housing owing to financial disparity in the Country and the burgeoning middle-income population.

Mutinda (2014) argues that interest rate environment is important in the performance and the returns of any given investment that is interest rate have profound impact on saving and consumption behaviors of investors. Ng'etich and Wanjau (2011) noted that interest rate affects the aggregate demand and aggregate supply position on any market. These changes also influence the expectations and plans of financial agents about their own future and the perception about welfare and redistribution of income and about the prospects of the economy. Rising or falling interest rates also affect consumer and business psychology. When interest rates are rising, both businesses and consumers respond differently.

Loanable funds theory assumes that interest rates are determined by supply of loanable funds and demand for credit (Muriuki, 2013). The many factors considered in loanable funds theory mean that equilibrium will be reached only when each of the factors is in equilibrium. Applying the loanable fund theory to the findings of this study shows that interest rate is one of the key components of residential property market performance that is interest rate influence the amount of loans that business community is ready and

107

able to borrow at any given time which consequently reflect the profit made in the residential property market. Low profits will insinuate incapability to repay borrowed funds and vice versa if profit is high. The findings of this study indicate that low interest rate should increase performance of residential property market but applying loanable fund theory then very low interest rate will discourage savings thus creating a balance/equilibrium between interest rate and residential property market performance.

4.3.3 Effect of Stock Market Prices on Performance of the Residential Property Market in Kenya

Table 4.13: VEC residual serial correlation LM tests of stock market prices and residential property market performance in Kenya

VEC Residual Serial Correlation LM Tests, Null Hypothesis: no serial correlation at lag order h, Sample: 2005Q1 2018Q4, Included observations: 52		
Lags	LM-Stat	Prob
1	1.421749	0.8404
2	2.598402	0.6271
3	2.548971	0.6359
4	2.315501	0.6779
Probs from chi-square with 4 df.		

Table 4.13 presents the results for the test of serial correlation. The test results rejected the hypothesis of serial correlation in the model. The null was not rejected on the basis that the p-value of the chi-square (langrage-multiplier-LM) were statistically insignificant for all the four quarters. In particular for lag one the LM-Stat 1.421749 and p-value was 0.8404. This shows that there was no serial correlation at lag one since the p-value was above 0.05 level of significance. For lag two the LM-Stat 2.598402 and p-value was 0.6271. This shows that there was no serial correlation at lag two since the p-value was above 0.05 level of significance. For lag three the LM-Stat 2.548971 and p-value was 0.6359. This shows that there was no serial correlation at

lag three since the p-value was above 0.05 level of significance. For lag four the LM-Stat 2.315501 and p-value was 0.6779. This shows that there was no serial correlation at lag four since the p-value was above 0.05 level of significance.

Table 4.14: VEC residual heteroskedasticity test of stock market prices and residential property market performance in Kenya

VEC Residual Heteroskedasticity Tests: No cross terms (only levels and squares) Sample: 2005Q1 2018Q4, Included observations: 52					
Joint test:					
Chi-sq	df	Prob.			
38.59144	42	0.6214			
Individual components:					
Dependent	R-squared	F(14,37)	Prob.	Chi-sq(14)	Prob.
res1*res1	0.31772	1.230707	0.2957	16.52142	0.2826
res2*res2	0.26462	0.951013	0.5177	13.76029	0.4677
res2*res1	0.20181	0.668214	0.7890	10.49423	0.7252

The test regression is run by regressing each cross product of the residuals on the cross products of the regressors and testing the joint significance of the regression. The first part of the output displays the joint significance of the regressors excluding the constant term for each test regression. Under the null of no heteroskedasticity, the non-constant regressors should not be jointly significant. From the above probability results of 0.6214 the presence of heteroskedasticity was rejected since the p-values for the joint test were statistically insignificant. Also, under the second part of individual components, the probability results were above 0.05 per cent thus we failed to reject the null of no heteroskedasticity.

Table 4.15: Regression result of stock market prices and residential property market performance in Kenya

Cointegrating Eq:	CointEq1
RPM (-1)	1.000000
SMP (-1)	-0.173183
	(0.02491)
	[-6.95175]
Error Correction:	D(RPM)
CointEq1	-0.657362
	(0.21628)
	[-3.03942]
R-squared	0.398602
Adj. R-squared	0.318416
F-statistic	4.970947
Akaike AIC	4.058931
Schwarz SC	4.321599

Vector error correction from first quarter of 2005 to fourth quarter of 2018 was employed to measure the effect of stock market price to the performance of residential property market in Kenya. From Table 4.15 the regression coefficient of stock market price was found to be -0.173183. This value shows that holding other variables in the model constant, an increase in stock market price by one percent causes the performance of residential property market to decrease by 0.173183 percent. This value had an associated t-statistic value of -6.95175 which was statistically significant. The result also shows the error correction term value of -0.657362. This value shows the speed of adjustment toward equilibrium value was 65.7362 per cent. The associated t- statistic value of -3.03942 was statistically significant. The R-Squared of the model was 0.398602. This shows that model explains 39.8602 per cent of the variability of the residential property market performance in Kenya. The F-Statistic was 4.970947 whose probability was less than 0.05 significance level implying that the model was

statistically significant. Akaike information criterion of 4.058931 was lower than Schwarz information criterion implying that Akaike information criterion was used in the model selection.

Similar results were observed by Glindro *et al.* (2011) who investigated the characteristics of house price dynamics and the role of institutional factor in nine Asia-Pacific economies during 1993-2006. The series used in the Glindro *et al.* (2011) study include residential property prices, GDP, population, construction cost index, land supply index, mortgage credit-to-GDP ratios, real mortgage rates, real effective exchange rates, stock price index, and the first principal component of four institutional indices. Glindro *et al.* (2011) observed that equity prices are negatively related to house prices, suggesting that the substitution effect dominates the wealth effect. Wokker and Swieringa (2016) also observed negative and significant relationship between stock market price and house prices. According to Wokker and Swieringa (2016) investors use past performance as an indicator of an asset class's future performance then a fall in stock returns would decrease expected future returns and thereby reduce the attractiveness of stocks in comparison to residential property market. This would imply a negative correlation between stock market and property market performance in support of the substitution effect.

This study finding differed with Fry, Martin, and Voukelatos (2010) study that undertook a structural vector autoregression model to identify overvaluation in house prices in Australia from 2002 to 2008. Fry, Martin, and Voukelatos (2010) observed that increase in stock values flow through to higher property prices, suggesting that house prices is complicated by wealth effect. Pillaiyan (2015) had the same findings as Fry, Martin, and Voukelatos (2010) with regard to stock market price effect on house prices. Apergis and Lambrinidis (2011) had similar findings like Fry, Martin, and Voukelatos (2010). Apergis and Lambrinidis (2011) explored the relationship between the stock market and the real estate market. The methodologies of co-integration and error correction modeling along with data from both the United States and the United Kingdom stock and real estate markets over the period 1985-2006 were used. In particular, Apergis and Lambrinidis (2011) attempted to investigate whether stock markets and real estate markets are integrated or segmented. Apergis and

Lambrinidis (2011) results displayed that the two markets are rather integrated, with the relationship increasing when the securitized real estate markets are considered in support of the wealth effect.

The finding of this study also differed with Miregi and Obere (2014) study that carried out an investigation on the effects of market fundamental variables on property prices in Kenya, a case of Nairobi from year 2001 to 2013. Miregi and Obere (2014) study took an explanatory design that aimed to establish the importance of the variables on interest in the determination of property prices. As per Miregi and Obere (2014) study findings there was no relationship between property and stock prices. To this effect Miregi and Obere (2014) recommend further investigation into the relationship between real estate and stock markets in Kenya.

4.3.4 Effect of Exchange Rates on Performance of the Residential Property Market in Kenya

Table 4.16: VEC residual serial correlation LM test of exchange rate and residential property market performance in Kenya

VEC Residual Serial Correlation LM Tests, Null Hypothesis: no serial correlation at lag order h, Sample: 2005Q1 2018Q4, Included observations: 52		
Lags	LM-Stat	Prob
1	1.947926	0.7453
2	2.720927	0.6056
3	0.587435	0.9644
4	2.588865	0.6288
Probs from chi-square with 4 df.		

Table 4.16 presents the results for the test of serial correlation. The test results rejected the hypothesis of serial correlation in the model. The null was not rejected on the basis that the p-value of the chi-square (langrage-multiplier-LM) were statistically insignificant for all the four quarters. In particular for lag one the LM-Stat 1.947926

and p-value was 0.7453. This shows that there was no serial correlation at lag one since the p-value was above 0.05 level of significance. For lag two the LM-Stat 2.720927 and p-value was 0.6056. This shows that there was no serial correlation at lag two since the p-value was above 0.05 level of significance. For lag three the LM-Stat 0.587435 and p-value was 0.9644. This shows that there was no serial correlation at lag three since the p-value was above 0.05 level of significance. For lag four the LM-Stat 2.588865 and p-value was 0.6288. This shows that there was no serial correlation at lag four since the p-value was above 0.05 level of significance.

Table 4.17: VEC residuals heteroskedasticity test of exchange rate and residential property market performance in Kenya

VEC Residual Heteroskedasticity Tests: No cross terms (only levels and squares) Sample: 2005Q1 2018Q4, Included observations: 52					
Joint test:					
Chi-sq	df	Prob.			
37.46919	42	0.6700			
Individual components:					
Dependent	R-squared	F (14,37)	Prob.	Chi-sq(14)	Prob.
res1*res1	0.32471	1.270844	0.2707	16.88526	0.2623
res2*res2	0.15127	0.471064	0.9344	7.866394	0.8962
res2*res1	0.21177	0.710072	0.7504	11.01239	0.6851

The test regression is run by regressing each cross product of the residuals on the cross products of the regressors and testing the joint significance of the regression. The first part of the output displays the joint significance of the regressors excluding the constant term for each test regression. Under the null of no heteroskedasticity, the non-constant regressors should not be jointly significant. From the above probability results of 0.6700 the presence of heteroskedasticity was rejected since the p-values for the joint test were statistically insignificant. Also, under the second part of individual

components, the probability results were above 0.05 per cent thus we failed to reject the null of no heteroskedasticity.

Table 4.18: Regression result of exchange rate and residential property market performance in Kenya

Cointegrating Eq:	CointEq1
RPM (-1)	1.000000
EXR (-1)	-0.268326
	(0.07623)
	[-3.51992]
Error Correction:	D(RPM)
CointEq1	-0.586221
	(0.18268)
	[-3.20901]
R-squared	0.385087
Adj. R-squared	0.303098
F-statistic	4.696839
Akaike AIC	4.081156
Schwarz SC	4.343823

Vector error correction model over the study period was employed to measure the effect of exchange rate on performance of residential property market in Kenya. Table 4.18, the regression coefficient of exchange rate was found to be -0.268326. This value shows that holding other variables in the model constant, an increase in exchange rate by one percent causes the performance of residential property market to decrease by -0.268326 percent. This value had an associated t-statistic value of -3.51992 which was statistically significant. The result also shows the error correction term value of -0.586221. This value shows the speed of adjustment toward equilibrium value was 58.6221 per cent. The associated t-statistic value of -3.20901 was statistically significant. The R-Squared of the model was 0.385087. This shows that model

explains 38.5087 per cent of the variability of the residential property market performance in Kenya. The F-Statistic was 4.696839 whose probability was less than 0.05 significance level implying that the model was statistically significant. Akaike information criterion of 4.081156 was lower than Schwarz information criterion implying that Akaike information criterion was used in the model selection.

Similar results were observed by Abelson *et al*. (2005) who undertook a study that aimed to explain changes in real house prices in Australia from 1970 to 2003. Abelson *et al*. (2005) developed and estimated a long-run equilibrium model that showed the real long-run determinants of house prices and a short-run asymmetric error correction model to represent house price changes in the short run. According to Abelson *et al*. (2005), the increase in the demand of purchasing houses holds a low exchange rate by foreign investors especially those emerging countries. As a country's exchange rate starts to depreciate, foreign investors are capable to convert more currency in that country and the good choice of foreign investment in that country are property market. Furthermore, Abelson *et al*. (2005) explained this relationship as a long-run relationship.

This study result differed with Mallick and Mahalik (2015) who used quarterly data (2010Q1 – 2013Q4) to explain the housing prices for fifteen major cities of different regions in India. Mallick and Mahalik (2015) found out that dominance of fundamental factors over the non-fundamental factor (speculative factors) explained the regional housing prices in India. Among the fundamental factors they observed that the share price index, non-food bank credit and foreign direct investment positively explained the housing prices while inflation and a partial measure of wealth negatively explain the same. Mallick and Mahalik (2015) found that real effective exchange rate has no significant influence on housing prices in India.

This study results also differed with Meidani, Zabihi and Ashena (2011) study that investigated the existence of causality among house prices, financial growth, and inflation in Iran using the Toda and Yamamoto approach during the period 1990:1-2008:3. Meidani, Zabihi and Ashena (2011) revealed that demand of house price will increase when exchange rate appreciates. Meidani, Zabihi and Ashena explained that

this is because house owners wish to preserve their asset value. Besides, Meidani, Zabihi and Ashena (2011) found that no causality relationship exists in between exchange rate and housing price in their research.

This study results also differed with Rebi (2014) study that investigated the determinants of house prices and employed error correction analysis in Albania in an attempt to explain the effect of exchange rate on the housing prices. Rebi (2014) revealed that the relationship between house prices and the exchange rate in Albania is positive and statistically significant. Rebi (2014) interpretation was that when households perceive the depreciation of the domestic currency as an erosion of their wealth they may be tempted to purchase houses which to them may act as a better store of value than keeping cash.

4.4 Effect of Market Prices on Performance of the Residential Property Market in Kenya

Table 4.19: Breusch-Godfrey serial correlation LM test of market prices and performance of residential property market in Kenya

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.711941	Prob. F(4,36)	0.1687
Obs*R-squared	8.310339	Prob. Chi-Square (4)	0.0808

Table 4.19 presents the results for the test of serial correlation. The test result does not reject the null of no autocorrelation. F-statistic 1.711941 and a p-value of 0.1687 and Obs*R-squared value of 8.310339 and associated p-value of 0.0808 indicates that the residuals were serially uncorrelated. Thus, the conclusion is that the model was stable and the estimates were valid.

Heteroskedasticity ARCH test was executed to assess the level of heteroskedasticity in the model. This test was chosen since it is most appropriate for the time-series data. Its primary intention is to assess the fitness of the model.

Table 4.20: ARCH test of market prices and performance of residential property market in Kenya

Heteroskedasticity Test: ARCH

F-statistic	1.442345	Prob. F (4,43)	0.2365
Obs*R-squared	5.678363	Prob. Chi-Square (4)	0.2245

Table 4.20 presents the result after the testing of heteroskedasticity using ARCH test. Since the test statistics were statistically insignificant. F-statistic 1.442345 and probability F (4,43) 0.2365 Obs*R-squared 5.678363 and probability Chi-Square (4) 0.2245. The presence of heteroskedasticity was rejected. The interpretation was that the estimation of the regression model was identified optimally.

In addition to serial correlation test and heteroskedasticity test, residual normality test was also carried so as to approximate normality of the model. A model whose residuals are approximately normal give better inferences of their findings.
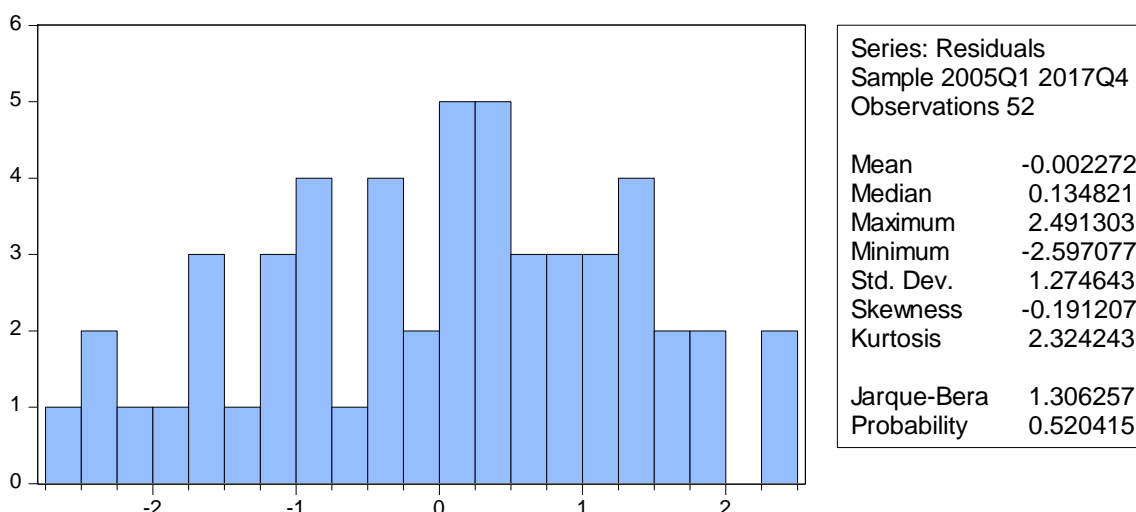
Figure 4.1: Residual normality test of market prices and performance of residential property market in Kenya

Figure 4.1 presents the graphical distribution of the residuals. The result shows that the distribution of the residuals was approximately normal. The skewness value was -0.191207 which is slightly negative and the kurtosis value was 2.324243 which was close to the expected value of 3 for a normally distributed variable. The Jarque–Bera value on the other hand was found to be 1.306257 with a p-value of 0.520415.

Table 4.21: Regression result of market prices and residential property market performance in Kenya

ARDL Cointegrating and Long Run Form: Dependent Variable: RPM: Dynamic regressors (4 lags, automatic): RPM, INR, IFR, EXR, SMP Method: ARDL: Sample (adjusted): 2006Q1: Included observations: 52 after adjustments 2018Q4: Maximum dependent lags: 4 (Automatic selection): Model selection method: Akaike info criterion (AIC): Number of models evaluated: 2500: Selected Model: ARDL (1, 4, 2, 0, 1)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	-368.607408	52.600965	-7.007617	0.0000
IFR	-30.634171	4.269297	-7.175461	0.0000
EXR	-47.102084	6.505486	-7.240364	0.0000
SMP	4.989473	0.973107	5.127365	0.0000
R-squared	0.576816	Mean dependent var		1.375192
Adjusted R-squared	0.460441	S.D. dependent var		2.042317
S.E. of regression	1.500178	Akaike info criterion		3.848219
Sum squared resid	90.02137	Schwarz criterion		4.298506
Log likelihood	-88.05369	Hannan-Quinn criterion		4.020848
F-statistic	4.453210	Durbin-Watson stat		1.689356
Prob(F-statistic)	0.000153			

Cointeq =.RPM - (-368.6074*INR -30.6342 IFR -47.1021*EXR + 4.9895*SMP)

Autoregressive distributed lag (ARDL) model was employed to measure the effect of market prices on performance of residential property market in Kenya. According to Nkoro and Uko (2016) ARDL co-integration technique does not require pretest for unit roots unlike other techniques. Thus, ARDL co-integration technique is preferable when dealing with variables that are integrated of different order or combination of both. ARDL co-integration technique is robust when there is a single long-run relationship between the underlying variables in a small sample size (30 observations to 80 observations). The long run relationship of the underlying variables is detected through the F-statistic (Wald test) that is when the F-statistic exceeds the critical value band. The major advantage of the ARDL co-integration technique, as explained by Nkoro and Uko (2016) lies in its identification of the co-integrating vectors where there are multiple co-integrating vectors. The ARDL approach has the additional advantage of yielding consistent estimates of the long-run coefficients that are asymptotically normal.

In the cointegrated model, as shown in Table 4.21, there was observed significant lags in adjustment to equilibrium that is interest rate had four lags, inflation rate two lags, stock market price and residential property performance had one lag each while exchange rate had zero lag. From Table 4.21 it can be observed that in the long run co-integrating form market prices model had an r-squared of 0.575816 and adjusted r-squared of 0.460441 that is market prices could explain 57.6816 per cent of the variation in residential property market performance. The adjusted r-squared of the market prices of 0.460441 was higher than the adjusted r-squared of the individual models thus indicating that the combination of the market prices explains more variation in residential property prices than any of the individual market price could. The standard error of 1.500178 is a measure of precision of the model. It reflects that the average error of the regression model would be 1.500178 in estimating or predicting the residential property market performance in Kenya. The residual sum of squares of the model was 90.02137 this is the amount in the data set that was not explained by the ARDL model. The F-statistic was 4.453210 and its probability was 0.000153 that was lower than the 0.05 level of significance. This shows that the model was significant as a whole. The model mean of residential property market performance was 1.375192 with a standard deviation of 2.042317. The high standard

deviation compared to the mean shows that there are noticeable changes in residential property performance over time. Out of the three-information criterion, Akaike information criterion was the lowest at 3.848219. The Durbin Watson test statistic of 1.689356 was slightly lower than 2.0, it implies that the information from previous quarters positively influences the current quarter performance. This implies that if there was negative performance of residential property market in the previous quarters there is high likelihood of a continuation of negative performance in the current quarter. Also, positive previous performance would imply high likelihood of positive current performance.

Herath and Maier (2015) argued that residential property market is inefficient first and foremost because of the heterogeneous products developed that differ by many aspects. Secondly, high transaction costs and infrequent transactions makes the market price inelastic that is cannot react to every new piece of information. Thirdly, regulation and strong role of policies between countries contributes towards the market being less efficient. Also, production lags contribute to sluggish generation of information. Last but not least the use of long-term contracts in real estate limits price adjustments thus contributing towards the market being less efficient. On the other hand, Hjalmarsson and Hjalmarsson (2008) argued the need to distinguish between perfect markets and efficient markets and supported that residential property markets are efficient markets but not perfect markets as they reflect the information in the market. This study result has shown that residential property market performance reflect information of prices of other markets that is inflation rate, interest rate, stock market price and exchange rate and thus agrees with Hjalmarsson and Hjalmarsson (2008) that residential property market performance reflect surrounding information and hence the residential property market in Kenya adheres to efficient market hypothesis.

4.4.1 Inflation and Market Performance

From Table 4.21, the regression coefficient of inflation was found to be -30.6342. This value shows that holding other variables in the model constant, an increase in inflation by one percent causes the performance of residential property market to decrease by 30.6342 percent. This value had an associated t-statistic value of -7.175461 which was

statistically significant since the associated probability value was 0.000. The negative significant effect of inflation rate in the long run model is similar to that observed in the two-variable model between inflation and the performance of residential property market.

Similar results were also observed by Lessard and Modigliani (2014) who carried out a study on inflation and housing market. Lessard and Modigliani (2014) study was driven by the wide swings in construction activity and in the turnover of the existing stock of housing as well as a growing feeling that adequate housing is out of the reach of an increasingly large number of households. The countries studied included the United Kingdom and Canada, that employed variable-rate mortgages with level money payments, Brazil and Israel that adopted price level adjusted mortgages, Sweden that had a combined variable rate with a time stream of patterns tailored to remove inflationary distortions, and Finland that had a hybrid scheme lying somewhere between that of price level indexation and variable nominal interest rates. Lessard and Modigliani (2014) concluded that inflation had an unfavorable effect on the demand for houses financed by mortgages and that fluctuations in the rate of inflation tend to lead to corresponding fluctuations in construction activity. Similar results were observed by Makena (2016) who did a study on real estate investment in Mombasa County, Kenya between years 2006 to 2015. Makena (2016) study employed regression analysis as real estate investment was regressed against the predictor variables. Real estate investment was measured against interest rate, GDP and inflation rate. Makena (2016) study established a negative correlation between inflation and real estate investment implying that an increase in inflation leads to a decrease in real estate investment.

4.4.2 Interest Rate and Market Performance

From Table 4.21 the regression coefficient of commercial bank interest rate was found to be – 368.6074. This value shows that holding other variables in the model constant, an increase in commercial bank lending interest by one percent causes the performance of residential property market to decrease by 368.6074 percent. This value had an associated t-statistic value of -7.007617 which was statistically significant since the

associated probability value was 0.0000. The negative significant effect of interest rate in the long run model is similar to that observed in the individual specific model.

Similar results were observed by Karasu (2015) who carried out a study to determine whether there was a real estate bubble in Turkey where house prices were increasing rapidly. Karasu (2015) study used a 10-year long data set (2005-2014). Karasu (2015) observed significant decreases in housing interest rates could be credited to the eased condition of credit in Turkey in the late 2000s. This deregulation seemed to strengthen the demand for housing. This led to increase in housing loans in Turkey as houses seemed to be less risky compared to other alternative investment instruments. Similar results were also observed by Tsatsaronis and Zhu (2004) who carried out a study to determine what drives housing price dynamics. Tsatsaronis and Zhu (2004) study was a cross-country empirical evidence of 17 industrialized economies between 1970 to 2003. Tsatsaronis and Zhu (2004) found that there was a strong inverse relationship between interest rates and house prices. That is, house prices rise when interest rates drop. As most purchases are done on credit, interest rates are an additional cost to home buyers. The monthly loan installment amount generally determines the amount a house buyer can afford. The monthly installment is of course governed by the loan amount, interest rate and duration of the loan. A lower loan interest rate will result in a lower monthly payment. Consumer's purchasing decisions are more sensitive to the nominal amount of monthly payments than to the size of the loan in relation to household income. There are also other researches that found a significant negative relationship between interest rates and housing prices (Kim, Lee & Kim, 2011; Muli, 2013; McQuinn & O'Reilly, 2008; Tse, Rodgers & Niklewski, 2014; Sutton, 2002; Egert & Mihaljek, 2007; Ayuso, Perez & Saurina, 2004; Ong & Chang, 2013; Xu & Chen, 2012).

The findings of this study differed with Pillaiyan (2015) study that investigated the drivers of house prices in Malaysia using vector error correction model over a fifteen year period 1999-2013. The variables investigated were real GDP, bank lending rate, consumer sentiment, business condition, money supply, number of loans approved, stock market and inflation. Pillaiyan (2015) found that bank lending rate had a negative

but insignificant effect. The results hinted at the potential of a housing price bubble in Malaysia.

This study result also differed with Muriuki (2013) who carried out a study on the effect of interest rates volatility on the growth of real estate market in Kenya in the period 2008-2012. Muriuki (2013) sort to show case this effect by showing how growth of real estate market is affected by the interest rates volatility by use of a regression model. Muriuki (2013) found out that the demand for real estate in Kenya was growing exponentially defying fundamentals such as high interest rates. The study owed this situation to the price inelastic demand for housing owing to financial disparity in the Country and the burgeoning middle-income population.

4.4.3 Stock Market Prices and Market Performance

From Table 4.21, the regression coefficient of stock market prices was found to be 4.9895. This value shows that holding other variables in the model constant, an increase in stock market returns by one percent causes the performance of residential property market to increase by 4.9895 percent. This value had an associated t-statistic value of 5.127365 which was statistically significant since the associated probability value was 0.000. The positive significant effect of stock market prices in the long run model differs with the negative effect that was observed in the two-variable model between stock market price and performance of residential property market.

This study results concurred with Fry, Martin, and Voukelatos (2010) study that undertook a structural vector autoregression model to identify overvaluation in house prices in Australia from 2002 to 2008. Fry, Martin, and Voukelatos (2010) observed that increase in stock values flow through to higher property prices, suggesting that house prices is complicated by wealth effect. Similar results were also observed by Pillaiyan (2015). The findings of this study were also similar to that of Apergis and Lambrinidis (2011) who explored the relationship between the stock market and the real estate market. The methodologies of co-integration and error correction modeling along with data from both the United States and the United Kingdom stock and real estate markets over the period 1985-2006 were used. Apergis and Lambrinidis (2011) attempted to investigate whether stock markets and real estate markets are integrated

or segmented. Apergis and Lambrinidis (2011) results displayed that the two markets are rather integrated, with the relationship increasing when the securitized real estate markets are considered.

This study result finding differed with that of Miregi and Obere (2014) who carried out a study on the effects of market fundamental variables on property prices in Kenya, a case of Nairobi from year 2001 to 2013. Miregi and Obere (2014) study found that there was no relationship between property and stock prices, despite huge theoretical and empirical evidences linking stock as an alternative investment to real estate. This study results also differed with Wokker and Swieringa (2016) who observed that equity prices are negatively related to house prices.

4.4.4 Exchange Rate and Market Performance

From Table 4.21, the regression coefficient of exchange rate was found to be -47.1021. This value shows that holding other variables in the model constant, an increase in exchange rate by one percent causes the performance of residential property market to decrease by – 47.1021 percent. This value had an associated t-statistic value of -7.240364 which was statistically significant since the associated probability value was 0.0000. The negative significant effect of exchange rate in the long run model is similar to that observed in the two-variable model between exchange rate and performance of residential property market.

The findings of the study were similar to those observed by Abelson *et al*. (2005) who undertook a study that aimed to explain changes in real house prices in Australia from 1970 to 2003. Abelson *et al*. (2005) developed and estimated a long-run equilibrium model that showed the real long-run determinants of house prices and a short-run asymmetric error correction model to represent house price changes in the short run. According to Abelson *et al*. (2005), the increase in the demand of purchasing houses holds a low exchange rate by foreign investors especially those emerging countries. As a country's exchange rate starts to depreciate, investors with foreign capital are capable to convert more currency in that country and the good choice of foreign investment in that country are property market.

The findings of this study differed with Mallick and Mahalik (2015) who used quarterly data (2010Q1 – 2013Q4) to explain the housing prices for fifteen major cities of different regions in India. Mallick and Mahalik (2015) found out that dominance of fundamental factors over the non-fundamental factor (speculative factors) explained the regional housing prices in India. Among the fundamental factors they observed that the share price index, non-food bank credit and foreign direct investment positively explained the housing prices while inflation and a partial measure of wealth negatively explain the same. Mallick and Mahalik (2015) found that real effective exchange rate has no significant influence on housing prices in India. This study results also differed with Meidani, Zabihi and Ashena (2011) study that investigated the existence of causality among house prices, financial growth, and inflation in Iran using the Toda and Yamamoto approach during the period 1990:1-2008:3. Meidani, Zabihi and Ashena (2011) revealed that demand of house price will increase when exchange rate appreciates. Meidani, Zabihi and Ashena explained that this is because house owners wish to preserve their asset value. Besides, Meidani, Zabihi and Ashena (2011) found that no causality relationship exists in between exchange rate and housing price in their research.

This study results also differed with Rebi (2014) study that investigated the determinants of house prices and employed error correction analysis in Albania in an attempt to explain the effect of exchange rate on the housing prices. Rebi (2014) revealed that the relationship between house prices and the exchange rate in Albania is positive and statistically significant. Rebi (2014) interpretation was that when households perceive the depreciation of the domestic currency as an erosion of their wealth they may be tempted to purchase houses which to them may act as a better store of value than keeping cash.

4.4.5 Moderating Effect of Tax Revenue on the Effect of Market Prices on Performance of the Residential Property Market in Kenya

Table 4.22: Breush-Godfrey serial correlation LM test of the model with tax revenue as a moderating variable

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.415063	Prob. F (3,33)	0.2558
Obs*R-squared	5.926920	Prob. Chi-Square (3)	0.1152

Table 4.22 presents the results for the test of serial correlation. The test result does not reject the null of no autocorrelation. F-statistic 1.415063 and a p-value of 0.2558 and Obs*R-squared value of 5.926920 and associated p-value of 0.1152 indicates that the residuals were serially uncorrelated. Thus, the conclusion was that the model was stable and the estimates were valid.

Table 4.23: ARCH test of the model with tax revenue as a moderating variable

Heteroskedasticity Test: ARCH			
F-statistic	0.243576	Prob. F (3,45)	0.8655
Obs*R-squared	0.782969	Prob. Chi-Square (3)	0.8535

Table 4.23 presents the result after the testing of heteroskedasticity using ARCH test. Since the test statistics were statistically insignificant with F-statistic 0.243576 with Prob. 0.8655, and Obs*R-squared 0.782969 with Prob. 0.8535. The presence of heteroskedasticity was rejected. The interpretation was that the estimation of the regression model was identified optimally.

In addition to serial correlation test and heteroskedasticity test, residual normality test was also carried so as to approximate normality of the model. A model whose residuals are approximately normal give better inferences of their findings.
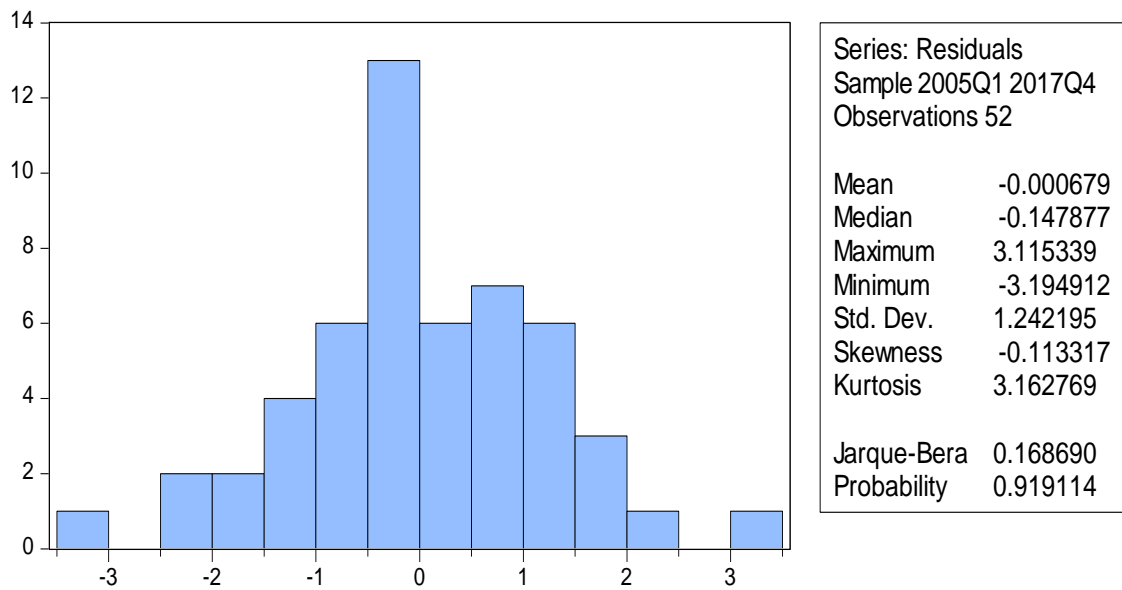
Figure 4.2: Residual normality test of the model with tax revenue as a moderating variable

Figure 4.2 presents the graphical distribution of the residuals. The result shows that the distribution of the residuals was approximately normal. The skewness value was -0.113317 which is slightly negative and the kurtosis value was 3.162769 which was close to the expected value of three for a normally distributed variable. The Jarque–Bera value on the other hand was found to be 0.168690 with a p-value of 0.919114.

The fifth objective sought to establish the moderating effect of tax revenue on the relationship between market prices and performance of residential property market in Kenya.

Table 4.24: Regression result with tax revenue as a moderator

ARDL Cointegrating And Long Run Form: Dependent Variable: RPM: Dynamic Regressors INR, IFR, EXR, SMP: Method: ARDL: Sample (adjusted): 2005Q4 2018Q4: Included observations: 53 after adjustments: Model selection method: Akaike info criterion (AIC): Number of models evaluated: 786432: Selected Model: ARDL (3, 2, 3, 2, 1, 2, 3, 3, 1, 0)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	-325.255756	112.247325	-2.897670	0.0079
IFR	-108.135840	29.933359	-3.612553	0.0014
EXR	85.319731	44.835055	1.902969	0.0691
SMP	77.507158	22.230134	3.486581	0.0019
TXR	7.083395	3.011476	2.352134	0.0272
TXR*INR	26.139395	8.810623	2.966804	0.0067
TXR*IFR	8.599425	2.397924	3.586195	0.0015
TXR*EXR	-8.360763	3.900227	-2.143661	0.0424
TXR*SMP	-6.257223	1.776195	-3.522823	0.0017
R-squared	0.856110	Mean dependent var		1.317170
Adjusted R-squared	0.688238	S.D. dependent var		2.066223
S.E. of regression	1.153690	Akaike info criterion		3.425909
Sum squared resid	31.94400	Schwarz criterion		4.503993
Log likelihood	-61.78659	Hannan-Quinn criterion		3.840488
F-statistic	4.748144	Durbin-Watson stat		2.443907
Prob(F-statistic)	0.000144			

Cointeq = RPM - (-325.2558*INR -108.1358*IFR + 85.3197*EXR + 77.5072*SMP + 7.0834*TXR + 8.599425*TXR*IFR -8.3608*TXR*EXR + 26.139395*TXR*INR -6.257223*TXR*SMP)

Baron and Kenny (1986) moderating methodology was employed to analyze the moderating effect of tax revenue. As shown in Table 4.24, the moderated model has

an R-squared of 0.856110 and adjusted R-Squared of 0.688238 meaning that the moderated model of market prices can explain 85.6110 per cent of residential property market performance in Kenya.

Table 4.25: Moderation effect of the general overall objective

Un-moderated model		Moderated model		Moderating effect
R-squared	0.576816	R-squared	0.85611	0.279294
Adj. R-squared	0.460441	Adj. R-squared	0.688238	0.227797
Log likelihood	-88.0537	Log likelihood	-61.7866	26.2671

From the results in the Table 4.25 it was noted that tax revenue had a positive moderating effect. This was confirmed by the difference in the values of R-squared, Adj. R-squared and Log likelihood under the column labeled difference. The moderation here for the overall model was positive. The interpretation was that the tax revenue information increased the predictive power of the effect of market prices to the performance of residential property market in Kenya. This shows that increase in tax revenue positively contributes to effect of market prices on the residential property market performance in Kenya.

This result agrees with Kamau (2017) study on the effect of property taxation on financial growth in Kenya using data from 2007 to 2016. Kamau (2017) study was informed by classical growth theory and traditional tax handle theory. The study employed descriptive research design. The findings of correlation analysis indicated that property taxed had positive and significant relationship with financial growth. Kamau (2017) study observed positive relationship between corporate taxes and financial growth. Kamau (2017) indicated that taxes contributed in improving the business environment of the country and also increase in tax was one of the indicators that the financial environment of the country was doing well.

The findings of this study were also in agreement with Kairanya (2016) who analyzed the impact of taxation as whole as well as the impact of indirect and direct taxes on financial growth using a simple endogenous growth model. Kairanya (2016) study used time series data from 1975 to 2014. The study employed an endogenous growth model and ordinary least square method to estimate the long-run co-integrating equation. Kairanya (2016) study showed that increase in tax collection in Kenya contributed significantly to the financial soundness of the country.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study was hinged on the hitherto lack of clarity as to whether and how market prices influences performance residential property market in Kenya. Literature review revealed conflicting arguments on application of the selected theories in this field of study. In addition, the findings of previous studies differed on the direction and strength of influence of the selected market prices on performance of residential property market under various context. A critique of the conflicting research reasoning of previous study findings led to the identification of research gaps. To explore the identified research gaps and find meaning, value and knowledge, positivist research attitude was employed guided by a causal design to examine the data over the study period 2005 to 2018.

Characterization of the data was done using necessary tests including but not limited to unrestricted cointegration rank test (trace), pair-wise multicollinearity test, vector error correction residual serial correlation Lagrange multiplier test, Levin Lin & Chu t* group stationarity test, pair wise Granger causlity test, autoregressive conditional heterskedasiticy test. Following the characterization of the data, it was observed that dynamic models are better suited to explore and explain the relationship under study in particular auto regressive distributed lag and vector error correction model were employed.

Research findings of the selected models were compared and contrasted with previous studies, and synthesized and discussed. It is on the basis of these findings and reasonings that inferences were arrived at for each of the research objectives. This chapter presents the summary of major findings of the study, relevant discussion, conclusion and the necessary recommendations. The summary under this chapter was done in line the research hypothesis of the study. The chapter also suggests areas for further research.

5.2 Summary of Findings

5.2.1 Effect of Inflation on Performance of the Residential Property Market in Kenya

The first objective of this study was to determine effect of inflation rate on performance of the residential property market in Kenya. The descriptive statistics were used to determine whether inflation rate was normally distributed. The results showed that the variable was slightly skewed. The kurtosis results also showed that the normality assumption was slightly violated. The Jarque-Bera test indicated that the variable had no significant departure from normality. The correlation analysis revealed that this variable was not highly correlated with other variables thus indicating low multicollinearity. The stationarity test results revealed that the variable had a unit root at level but was stationary at first difference. The cointegration results also revealed that there was the presence of a long-run equilibrium of this variable with other variables in the study.

Comparison of inflation rate and performance of residential property market in the two-variable specific model revealed that inflation rate had a negative and significant effect on performance of residential property market in Kenya. Under the long run overall model of market prices and performance of residential property market the findings were consistent that is inflation rate had a negative and significant effect on the performance of residential property market in Kenya. The null hypothesis of Granger causality test between inflation rate and residential property market performance in Kenya was not rejected indicating that there was no causation between these two variables.

5.2.2 Effect of Interest Rate on Performance of the Residential Property Market in Kenya

The research set to establish the effect of commercial bank lending interest rate on performance of the residential property market in Kenya. The descriptive statistics were used to determine whether interest rate was normally distributed. The results showed that the variable was slightly skewed. The kurtosis results also showed that the

normality assumption was slightly violated. The Jarque-Bera test indicated that the variable had no significant departure from normality. The correlation analysis revealed that this variable was not highly correlated with other variables thus indicating low multicollinearity. The stationarity test results revealed that the variable had a unit root at level but was stationary at first difference. The co-integration results also revealed that there was presence of a long-run equilibrium of this variable with other variables in the study.

Comparison of commercial bank lending interest rate and performance of residential property market in the two-variable specific model revealed that interest rate had a negative and significant effect on market performance of residential properties in Kenya. Under the long run overall model of market prices and performance of residential property market the findings were consistent that is interest rate had a negative and significant effect on the performance of residential property market in Kenya. The null hypothesis of Granger causality test between commercial bank lending interest rate and residential property market performance in Kenya was not rejected indicating that there was no causation between these two variables.

5.2.3 Effect of Stock Market Price on Performance of the Residential Property Market in Kenya

The research set to assess the effect of stock market price on performance of the residential property market in Kenya. The descriptive statistics were used to determine whether stock market price was normally distributed. The results showed that the variable was slightly skewed. The kurtosis results also showed that the normality assumption was slightly violated. The Jarque-Bera test indicated that the variable had no significant departure from normality. The correlation analysis revealed that this variable was not highly correlated with other variables thus indicating low multicollinearity. The stationarity test results revealed that the variable had a unit root at level but was stationary at first difference. The cointegration results also revealed that there was the presence of a long-run equilibrium of this variable with other variables in the study.

133

Review of stock market price effect on residential property market performance in the two-variable specific model revealed that stock market price had a negative and significant effect on performance of residential property market in Kenya in support to the substitution effect. Under the long run overall model of market prices and performance of residential property market, stock market price had a significant positive effect on the performance of residential property market in Kenya in support to the wealth effect. The null hypothesis of Granger causality test that stock market price does not Granger cause residential property market performance in Kenya was not rejected while the reverse that residential property market performance does not Granger cause stock market prices was rejected.

5.2.4 Effect of Exchange Rate on Performance of the Residential Property Market in Kenya

The research set to establish the effect of exchange rate on the market returns of the residential property market in Kenya. Descriptive statistics were used to determine whether exchange rate was normally distributed. The results showed that the variable was slightly skewed. The kurtosis results also showed that the normality assumption was slightly violated. The Jarque-Bera test indicated that the variable had no significant departure from normality. The correlation analysis revealed that this variable was not highly correlated with other variables thus indicating low multicollinearity. The stationarity test results revealed that the variable had a unit root at level but was stationary at first difference. The cointegration results also revealed that there was the presence of a long-run equilibrium of this variable with other variables in the study.

Comparison of exchange rate and performance of residential property market in the two variable specific model revealed that exchange rate had a negative and significant effect on performance of residential property market in Kenya. Under the long run overall model of market prices and performance of residential property market the findings were consistent that is exchange rate had a negative and significant effect on the performance of residential property market in Kenya. The null hypothesis of Granger causality test between exchange rate and residential property market

performance in Kenya was not rejected indicating that there was no causation between these two variables.

5.2.5 Moderating Effect of Tax Revenue on the Effect of Market Prices on Performance of the Residential Property Market in Kenya

The research set to investigate the moderating effect of tax revenue on effect of market prices on performance of the residential property market in Kenya. The descriptive statistics were used to determine whether tax revenue was normally distributed. The results showed that the variable was slightly skewed. The kurtosis results also showed that the normality assumption was slightly violated. The Jarque-Bera test indicated that the variable had no significant departure from normality. The correlation analysis revealed that this variable was not highly correlated with other variables thus indicating low multicollinearity. The unit root test results revealed that the variable had a unit root at level but was stationary at first difference. The cointegration results also revealed that there was the presence of a long-run equilibrium of this variable with other variables in the study.

The moderation effect of tax revenue increased the explanatory power on the effect of market prices on the performance of residential property market in Kenya. This is because the adjusted R-squared increased in the moderated model over the unmoderated model. This shows that tax revenue was a good moderator as it strongly enhances the influence of market prices on the performance of residential property market in Kenya. The null hypothesis of Granger causality test between tax revenue and residential property market performance in Kenya was not rejected indicating that there was no causation between these two variables.

5.3 Conclusions

5.3.1 Inflation Rate and Market Performance

The study concludes that inflation rate has a negative and significant effect on the performance of the residential property market in Kenya. This shows that inflation rate has an explanatory power on performance of the residential property market in Kenya.

135

Also, inflation rate does not Granger cause residential property market performance in Kenya. The conclusion was that inflation rate was a germane factor in explaining the performance of the residential property market in Kenya. The study results show that inflation had an unfavorable effect on the performance of residential property market in Kenya and that fluctuations in the rate of inflation tend to lead to corresponding fluctuations in residential property market performance. This implies that increase in inflation discourages investment in the residential property market in Kenya that is when there are financial strains in the commodity market the demand for residential properties will reduce.

5.3.2 Interest Rate and Market Performance

The study concludes that the commercial bank lending interest rate has a negative and significant effect on the market returns of the residential property market in Kenya. This shows that commercial bank lending interest rate has an explanatory power on performance of the residential property market in Kenya but does not Granger cause performance of the residential property market. The conclusion was that commercial bank lending interest rate was a relevant factor in explaining the performance of the residential property market in Kenya. Results from this study reveals that returns in residential property market increase when interest rate drop this implies that most purchases are done on credit, thus interest rates are an additional cost to residential property investors. The loan installment amount reveals the amount a residential property investor can afford. The monthly loan payment installment is governed by the loan amount, interest rate and duration of the loan. A lower loan interest rate will result in a lower monthly payment. The finding of this study implies that purchasing decisions are more sensitive to the nominal interest charged in the monthly payments.

5.3.3 Stock Market Price and Market Performance

The study concludes that stock market price had a significant negative effect on the performance of the residential property market in Kenya in support to the substitution effect but in the long run stock market price had a significant positive effect on the performance of the residential property market in Kenya in support to the wealth effect. This shows that stock market price had an explanatory power on performance of the

residential property market in Kenya. Also, stock market price does not Granger cause residential property market performance in Kenya. The conclusion was that stock market price was an applicable factor in explaining the performance of the residential property market in Kenya. This shows that in the long run investors feel more financially secure and confident about their wealth when their investment portfolios increase in value. This wealth effect reflects their psychological effect and encourages them to invest in other ventures particularly residential property market thus creating positive symmetric relationship between the markets. Nevertheless, in the short run when investors are managing their investment portfolios the stock market investment opportunities will compete with residential property market opportunities based on their current performance in agreement with substitution effect leading to an inverse relationship.

5.3.4 Exchange Rate and Market Performance

The study concludes that exchange rate has a negative and significant effect on the performance of the residential property market in Kenya. This shows that exchange rate has an explanatory power on performance of the residential property market in Kenya. Also exchange rate does not Granger cause performance of the residential property market in Kenya. The conclusion was that exchange rate was a pertinent factor in explaining the performance of the residential property market in Kenya. The inverse relationship between exchange rate and residential property market performance in Kenya shows that demand of purchasing houses by investors with foreign currencies increases as the exchange rate depreciates. This implies that as the country's exchange rate devalues, investors with foreign currencies are capable to convert more currency in Kenya shilling and one of their good choices of investment is residential property market.

5.3.5 Tax Revenue and Market Performance

The study concludes that tax revenue has a significant positive moderating effect on market prices and the performance of residential property market in Kenya. Tax can be considered as the price paid by entities within the country so to benefit from the pestle factors in a particular country. The conclusion was that tax revenue was an

appropriate moderating factor in explaining the effect of market prices on performance of the residential property market in Kenya. This shows that tax revenue contributed positively in the business environment of the country. In the residential property market tax revenue has contributed in providing an enabling environment for that market be it through infrastructural development, subsidies of inputs, setting up favorable mortgage scheme to certain groups like members of parliament and members of county assemblies, keeping a check on inflation and exchange rates, and favorable policies and regulations such as devolution and "big four" transformation agenda.

5.4 Recommendations

Based on the findings and conclusions of the study, the following recommendations have been drawn.

5.41 Inflation Rate and Market Performance

This study showed that inflation rate had a statistically significant effect on the performance of the residential property market in Kenya. To investors, the study recommends that they be vigilant and strategizes on the Country's inflation rate especially the period between planning of residential units to the actual sell period. The Government is also advised that so as to achieve their objective on housing there is need to continuously monitor and control inflation in the Country.

5.4.2 Interest Rate and Market Performance

In addition, the study showed that commercial bank lending interest rate had a statistically significant effect on the performance of the residential property market in Kenya. For investors who purpose to use debt to finance their investment in residential property market, the study recommends that they should consider financial institutions with favorable terms as this will ultimately influence their investment performance. Investors should also consider partnering with lenders who will offer competitive mortgage terms to their prospective clients. This also explains where many investors employ the use of off-plan sells to finance their investments. The study also recommends that the Government of Kenya and other regulators should put in place

mechanisms that will help them monitor the fluctuations in the commercial bank lending interest rates. The Central Bank of Kenya capping on interest rate, amendments in between and later on removing the ceiling forms an area of interest for further studies.

5.4.3 Stock Market Price and Market Performance

Furthermore, the study showed that stock market prices had a statistically significant effect on the performance of the residential property market in Kenya. The study recommends to investors that although stock market is a substitute investment to residential property market in the short run, a positive performance of the stock market will in the long run lead to a positive performance in the residential property market. Thus, investors while strategizing on their investment portfolios should take into consideration the relationship between these two markets. Kenya being a developing country, there is indeed opportunity for investors in residential property market to tap into the real estate investment trust (REITs) that offers investors exposure to real estate properties and mortgage through a security exchange market listed instrument. The study therefore recommends that the Nairobi Securities Exchange and Capital Market Authority to put more focus and encourage investors to trade in REITs related instruments.

5.4.4 Exchange Rate and Market Performance

Also, the study showed that exchange rate had a statistically significant effect on the performance of the residential property market in Kenya. The study therefore recommends that investors make calculated moves that take advantage presented by variations in exchange rate and/or minimize any adverse situation created by the same variations. There is also need for residential property market investors to focus their marketing strategies to investors with foreign currencies be they Kenya's in the diaspora, foreign nationals or Kenya's in the country maintaining foreign currency accounts or hoarding foreign currencies. The study also recommends that the Government of Kenya should put in place mechanisms that help it monitor the fluctuations in the exchange rate and come up with policies that will avert any negative consequences to the residential property market in Kenya.

5.4.5 Tax Revenue and Market Performance

Last but not least the study showed that tax revenue had a statistically significant moderating role on the effect of market prices on the performance of the residential property market in Kenya. Investors should consider taking advantage of tax policies and/or incentives that are geared towards supporting the residential property market in Kenya such as the big four agenda. The government should also consider supporting the residential property market by creating favorable environment through establishing the necessary infrastructure, encouraging innovation, and inputs that have fair price and quality. The study also recommends that the government of Kenya should put in place mechanisms that help it monitor the fluctuations in the tax revenue, and issues in tax administration, among others. The government should come up with policies that make sure that the tax revenues in the country are monitored to avert negative consequences in the residential property market in Kenya.

5.5 Suggestions for Further Research

This study helped to analyse the effect of market prices and tax revenue on performance of residential property market in Kenya. This study did not include all markets prices that may have an effect on property market performance that may be considered in future studies. Also, future studies should consider the housing demand and or transaction volume as a dependent variable in studying the Kenyan market. Furthermore, there is need to also check on performance of commercial property market in Kenya. A further study is recommended to include longer period for the time series data. There are changes in regulation especially the capping of interest rate in Kenya, the big four agenda that would be interesting in finding out their effect on investment in the property market. This would help in capturing the potential financial cycle's effect. There is also need to consider a different theoretical framework and methodology to analyse the same relationship. The growth of available data with regards to residential property market is making it plausible to employee event studies methodologies based on policies such as housing policies, constitutional changes, interest rate capping among others.

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176

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APPENDICES

Appendix I: Research Introduction Letter

Dear Sir / Madam

I am a PhD student at Jomo Kenyatta University of Agriculture and Technology. As a requirement for the award of a degree in finance, I am required to carry out a research. The research is titled **"MARKET PRICES, TAX REVENUE AND THE PERFORMANCE OF RESIDENTIAL PROPERTY MARKET IN KENYA"** The information collected from your organization will be treated with confidentiality and it is for academic research purpose only. Your response will be highly appreciated.

Yours Faithfully

Charles Gitiya Njoroge

Appendix II: Secondary Data Collection Sheet

Period (Quarters)	Independent variables					Dependent variable
	12-Month Inflation (Average)	Commercial Banks' Weighted Average Lending Interest Rates (%)	NSE 20 Share Index (Average)	Kenya Shillings per United States dollar (Average)	Tax Revenue (Shillings Millions) (Cumulative)	HassConsult Composite Index 2000=100
2002 Quarter 1	3.79000	19.11333	1,280.00000	78.30133	307,159	115
2002 Quarter 2	2.32000	18.53667	1,095.66667	78.41733	431,444	124
2002 Quarter 3	1.07667	18.12667	1,056.00000	78.72600	73,994	128
2002 Quarter 4	1.80667	18.24333	1,213.66667	79.47433	200,725	133
2003 Quarter 1	1.90333	18.78000	1,559.00000	77.04733	331,578	132
2003 Quarter 2	2.90333	17.60667	1,952.66667	73.66167	475,653	132
2003 Quarter 3	5.85333	14.97667	2,164.00000	76.20367	82,445	137
2003 Quarter 4	13.43333	14.09667	2,644.00000	76.84067	223,145	140
2004 Quarter 1	9.02333	13.20333	3,034.61333	76.64900	372,171	143
2004 Quarter 2	8.80000	12.46333	2,678.83000	78.80767	541,118	141
2004 Quarter 3	6.05667	12.25667	2,695.86000	80.51267	100,803	140
2004 Quarter 4	6.05333	12.20333	2,897.85667	80.72667	280,923	141
2005 Quarter 1	14.43333	12.43667	3,144.42000	76.55700	468,219	147
2005 Quarter 2	17.59000	13.10667	3,568.37667	76.40800	656,548	150
2005 Quarter 3	9.36333	12.98333	3,917.79667	75.38200	106,144	150
2005 Quarter 4	14.24000	13.02000	3,962.20333	73.85133	299,840	152

Period (Quarters)	Independent variables					Dependent variable
	12-Month Inflation (Average)	Commercial Banks' Weighted Average Lending Interest Rates (%)	NSE 20 Share Index (Average)	Kenya Shillings per United States dollar (Average)	Tax Revenue (Shillings Millions) (Cumulative)	HassConsult Composite Index 2000=100
2006 Quarter 1	7.63333	13.26667	4,110.00000	72.09967	494,591	153
2006 Quarter 2	4.42333	13.75000	4,211.65000	72.15767	694,432	159
2006 Quarter 3	5.71667	13.63333	4,541.47667	73.13100	130,942	168
2006 Quarter 4	4.33000	13.89333	5,525.07000	71.01433	343,619	173
2007 Quarter 1	4.88000	13.66000	5,431.76667	69.59800	563,169	177
2007 Quarter 2	6.58667	13.28333	5,098.86667	67.44767	820,759	179
2007 Quarter 3	1.81000	13.06667	5,286.20000	67.01267	172,284	183
2007 Quarter 4	2.71333	13.31667	5,216.76667	65.21267	437,107	186
2008 Quarter 1	5.34333	13.89333	4,876.10000	67.87633	700,653	193
2008 Quarter 2	5.63333	13.99333	5,232.46667	62.64600	987,821	208
2008 Quarter 3	7.85667	13.74000	4,565.83333	68.59733	181,529	228
2008 Quarter 4	17.44000	14.44000	3,416.56667	77.62433	482,707	233
2009 Quarter 1	15.87667	14.77333	2,826.23333	79.58133	810,415	244
2009 Quarter 2	16.58000	14.88333	2,982.43333	78.44600	1,157,641	252
2009 Quarter 3	9.68667	14.76333	3,127.10000	76.24267	203,838	265
2009 Quarter 4	10.61333	14.79667	3,173.53333	75.13800	542,884	269
2010 Quarter 1	9.76000	14.92000	3,755.86667	76.48767	880,336	267

Period (Quarters)	Independent variables					Dependent variable
	12-Month Inflation (Average)	Commercial Banks' Weighted Average Lending Interest Rates (%)	NSE 20 Share Index (Average)	Kenya Shillings per United States dollar (Average)	Tax Revenue (Shillings Millions) (Cumulative)	HassConsult Composite Index 2000=100
2010 Quarter 2	7.98667	14.47667	4,271.43333	78.93767	1,271,351	271
2010 Quarter 3	3.05000	14.15000	4,507.66667	80.92600	223,359	283
2010 Quarter 4	3.67667	13.89000	4,495.80000	80.58067	623,652	298
2011 Quarter 1	3.33333	13.95667	4,197.33333	82.23600	1,028,027	310
2011 Quarter 2	3.84333	13.90333	4,025.00000	86.12400	1,485,811	311
2011 Quarter 3	7.05000	14.41667	3,495.33333	93.01367	251,109	307
2011 Quarter 4	13.16000	17.92000	3,289.00000	93.86967	694,214	305
2012 Quarter 1	16.50667	20.05333	3,298.33333	84.13867	1,134,776	312
2012 Quarter 2	19.18667	20.21333	3,634.00000	84.12033	1,659,305	319
2012 Quarter 3	16.87333	20.00333	3,890.00000	84.27600	281,026	333
2012 Quarter 4	11.77667	18.32333	4,121.00000	85.57833	781,524	338
2013 Quarter 1	6.38333	17.90000	4,599.00000	86.72133	1,293,217	341
2013 Quarter 2	2.46333	17.43000	4,789.66667	84.60767	1,962,041	345
2013 Quarter 3	4.07667	16.94667	4,759.66667	87.25500	379,003	340
2013 Quarter 4	4.36667	16.96000	4,988.00000	85.90733	1,014,972	342
2014 Quarter 1	6.99333	17.00000	4,911.78000	86.32700	1,633,492	346
2014 Quarter 2	7.42333	16.67667	4,905.19000	87.24667	2,323,873	350

Period (Quarters)	Independent variables					Dependent variable
	12-Month Inflation (Average)	Commercial Banks' Weighted Average Lending Interest Rates (%)	NSE 20 Share Index (Average)	Kenya Shillings per United States dollar (Average)	Tax Revenue (Shillings Millions) (Cumulative)	HassConsult Composite Index 2000=100
2014 Quarter 3	4.37667	16.40333	5,100.36667	88.23833	402,373	363
2014 Quarter 4	7.03333	15.97667	5,154.62333	89.87800	1,101,805	365
2015 Quarter 1	7.54333	15.62000	5,317.21333	91.52467	1,884,970	365
2015 Quarter 2	6.18000	15.57333	4,928.08000	95.84400	2,680,392	373
2015 Quarter 3	3.97333	16.08333	4,251.61000	102.96733	487,165	392
2015 Quarter 4	6.99333	17.34667	3,975.25333	102.38067	1,279,089	407
2016 Quarter 1	6.14333	17.92667	3,875.33333	101.91000	1,999,641	425
2016 Quarter 2	4.68000	18.14667	3,839.12333	101.03500	2,991,621	440
2016 Quarter 3	7.02333	16.54000	3,303.57000	101.33767	548,282	439
2016 Quarter 4	5.35667	13.68667	3,220.87333	101.73433	1,430,471	437
2017 Quarter 1	6.33000	13.65333	3,112.00000	103.41467	2,329,998	436
2017 Quarter 2	6.50000	13.66000	3,607.00000	103.35933	3,359,936	423
2017 Quarter 3	6.44000	13.68000	3,751.00000	103.51767	592,965	418
2017 Quarter 4	10.79667	13.67667	3,711.00000	103.35133	1,544,279	425
2018 Quarter 1	7.52333	13.60667	3,735.78233	101.83300	2,530,583	437
2018 Quarter 2	4.98333	13.23667	3,726.73100	100.75900	3,538,762	448
2018 Quarter 3	2.88000	12.84667	3,336.49167	100.70623	633,255	454

Period (Quarters)	Independent variables					Dependent variable
	12-Month Inflation (Average)	Commercial Banks' Weighted Average Lending Interest Rates (%)	NSE 20 Share Index (Average)	Kenya Shillings per United States dollar (Average)	Tax Revenue (Shillings Millions) (Cumulative)	HassConsult Composite Index 2000=100
2018 Quarter 4	5.00667	12.55667	2,910.00333	101.90800	1,704,129	454
2019 Quarter 1	4.39667	12.49333	2,878.53100	100.72660	2,723,784	445