

Effects of Macro-Economic Variables on Real Estate Residential Property Prices in Kenya.

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Abstract

The Kenyan real estate residential property market has grown tremendously between the years 2000 to 2019. Many Kenyan and foreign investors have actively invested in the Kenya real estate property market signaling their confidence in an industry that is very lucrative upon careful consideration of factors influencing this growth. Despite some arguable reports that the real estate market in Kenya is reaching a bubble that is bound to burst (property sales slowing down), there are significant areas that continue to record soaring property sales price growth. This study sought to understand the effects of macroeconomic variables on real estate residential property prices in Kenya, and has focused on interest rates, Kenya's GDP, money supply and inflation as macro-economic variables in the study. The study used real estate property prices from the entire market census. The data collected focused on 40 market quarter observations from the year 2009 to 2018. Descriptive research design was used and the model of choice was regression model. This was used to analyze the relationship between residential real estate property prices and the variables which are interest rates, Kenya's GDP, money supply and inflation. The study used secondary data from Hass consult quarterly reports, Knight Frank annual reports, KNBS quarterly reports and CBK quarterly reports for the period between 2009 and 2018. Other minor reports and publications were used to firm up the study as well. The analysis done found a positive correlation between real estate property prices and interest rates, Kenya's GDP and money supply. There was a negative correlation between inflation and the real estate property prices. During the studies the limitations encountered were reliance on one firm on the housing prices. This real estate company however had composite data that was a compilation of data found from 20 other real estate company. The study was also limited to a 10 year span, which is a considerable short duration. However the last 10 years have seen the real estate market in Kenya grow fastest hence need for a proper research that concentrates on the 10 year

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I. Introduction

• Background of the Study

Real Estate refers to property, buildings and land including air above it and ground below it and any other thing on it, movable or immovable (Amadeo, 2018). According to Brueggman (2003), Real estate is categorized into 3; residential property, commercial property, and industrial property. Residential property are real estate properties meant for people to reside in and are made up of apartments, townhouses, bungalows and massionettes. Commercial real estate property are meant for income generation and comprise of shopping malls, office buildings, hotel buildings and other recreational buildings. Industrial real estate property includes manufacturing properties, warehouses and farms.

1.1.1 Macroeconomic Variables

Macroeconomics is the study of the behavior of economic aggregates. Macroeconomic variables are associated with the economic aggregates (Salleh et al., 2015). The variables include gross domestic product which is the total value of goods produced and services provided in a country during one year. Another variable is inflation which is the proportional variation of the consumer price index over a period of time. One other variable is interest rates which is the cost of borrowing money. Lastly, we have money supply which is the total amount of money in circulation or in existence in a country

1.1.2 Residential Property Prices

Price is the money given as consideration in exchange for a good or a service (Salleh et al., 2015). It is the quantity of goods given or received in exchange for another good (Commons, 2000). A price is arrived at by

calculations and research that put into consideration factors such as the prevailing market conditions, available competition in the industry, demand and supply. Importance of price is that it indicates whether that particular market has an oversupply or an undersupply of that particular commodity given the demand levels. Whenever supply exceeds demand, then the prices go down and when demand is less than the available supply, prices tend to go up (Verheye, 2007). Different markets however price their products or services differently therefore sometimes the true value of a good or a service may not be reflected in a price (Igbinsosa, 2011). In a monopoly market, the seller dictates the price, while in a perfect competition market, the buyers set the prices. In real estate, price is what a property owner charges in exchange for the property.

In the properties market, the pricing imposed by the seller is reflective of the prevailing market pricing and is a determinant on whether a buyer invests in property or not (Salleh et al, 2015). It is also used as a comparison with other similar assets in the market (Verheye, 2007). Proper pricing of real estate product is crucial to facilitation transaction in real estate market, whether rental or sale, as it encourages investors and promotes activities in the construction sector (Oloke, Olawale and Oni, 2007). The important aspect in pricing is that it helps the investors on deciding whether to purchase the property or not as is often characterized by assets whose returns are realized in the long run (Admidins and Zvanitajs, 2011).

According to Bruggerman and Fisher, (2008) all over the world, the real estate sector is one of the major drivers of the economies and majorly boosts the infrastructure industries due to the heavy consumption of materials like steel, cement, iron, wooden fittings, sanitary sector, fabricated building materials, construction machinery and tools, paint industry. The architectural, engineering and related consultancies sectors have grown due to the growth of the real estate market (Bruggerman and Fisher, 2008). The production of these sectors is pegged on the size of the real estate market. The real estate sector however faces a recurrent nature of demand and plunge, which is intrinsic to this sector, as a result of which there comes periods when the real estate sector has to sustain on its own momentum of holding on to its core appeal of being a huge money spinner in terms of investments in general times (Brown et al., 2001). According to Burnside and Rebelo (2011), due to the real estate sectors market capitalization and its ability to increase asset value by a big margin over a short period of time, institutional investors are pulled into these kinds of investment. These attractive returns are driven by the flourishing demand for quality real estate, the market value of prime real estate locations, and the expected rate of return due to the continual demand for real estate assets. In markets across the globe, the real estate sector had witnessed a sudden growth prior to the recession that was experienced in 2008 and 2009 in the American, European and Asian continents.

Globally, in every market the real estate sector has been the most preferred form of investment in terms of its returns on investment, which is true in every sense (Seabrooke et al., 2004). In this market, the demand has always been higher than the supply hence the assurance of returns. In the US real estate market, financial institutions like Fannie May, Freddie Mac and Bear Stearns had invested heavily in the real estate sector with the expectation of a high return in their investments (Hage, 2008). These financial institutions however suffered greatly by losing a considerable amount of their initial investment as that market was shortly after hit by the financial crisis. Their analysts had not envisioned the blow that market was about to face and could therefore not advise these financial institutions against investing a lot into the American real estate. Like any other business, poor strategies, wrong decisions and factors beyond control led to the real estate bubble. Emergence of the credit crunch rose from the USA real properties market and had a ripple effect on other sectors in the USA before spreading to other continents.

The Indian real estate sector is one of the most globally recognized sectors. It is slated to grow at 30 per cent over the next decade. It comprises four sub sectors - housing, retail, hospitality, and commercial. The growth of this sector is well complemented by the growth of the corporate environment and the demand for office space as well as urban and semi urban accommodations. The construction industry ranks third among the 14 major sectors in terms of direct, indirect and induced effects in all sectors of the economy (Kapila, 2014).

The South African real estate market size is expected to increase to US\$ 180 billion by 2020. The housing sector alone contributes 5-6 per cent to the country's gross domestic product (GDP). Also, in this period, the market size of this sector is expected to increase at a compound annual growth rate of 11.2 per cent. Retail, hospitality and commercial real estate are also growing significantly, providing the much-needed infrastructure for South Africa's growing needs. Real estate has emerged as the second most active sector, raising US\$ 1.2 billion from private equity investors in the last 10 months (Norbert, 2014).

In Seychelles foreign investors have bought real estate valued property space worth over US\$ 2 billion. Responding to an increasingly well-informed consumer and keeping in mind the globalization of the business outlook, real estate developers have also shifted gears and accepted fresh challenges especially that of land scarcity. Real estate developers are struggling to meet the growing demand for housing and the need for managing multiple projects across cities in the country (Raman, 2013).

1.1.3 Macroeconomic Variable and Property Prices

According to Lynn (2007) since economic variables are normally interconnected, what affects one part of the economy causes a ripple effect across the whole economy. In the last ten years, various financial institutions, including the International Monetary Fund (IMF), have had to pay attention to the various indicators of economic health across the world. In the past years, researchers have dedicated much of their time, resources and effort studying the properties market pricing due to sensitivity of the market and fluctuations. Due to the economy being unstable in many countries like the U.S., real estate prices fluctuations have led to an increase in mortgage defaults. A lot of these residential properties have outstanding loan balances greater than the property values (Burnside et al., 2011). Real estate property prices reveal the state of the real estate market and these prices are usually controlled by demand for these properties. The demand on the other hand is determined by both macroeconomic and microeconomic factors in a country. Understanding the forces behind demand for real estate will help in understanding the reason behind the frequent price changes in this market.

An interest is the money above the initial borrowed amount (Brigo and Mercurio, 2006). Interest rate is a price that relates to present claims on resources relative to future claims on resources. According to (Keynes, 1936) interest rates is the cost of borrowing capital over a certain time period. A lot of businesses and individuals depend on borrowing as a way of financing themselves and due to this, the prevailing interest rate is very important as it directly affects the business or the individual during the period that they owe money to the lender (Keynes, 1936). Property ownership financing is done through mortgages offered by banks in Kenya. It is however not as popular as it is in the American, European and Asian continents. In 2016, the Kenyan mortgage market size was 3% of the Gross Domestic Product and there were less than 25,000 mortgage loans outstanding. According to World Bank reports (2017) sacco's are preferred by a majority of Kenyans and are more popular lenders due to the fact that they offer loans at lower interest rates compared to the Kenyan banks. Their loans are also much more accessible unlike bank funding.

Money supply, also known as money stock is the total amount of monetary assets present in an economy at a particular period (Cummings, 2010). A change in money supply levels could result in either a decrease or an increase, which may have a direct or an indirect impact in asset prices. Money supply in an economy however may increase the inflation rates in an economy and this increases discount rates therefore affecting investments (Liow and Ibrah, 2005)

Inflation levels in the economy is a determinant of the final selling price of the property (Glaeser, 2012 and World Bank, 2011). Real estate construction is known to be a costly and material depleting industry due to its complexity and volatility occasioned by varied needs, wants and preferences (Ramata, 2017). During a project construction period, there are many unexpected events including controllable and uncontrollable factors that can affect the cost of the construction (Vedabrata, 2012). Fluctuations of prices of materials are a common problem in the construction industry. Besides material prices, changes in design during construction and a project exceeding the completion date are also some of the factors that have an effect on the cost of construction. Yu and Chan, (2010) studied factor analysis of various significant variables on project cost overruns and concluded that factors such as contractor inabilities, inadequate project preparation, resource planning, interpretation of requirements, works definition, timeliness, government bureaucracy and risk allocation contribute to the overruns. In Kenya, the demand for construction materials, particularly cement rose by 1.7% between the years 2011 to 2012. In the same period, the value of real estate buildings rose by 9.6%. There is thus a relationship between inflation and the pricing of residential real estate.

1.1.4 Residential Property Prices in the Kenyan Market

Kenya has over the years experienced influx in investments and growth of the sector which many analysts predict will continue in the coming years (Karoiki 2013). Homeownership is currently estimated to be at 16% which is still very low (Ruitha, 2010). According to World Bank report (2010), Kenya is one of the fastest growing developing countries in terms of urbanization. The report further indicates that about 200,000 people migrate to the urban areas annually and that the rural areas are also urbanizing due to infrastructural development penetration. Affordable housing provision is however a problem that both the local and national Kenyan government(s) face, and this has been taken over by the private sector (Kenya's vision 2030). Since the private sector is profit driven, it has focused its energy and interest in the middle income and high-end households. As a result, informal settlements and slums have mushroomed in major towns to cater for the growing demand for the low-income housing category (UN-Habitat report, 2011). Workers of many companies setting base in Kenya and at the counties are expected to create a high demand for housing according to Architectural Association of Kenya (AAK, 2011).

In Kenya the real estate market is increasingly dominated by institutional investors. This presents a challenge to private real estate investments because individual properties are not bought and sold on a regular basis like stocks and bonds (Dawson et al, 2007). Unlike the developed countries that use stocks and bonds, financing of real estate, in Kenya it is predominantly through mortgage financing. Interest rate targets are a vital

tool of monetary policy and are taken into account when dealing with variables like investment, inflation, and unemployment. The Central Bank of Kenya generally tends to reduce interest rates when they wish to increase investment and consumption in the country's economy. However, a low interest rate as a macro-economic policy can be risky and may lead to the creation of an economic bubble, in which large amounts of investments are poured into the real-estate market and stock market. The Kenyan property market has increased by 25 per cent, including increases in commercial and residential real estate East Africa's biggest economy is growing at a rate of 2.7 per cent annually. During the country's rebasing – replacing of the old base year used for compiling the constant price estimates to a new and more recent base year – that saw the country attaining a lower middle income status, the real estate sector contributed 5.9 per cent accounting for most of the change in the level of the country's GDP. Meanwhile, a survey by the country's central bank revealed there were less than 20,000 mortgage loans in the country in 2013, a fraction to that of the population of the capital city, Nairobi at over four million. Nonetheless, the real estate sector in the country grew by 2.6 per cent in the second quarter of 2014 according to the county's statistics bureau. The Kenyan real estate market is focused on renting properties, with 70 per cent of house hunters looking to rent. Although there is an imbalance between the supply of housing and the current demand, this gap provides investors and developers with a great opportunity to make capital gains and fuel the economy. Especially with lower interest rates, the real estate market has great potential for growth. A housing price index is set to be launched to help policymakers take a broader view of changes in the economy and to assist investors in managing risk as the country currently has no independent tool for tracking real estate prices (ROK, 2014). Kenya's GDP increased to 55.2 billion US dollars in 2013 from 44.1 billion US dollars, a 25.3 per cent jump. The real estate sector contributed 5.9 per cent accounting for some change in the level of the country's GDP. The country's booming property market is said to be responding to demand that has been created by the expanding middle class. Currently, the total number of mortgage accounts in Kenya stands at 20,000 which is significantly below the demand for housing units of more than 200,000 per year and growing. There is therefore an urgent need to increase the supply of new and affordable housing units. Financial institutions are similarly focusing their effort towards easing access to affordable credit by lowering the mortgage rates, lengthening the mortgage repayment periods by embracing multi-generational mortgages and restructuring mortgage repayment mode in order to accommodate the informal sector (GOK 2014). Lower interest rates allow more people to be able qualify to purchase a home, thus more people can afford to purchase and at the same time, because more people are able to purchase homes it reduces the amount of homes on the market (reduces the supply) which in turn pushes up the cost. Conversely, when interest rates are high fewer buyers are able to qualify for a loan which increases supply. Over supply tends to push prices lower. The real estate sector being one of the major sectors of the economy in Kenya has been largely affected by fluctuating interest rates. The study seeks to show case this effect by showing how real estate growth is affected by the cost of borrowing. Real estate is a large investment which requires huge capital that most ordinary Kenyans cannot raise, therefore they turn to banks to finance this cost of construction or purchase (Kith, 2008). The cost of borrowing in all banks is driven by the real interest rate which is fueled or largely accommodates inflation. Inflation is the key driver of interest rates. The banks are highly supervised and are under the obligatory role of the Central bank of Kenya which determines the base lending rate accommodating all factors in the economy, based on this the bank can then come up with their own mortgage rates or borrowing rates a few basis points from the Central Bank lending rate.

Apartments have been steadily representing a greater share of the overall residential supply within Nairobi, in line with increased demand for this type of product and due to high land costs in prime areas (Lasalle, 2018). According to Hass Consult Q3 2017 reports, several Nairobi estates had a nominal house price increase. Muthaiga, recorded an increase in house prices of 12.5% during the year to Q3 2017, Loresho (8.9%), Langata (7.6%), Nyari (6.5%), Kitisuru (4.6%), Gigiri (4.6%), Spring Valley (2.6%), Karen (2.1%), Eastleigh (1.5%), Ridgeways (1.4%), and Runda(1%) followed closely according to the research. However, when the 7.06% inflation rate in end-Q3 2017 is taken into consideration, these prices in most of the city's residential estates have actually declined year-on-year during the said period. The figure below shows the price fluctuations in the real estate market in Kenya between the years 2010 to 2017.



Fig 1: Annual residential Property Price Change in %

The question is, how do various factors drive property prices? People's ability to invest in real estate may be directly or indirectly affected by several variables. It is therefore very important for the investor to understand the relationship between the macroeconomic and microeconomic variables and return on investment when one plans to invest in real estate. Due to the speculations on what exactly affects this market, this study seeks to research on whether factors like interest rates, Kenya's GDP, money supply and inflation affect pricing of property in Kenya.

Recently REITs structure and tax dispensation for companies were introduced in Kenya, and the country's listed property market has grown considerably over the past few years. Since the introduction of REITs, international investors have flocked into Kenya's property market. Because of these positive developments, Kenya was included on the list of seven emerging real estate markets to watch for in 2016 by global online real estate platform lamudi. As a result of the expansion, price has been continuously changing.

- **Statement of the problem**

According to Mark (2003) real estate development and construction is a very risky process, with many unexpected occurrences throughout the process. Sukulpat (2010) indicates that the risks in real estate development arise from economical (foreign exchange rates, volatility of returns, levels of interest rates) technological, social environment and political climate. Report published by property index and management firm Hass Consult (2012) show that the mean price for a housing unit in Nairobi, in the year 2000 was sh7 million and seven years later, the same housing unit was at a mean of sh24 million that is a 338% increase in value in a span of 7 years. As of 2012, Kenyan Population growth was estimated at 4.2% per annum. Based on this growth and the rate of urban migration, the yearly annual increase in demand for housing in Kenya is of 206,000 units annually of which 82,000 is in urban areas. In 2011, the ministry of housing estimated that the formal supply of houses to the market reached 50,000 units creating a marginal shortfall of 156,000 units which added up to the existing backlog of 2 Million units. In 2012, it is estimated that a further 85,000 units were also added to the backlog (CAFA 2011, CAHF 2012)

In the past few years, Kenya's property market has been on an upward trend with many questions being raised on whether the bubble is likely to burst. Questions concerning the economic factors holding the law of demand and supply of property market have since been raised by economists and researchers. According to property consultant's Knight Frank (2013), Nairobi's upmarket suburbs, rent rose by the highest margins, placing the city ahead of 15 other cities in Africa, Asia, Middle East and Europe. This is attributed to Nairobi being a regional hub due to its high return on investments and is attracting many transnational corporations who are driving rent up. Kenya, being a politically stable country, apart from election years, attracts a lot of foreign direct investments, most of it in the real estate industry. Some of these multi-nationals include, Tullow, General Electric, Google, Nestle, Pepsi, Foton Automobiles, Bank of India, the big four audit firms and HSBC, according to Knight Frank's Prime Global Rental Index (KFPGR, 2013). The index indicated that rent rose as follows; Nairobi 17.9 %, Dubai 14.3%, and Beijing 8.5 % (KFPGR, 2013). Globally, rent increased by an average of 5.1% in 2012 which means Nairobi rate of rent increase was more than three times the global average (KFPGR, 2013) during the same period the rate of interest rates kept on changing.

Empirical studies (World Bank 2010, CBK 2010, Prime Global Rental Index 2012, TCM Africa 2013, Tyson's, Hass consult) have shown that increase on property prices is attributed to the decrease in interest rates, especially the rates on interbank exchanges, inflation and Treasury bills, which have a profound effect on the value of income-producing real estate as an investment vehicle. The influence of interest rates on an individual's ability to purchase residential properties (by increasing or decreasing the cost of mortgage capital) is so profound that many people incorrectly assume that the only deciding factor in real estate valuation is the mortgage rate (Daminiano, 2001). Other factors that have a significant impact on the real estate pricing are the level of a country's GDP, level of a country's money supply and the inflation levels in a country.

- **Objectives of the study**

- **General objective**

The general objective of the study was to analyze the effects of macro-economic variables on real estate residential property prices in Kenya.

- **Specific Objectives**

The specific objectives were:

1. To establish the effect of interest rates on real estate residential property prices in Kenya
2. To determine the effect of Kenya's GDP on real estate residential property prices in Kenya
3. To establish the effect of money supply on real estate residential property prices in Kenya
4. To establish the effects of inflation on real estate residential property prices in Kenya

1.4. Research Questions

1. Do interest rates have an effect on real estate residential property prices in Kenya?
2. Does Kenya's GDP have an effect on real estate residential property prices in Kenya?
3. Does money supply have an effect on real estate residential property prices in Kenya?
4. Does inflation have an effect on real estate residential property prices in Kenya?

1.5. Significance of the study

Real estate is a major area of discussion and research and the study will provide relevant knowledge in the field of real estate which will be beneficial to academicians. It will also provide a basis for further research in the field and contributes to the literature on effects of the variables on real estate prices.

The findings of this study may also be used by the government and other policy making bodies as a guideline in formulation and development of policies that are concerned with real estate sector of the economy. The government as the regulator of real estate sector would benefit with the findings of this study as it would be enlightened on the various approaches that real estate firms can adopt to determine the prices of properties. Information gathered through this study would help the government to formulate policies beneficial in the best approaches in the real estate sector in Kenya.

The financial institutions that provide housing such as commercial banks, savings and credit cooperative organizations, insurance companies and pension funds which have become equity investors in housing projects will benefit from this study. They are more likely understand how interest rates will affect their influx of capital into the real estate development in order to satisfy their needs for higher yield particularly in the development of new property. The lenders especially those advancing loans mortgages would find the research useful as the findings will be integrated in the loan advancement decisions to real estate investors.

The study is likely to help real estate investors to make informed choices in the real estate property investment. Investors seeking to join or expand in the real estate sector is likely be able to make informed evaluation as to what is driving the changes in real estate prices and thus be able to make sound decisions. Understanding how the variables affect real estate prices is important to investors' strategies. Financial analysts will also find this study useful in providing information necessary in advising their clients on financial decisions.

1.6. Scope of the study

The study focused on the Kenyan real estate market and used the composite index which represents an average price of the Kenyan residential real estate property. The 10 year data was collected from a real estate firm that provides composite index and that also collects data from 12 other real estate firms. The choice of the scope was necessitated by the consistent availability of the average price throughout the duration of the study. The study was guided by the dependent variable being residential real estate property prices and the independent variables being interest rates, Kenya's GDP, money supply and inflation. The study was conducted over a period of 8 months and allocated a budget of 20,000.

1.7. Limitations of the study

The greatest limitation of the study was unavailability of a variety of housing prices data. The researcher only used one source for these data since it was the only one available. The real estate company that had the data published however had composite data that was a compilation of data found from over 10 other real estate companies.

The study was also limited to a 10 year span, which is a considerable short duration. However the last 10 years have seen the real estate market in Kenya grow fastest hence need for a proper research that concentrates on the 10 years.

II. Literature Review

2.1. Introduction

This chapter discussed review of past research papers on factors that affect the real estate prices. The chapter also discussed the relationship between these variables in Kenya and how they affect real estate prices

- **Theoretical review**
- **Theory of Price**

Developed by Friedman (1976), this study explains that pricing is mainly influenced by the divergent forces. One side has demand forces that are driven by utility and the other side has supply that is driven by cost. The equilibrium is achieved when the demand coming from the consumer equates with the supply side that comes from the seller (Omboi and Kigige, 2011). The theory focuses on the buyers and sellers conflicting interest (Weber 2012). The theory further assumes that the information flow is perfect in the market and that the sellers give the right information to the buyers so the buyers have the right information before transacting and that they can absorb it without cost (Meese, 2003).

According to Weber (2012), the price attached to any good or service is influenced by demand. Laurentiu & Anca-Teodora, (2008) observed that the properties market is a free economy where the pricing is solely demand based. The theory however believes that there is perfect information flow which is not the case in a real market situation.

- **Economic Growth Theory**

This theory was pioneered by Harod and Domar (1950) and is in line with the Keynesian view. The model reveals that the price of all assets is affected by many factors which determine the behavior of operators taking part in the market transactions (Berry, 2006). This theory further explains that the improvement in technology and investment levels affect the economic growth rate of a country. According to (Monogbe, 2015), growth in the financial institutions of a country improves the overall health of the economy.

Hongyu, Park and Siqi, (2002) finds that for overall economic growth, all sectors in the economy have to work closely together and therefore the real estate sector has to work together with the other sectors in the economy. According to the economic growth model, the value attached to real estate properties goes hand in hand with the citizen's disposable income in the country. This indicated a direct correlation which exists between property pricing and economic performance (Berry, 2006). The theory however does not explain the extent to which the two variables correlate.

- **Structural Model of The Housing Market**

The model of the housing market was pioneered by Pottow (2007). According to the theory, consumers are attracted to the sector due to the longevity of the structures which last over a long period. The theory also explains that real estate prices are driven by demographic pressures and disposable income. Characteristics of the property market like installment payments is catered for in the theory (Bajari et al., 2008). The theory also emphasizes that macroeconomic stability, weaker legal system and regulatory environments, inefficient 'collateralization' of assets as well as lenders affect housing sector (Akumu, 2004). The model further reveals that lending by financial institutions influences the property prices through the use of mortgages and as a result, properties' market achieves equilibrium aided by the financing institutions (Nobili and Zollino, 2012). According to Nobili (2017), this model allows for variation in house supply, but only in the shortrun and that the financial institutions affect equilibrium in the housing market through its effects on housing demand and supply.

- **The Quantity Theory Of Money**

The quantity theory of money by Irving Fisher (1911) asserts that changes in the general level of general prices are determined primarily by changes in the quantity of money in circulation. The quantity theory of money formed the central core of 19th century classical monetary analysis, which provided the dominant conceptual framework for interpretation in contemporary financial events and formed the intellectual foundation of orthodox policy prescription designed to preserve the gold standard. David Hume (1776) provided the first

dynamic process analysis of how the impact of a monetary change spread from one sector of the economy to another, altering relative price and quantity in the process. He provided considerable refinement, elaboration and extension to the quantity theory of money. David Ricardo (1823), thought such disequilibrium effects ephemeral and unimportant in long-run equilibrium analysis. He charged that inflation in Britain was solely the result of the Bank of England's irresponsibility over issue of money, when in 1797, under the stress of the Napoleonic Wars; Britain left the gold standard for an inconvertible paper standard. Ricardo discouraged discussions on possible beneficial output and employment effects of monetary injection. Irving Fisher (1947) spelled out his famous equation of exchange: $MV=PT$. This and other equations, such as the Cambridge cash balance equation, which corresponds with the emerging use of mathematics in neo-economic analysis, define precisely the conditions under which the proportional postulate is valid. Fisher demonstrated that monetary control could be achieved in a fractional reserve-banking regime via control of an exogenously determined stock of high power money.

- **Classical Theory of Interest Rate**

Developed by Irving Fisher in 1930, this theory concerns the determinants of the pure or risk-free interest rate. The theory argues that households control the rate of interest in an economy through savings. Savings is what is left from an individual's income after consumption spending (Keynes et al., 1936). Through saving, a household foregoes current consumption. Amount to save is controlled by the individual's target, the size of income and future income expectations (Bullard et al., 1991). The higher an individual's income, the higher they save (Karoki, 2013)

According to the theory, the attractiveness to save is brought about by the level of interest rates in an economy. The theory further explains that a household has to be rewarded for foregoing current consumption and choosing to save and the higher the reward in form of interest, the higher the amount set aside in form of saving (Neely, 2001). This is called substitution effect.

- **Conceptual Framework**

The aim of this study is to look at the real estate residential property pricing and its determinants. The figure 2.1 below demonstrates the relationship between the independent variables and the dependent variable.

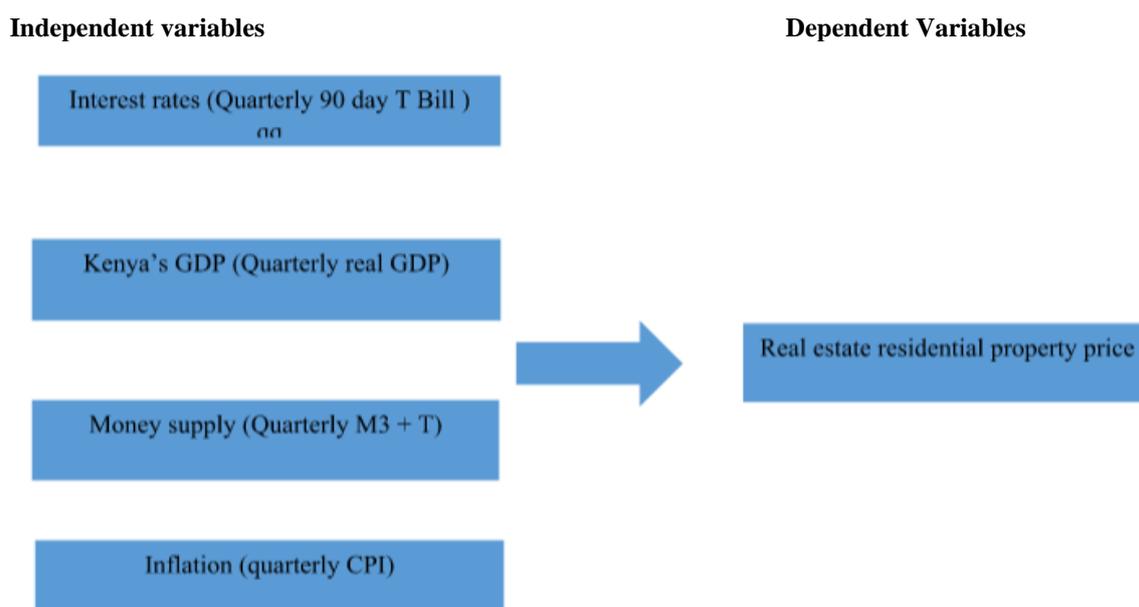


Figure 2.1: conceptual framework

2.3.1 Interest Rates

The researcher settled on the 90 day treasury bills. The choice was driven by the fact that the CBK capped the lending rates to 4% above the CBR rate. This has been ongoing for the last two years hence making the bank rates stable. This was quarterly data that was found in the CBK reports.

2.3.2 Gross Domestic Product

The research used the real GDP rates provided by the KNBS. Reason for the use of real GDP is because it has been adjusted for inflation. This was quarterly data.

2.3.3 Money Supply

Money supply used by the researcher was the broadest classification M3 + T. This was chosen since it is the broadest classification hence comprehensive. This was quarterly data.

2.3.4 Inflation

The inflation measure used was the Consumer Price Index and the data was available in the KNBS reports. The data was quarterly data.

- **Empirical Review**
- **Interest rate and real estate pricing**

Despite the significant impact that real estate have on communities and on the environment, the real estate sector has until recently been largely overlooked as a vehicle for Investment (Pivo, 2005). This has proliferated globally as a model for evaluating the impacts of investments not only economic returns on investments, but also the social and environmental impacts of those investments. The real estate investment has received widespread attention and significant acceptance in many countries around the world, and is just beginning to make inroads into the other sectors (Odell, 2006). As such, there is presently no standard for evaluating real estate investments for adherence to Socially Responsible practices. These two facts present another significant challenge to financing real estate. Integrating real estate investments into financial models aimed at quantifying the value of development, is critical to potential investors (Boyd, 2004). The world, real estate investment has increasingly affected the overall economy developing countries. The development of global real estate investment benefits from the liberalization and internationalization of financial market. The evaluation of market fundamentals and institutions of recipient localities are the key factors that drive the real estate market (Zhou, 2006). Global investment cost of international real estate diversification account for 68% of the market with china setting the pace with its emerging middle class. Investment in real estate has its challenges and the property market firms ought to mitigate the risks inherent in their local and domestic market. In China, real estate investment is the concern for government monopoly, while common citizens. Have no role in real estate business. Stability and affordability is more important in the real estate market than profitability (Chen, 2006) Rahman (2008) examined the causes and effects of rising prices in Australia housing market. The research findings established that for any given price level lower interest rates implied lower mortgage repayment which allowed borrowers to borrow more for a given repayment to income ratio which causes an increase in housing demand and prices other factors held constant as was the case in the 1980s. Once interest rates increases housing demand eased and prices remained steady, increased moderately or in some cases decreased steadily as was the case between 1995-2003. Goodhart and Hofmann (2008) incorporated the panel VAR to investigate the relationship between house prices, macroeconomic variables and other financial indicators in 17 industrialized countries. The variables in the study model were real GDP growth, CPI inflation, short-term nominal interest rate, house price growth, broad money growth and nominal private credit growth. The results depicted Granger-causal relationship between a majority of the variables and in particular causal relationship from interest rate to house prices and credit growth. The researchers found that a 25 point orthogonalized expansionary interest rate innovation led to a statistically significant 0.8% increase in house price.

Over the past 4-years, Kenya's inflation rate has been stable, averaging 6.2%, well within the government target of between 2.5% and 7.5%, driven by stable food prices and low oil prices. As for interest rates, taking the 91day T-bill as the benchmark, it is currently trading below its 5-year average of 9.4%. The spike in October 2015 was due to government appetite for short term funds as they were behind on their domestic borrowing and not due to underlying macroeconomic challenges. Inflation and interest rates are expected to remain stable in the medium term given (i) prudent monetary policy, and (ii) the government being at par with its domestic borrowing target for this financial year but there is still some risks given the high government borrowings.

- **Gross Domestic Product and real estate pricing**

Huang and Ma (2015) conducted a research on the influence of real estate investment and economic growth in China. A preliminary analysis on the status of real estate investment, economic growth and fixed investment was carried out to establish the relationship between real estate investment and economic growth based on input-output method and National economic accounting theory. The research findings established that the influence of real estate investment on economic growth exceeded that of economic growth on real estate investment. Moreover, money supply played an important role to increase in real estate investment. Muli (2015) carried out a study whose main objective was to examine the impact of GDP on growth of real estate investment in Kenya. The sample for the study comprised of real estate and renting business where data for annual time series on interest rate, inflation rate, population growth and GDP was obtained for the years between 1998 and

2012. The target population of the study consisted of private and public property developers. Primary data was collected from property developers both from the government and private sector, and financial institutions dealing in real estate property. Secondary data was obtained from Government of Kenya publications such as the Annual Budget and Financial Estimates, Central Bank of Kenya Annual report, Kenya Economic Survey and statistical abstracts by the Ministry of Planning National Development and Vision 2030. From the results the contribution of factors affecting real estate growth as measured by Pearson correlation coefficient suggest that GDP had the highest contribution with a value of 83%, inflation growth at 78%, interest rate at 75% and population growth at 29%. GDP growth, interest rate variation and growth in inflation were found to be statistically significant to real estate growth. The researcher recommends that policy measures geared towards improving economic growth and curbing rising inflation and interest rates should be undertaken so as to increase the level of investment. Peng et al., (2008) examined the relationship between the macro economy and property market development in China using data of 6 major cities and 25 provinces. The study sought to identify how price changes in property affected macroeconomic variables such as GDP growth, investment, consumption and bank credit expansion. The research findings established that property price growth was positive and significantly related to real GDP growth. They further assert that bank credit expansion did not play a critical role in property price inflation. Chau and Chui (2005) examined the relationship between real estate prices, real estate investment and economic growth in Hong Kong. Data was obtained from the RVD and the Census and Statistics Department of Hong Kong. The real estate investments were obtained from expenditure GDP series which was classified into private and public sectors which consisted of residential and non-residential buildings. The data series was tested for seasonality and stationarity with Granger casualty test being performed to test for lead-lag relationship. The results suggested that during the period between 1973 quarter 1 and 2003 quarter 2 there was no relationship between GDP and real estate investment which was attributed to the significant variation of project duration in Hong Kong

Over the last years, emerging markets, led by China and India, have supported global growth. Frontier markets, such as Africa, have not been left behind with strong growth in most African countries. Some of the factors supporting growth include: an improved macroeconomic environment, positive demographic trends, improved business and political climate making it easier to do business, and increased investment in infrastructure. The aforementioned factors have led to high GDP growth, which has resulted in Africa being an attractive investment destination for investors seeking high and stable long-term returns. On the other hand, most of the developed markets are still struggling with growth, with the United States of America registering about 2% GDP growth, while Europe is still stuck in an economic quagmire with little to no growth. Emerging and frontier markets such as those in Africa are now the most attractive investment destinations for investors; one of the few places where investors can access 5% to 7% GDP growth over the next 10-years.

- **Money Supply and real estate pricing**

Mahalik & Malik (2011) studied the relationship between money supply and real estate prices. In his study, he revealed that increased currency supply implies more money is chasing limited resources and therefore having an inflationary effect on the economy. According to the study, this hampers economic growth. Money growth impacts inflation developments in the long run as advocated by the quantity theory of money, according to which money growth precedes equal changes in general price level rate of growth.

- **Inflation and real estate pricing**

Inflation deprives investors of their expected profits. Inflation erodes the value of corporate earnings. Inflation favors borrowers as debt repayments are made in lower value and inflation pummels consumers especially those on fixed incomes by depressing the purchasing power of their incomes. In an effort to quiet their uneasiness, investors are reexamining the capacity of various asset types to offer inflation protection, should inflation become problematic. Conventional wisdom and some solid historical research show that real estate does indeed offer inflation protection. Arnason and Persson (2012) conducted a study whose main objective was to analyse Swedish real estate's and other Swedish financial assets capability to hedge inflation. The researchers conducted a linear regression analysis and correlation analysis with inflation being measured from three perspectives: actual inflation, unexpected inflation and expected inflation. Data on inflation was collected for the period between 1993 and 2011. The research findings establish that none of the exposures of real estate are a hedge against expected, unexpected and actual inflation. Moreover, stocks and bonds had a negative relation to inflation while gold depicted a partial hedge against inflation. The researchers further assert that real estate in Sweden does not offer a hedge against inflation and instead they suggest that real estate is instead driven by business cycles, accessibility to financing and interest rates as opposed to inflation. Burdekin and Tao (2012) conducted a study on the relationship between house prices, share prices and the macroeconomic variables which was examined using vector autoregressive (VAR) framework. The paper used data collected between 1999-2011 to examine the possible linkages between lending activity, real estate prices,

stock prices and inflation. The research findings established that house prices respond to liquidity and lending rates along with evidence of cointegration of stock prices and housing prices. House price inflation was found to consistently impact the overall inflation rate in China based on causality testing and VAR estimation. Nguyen et al., (2008) conducted a study which sought to establish whether real estate investment hedges expected and unexpected return in Taiwan. Data was collected between 1991 and 2006. The research findings revealed that a negative relationship between housing returns and both expected and unexpected returns proving the ineffective inflation hedge in Taiwan. Khil and Lee (2013) conducted a study on stock returns, housing returns and inflation in US, UK and Korea. The study used a bivariate model identification of positive and negative shocks to inflation. The research findings established that housing returns cause inflation and its dynamic net effect was found to be significantly positive in all three countries.

Governments in various African countries are taking measures to anchor inflationary pressures and keep inflation within stipulated limits. Fiscal restraint, independence and disciplined monetary policy has also created a sustained disinflationary trend. Specifically, the adoption of monetary growth rules and inflation targeting many countries has provided a more stable anchor for inflation expectations.

- **Critique of literature**

The literature in this study was comprehensively reviewed. The research dwelled on the secondary data available, publications and existing documents that supported the study. Relevant studies were reviewed thoroughly by the researcher. The references were critically analyzed and the results from each of the studies undertaken were thoroughly compared and contrasted. From the problem being investigated, to find out the selected macro-economic determinants of real estate residential property pricing in Kenya, it was evident that there was need for further research in order to link variables together.

The greatest limitation of the study was unavailability of a variety of housing prices data. The researcher only used one source for these data since it was the only one available. The real estate company that had the data published however had composite data that was a compilation of data found from over 10 other real estate companies.

The study was also limited to a 10 year span, which is a considerable short duration. However the last 10 years have seen the real estate market in Kenya grow fastest hence need for a proper research that concentrates on the 10 years.

- **Summary**

In conclusion, there is wide literature to support residential estate pricing. The price theory explains the role of prices in an economy. The economic growth attempts to explain the link between economic growth and real estate prices and classical theory of interest rates come in and explain how interest rates in terms of mortgage repayments affect the property pricing. The structural model of the housing market and the real estate valuation theory try to explain real estate pricing from different aspects and provide good basis for empirical studies.

- **Research Gaps**

This study identified interest rates, Kenya's GDP, money supply and inflation as determinants of real estate residential property pricing. Studies done locally by Oloke & Olwale (2017); Omboi & Kigige (2011) and international ones by Stohldreier (2012) and Borowiecki (2009) studied the factors that determine housing prices. Omare (2015); San (2013) and Gathuru (2014) all studied the correlation linking microeconomic variables to house pricing. From the reviewed studies, it was evident that the factors affecting real estate pricing have been studied.

While real estate continues to impact significantly in Kenya, most of the studies done revolved around demand and inflation. The Kenyan real estate market has however changed since the last study was done. The residential property market has had major fluctuations. The price dynamics have gone against the traditional theories in place. Introduction of alternative building technology that is different from the old methods, capping of the interest rates, introduction of affordable housing as one of the government's big 4 agenda, introduction of REITs among other changes have shaken the real estate market prices. This study therefore seeks to find out the strengths of the relationship between the dependent and independent variables and study further the relationship between housing prices and cost of construction, as very little studies on that has been done locally on that. This study also chose to dwell on the upper middle income housing category, which is different from all the studies that have been done locally as they all dwelt on real estate in general.

III. Research Methodology

3.1. Introduction

This chapter contains the research design, defines the population of the research. It also contains the sample design and data collection procedures used. Data analysis method used together with the analysis model were also outlined here.

3.2. Research Design

A research design is a plan to guide the researcher in gathering, analyzing, and interpreting observed facts (Orotho, 2003). The study used descriptive research design. Descriptive research design allows the researcher to study the sample or population by collecting reliable data (Mugenda & Mugenda, 1999). According to Zinkmund (2010), descriptive research studies are based on some previous understanding of the nature of the research problem. This is a survey research that explored the existing status of the variables at a given point in time. This research design method was settled on by the researcher because it allowed for careful studying and comparison of the research findings. This design enabled the researcher to obtain data for analysis.

3.3. Target Population

This is the total number of items in a research from which samples may be obtained (Ngechu 2004). Nairobi has a total of 93 residential estates. These estates were further divided into the low-income estates, low middle income estates, upper middle income estates and the high end estates. In this study, the researcher used quarterly secondary data from KNBS, Hass Consult and NCA from 2009 to 2018. The total number of observations on each variable was 40.

3.4. Census Design

This is the inclusion of all the members of the study in a unit of analysis (Karoki, 2015). From the population frame, the required elements will be selected to make the sample. An entire market census study was conducted during the research and data collection. The study covered the average real estate prices in Kenya. This was opted in order to eliminate sampling errors and sampling bias. Concentration on the whole market also ensured that we got an average representation of the whole market.

3.5. Data Collection

The study used secondary data and the researcher got the residential property pricing from Hass Consult quarterly reports of between 2009 - 2018. The duration was settled on as this is the time Hass Consult started publishing real estate price comparison reports and the 2019 Q3 and Q4 data had not yet been published. These reports gave the mean prices of housing units in the areas of the study. Data on inflation, interest rates, Kenya's GDP and money supply were obtained from CBK and KNBS quarterly reports of between 2009 – 2018.

3.6. Data Processing and Analysis

Data analysis involves methodically using statistical and / or logical techniques to expound, assess and summarize data. Regression analysis and correlation analysis was used to analyze the data using the statistical package for social sciences (SPSS).

3.6.1. Analytical Model

Multiple linear regression model was adopted for the study. The model was as follows ;

$$Y_t = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + E$$

Where ;

Y_t = Residential real estate pricing

X_1 = Interest rates

X_2 = Kenya's GDP

X_3 = Money supply

X_4 = Inflation

B_0 = Constant

$B_1 - B_4$ = Coefficient of the regression equation

E = Probable error

3.6.2 Variable Measurement

This is the quantification of data (Mohammed 2015). The data collected was continuous and a regression model was used to explain the relationship between dependent and independent variables.

3.6.3 Diagnostic Test

This is a scientific method in a research study that creates awareness of the existing knowledge in a particular line of study and researches further on that field and compares it to results found in previous studies (Mohammed, 2015). This study was diagnostic in nature.

IV. Data Analysis, Results And Interpretation

4.1. Introduction

This chapter analyses the data collected on the selected determinants and interprets the results analyzed. The data in this chapter was collected from the quarterly published reports of between 2009 to 2018 from various sources. KNBS, CBK and Hass consult were the data sources. The sources was settled upon by the researcher as the firms produce the most trusted data. The collected data was then processed into information using statistical package SPSS to bring out a clear relationship between variables. Both inferential statistics and descriptive statistics were used during data presentation.

4.2.1. Residential real estate property prices

Below is a graphical representation of the data above



Figure 4.1: Annual average house prices (KSh '000,000)

The figure above shows the real estate property prices trend in the last 10 years. The source of the data was Hass consult. The housing prices was the average purchasing price of the houses in Kenya and was in millions. The data was quarterly data hence clearly showing the movement in the prices. From the above diagram there has been an increase in housing prices over the last 10 years. The trend starts with a recording of 17.09M in the 1st quarter of 2009. As at the end of 2018, the prices had risen to 31.32M. During the study span, 3rd quarter of 2010 recorded the highest price of 30M and the 1st quarter of 2009 recorded the lowest price of 17M.

4.2.2. Annual average interest rates

Below is a graphical representation of the above data.

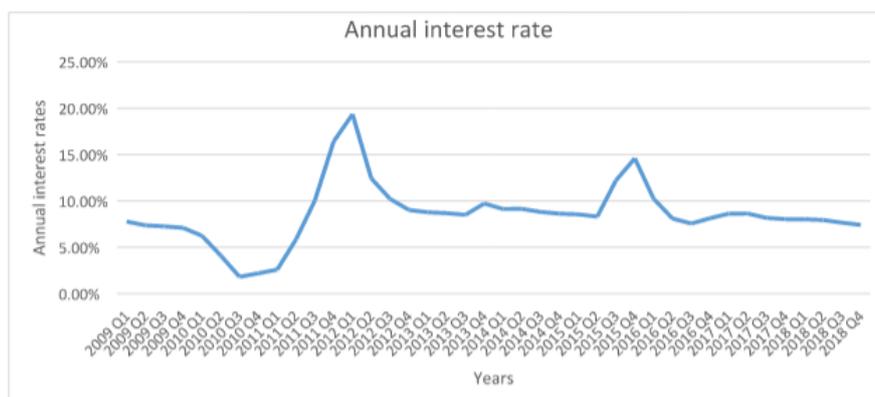


Figure 4.2 Annual average interest rate (%)

The diagram shows the average interest rate on a quarterly basis between the year 2009 – 2018. Interest rates data was collected from the CBK reports under the 90 day treasury bill section. In the 1st quarter of 2009, the rate was at 7.77% p.a. By the 4th quarter of 2018, the rates was at 7.42% p.a. During the 10 year period, the rates kept on fluctuating. 1st quarter of 2012 recorded the highest rate of 19% during the research span while 3rd quarter of 2010 recorded the lowest return of 1%

4.2.3. Average annual Gross Domestic Product

Below is a graphical representation of the data.

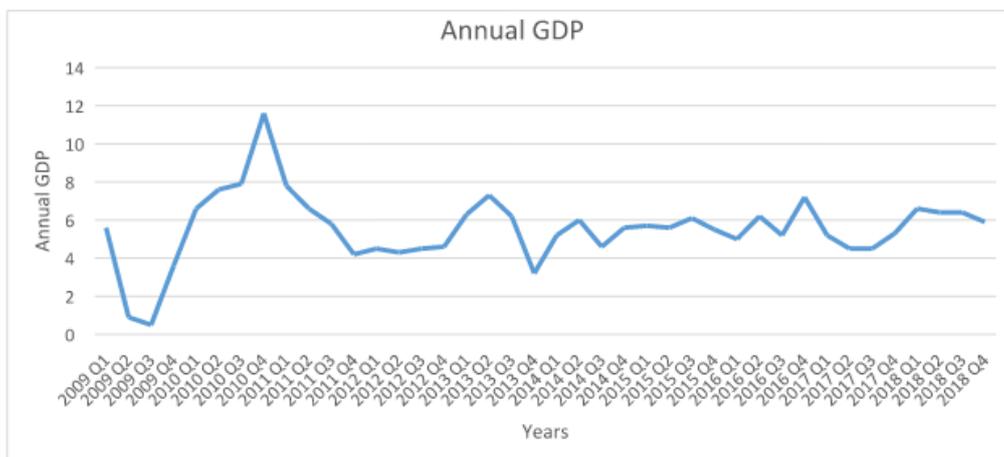


Figure 4.3: Average Annual gross domestic product (‘000,000)

The diagram shows the average annual GDP on a quarterly basis between the year 2009 – 2018. The GDP data was collected from the KNBS publications. In the 1st quarter of 2009, the GDP was 5.6. As at the 4th quarter of 2018, the GDP was at 5.9. 4th quarter of 2010 recorded the highest rate of 11 during the research span while 3rd quarter of 2009 recorded the lowest return of 0.5 %.

4.4. Average annual money supply

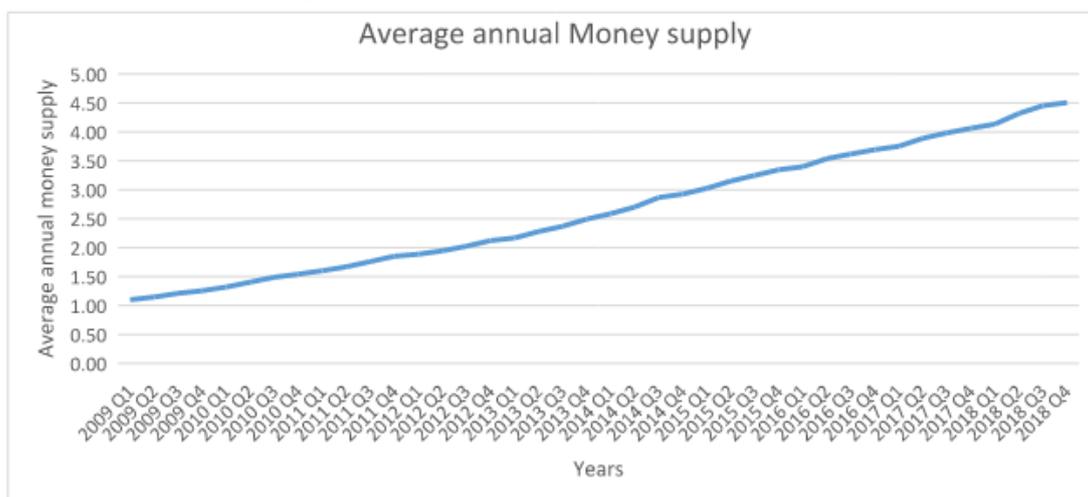


Figure 4.4 Average annual money supply (‘000,000)

The diagram shows the money supply on a quarterly basis between the year 2009 – 2018. These was measured using the broadest money classification by the CBK. Money supply has been on a steady increase over the years. The beginning of 2009 recorded money supply level of 1.10. As at the end of 2018, the levels were at 4.51. Money supply grew gradually over the 10 year period.

4.5. Average annual inflation

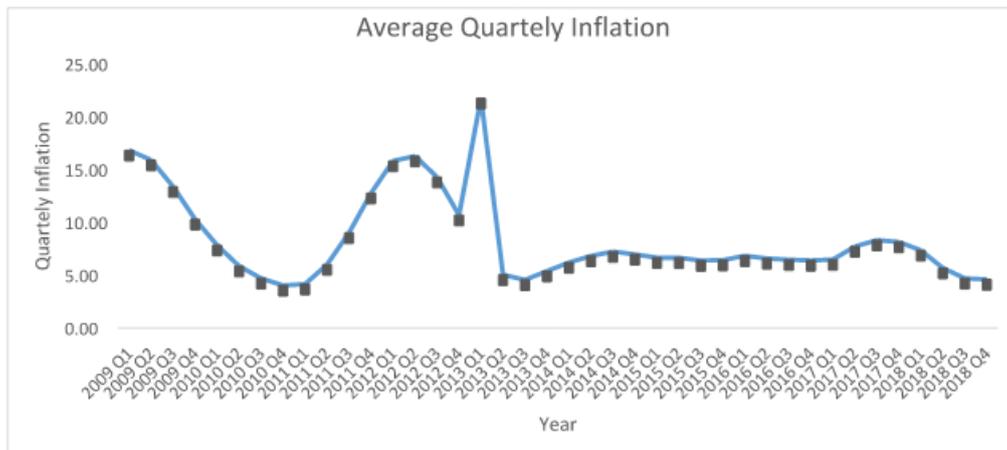


Figure 4.5: Annual average inflation (%)

The diagram shows the average interest rate on a quarterly basis between the year 2009 – 2018. The data was measured using the consumer price index and was gathered from the KNBS publications. The 1st quarter of 1009 recorded an inflation rate of 16.83%. 10 years later, in the 4th quarter of 2018, the rates were at 4.06%. 1st quarter of 2013 recorded the highest rate of 21% during the research span while 4th quarter of 2010 recorded the lowest return of 3%. In the 10 year research period, the rates kept on fluctuating.

4.6. Descriptive statistics

Descriptive Statistics			
	Mean	Std. Deviation	N
Average Prices	25.6525	4.59018	40
Interest Rates	8.5892%	3.27136%	40
GDP	5.5575	1.83162	40
Money Supply	2.6459	1.05290	40
Inflation	8.4368	4.20283	40

Table 4.1: Descriptive statistics

The table above provides the means, standard deviations, and group sizes(N=40) Quarterly data between 2009-2018 for the dependent variable, real estate prices and the 4 independent variables Interest rates, Kenya’s GDP, Money supply and Inflation. Real Estate price has a mean value of 25M and the standard deviation of the data is 4.49. The Interest rate has a mean value of 8.58 and the standard deviation of the data is 3.27. Data collected on GDP gave a mean value of 5.50 and a standard deviation of 1.83. Money Supply gave a mean value of 2.65 and a standard deviation value of 1.05. Inflation gave an average value of 8.44 and a standard deviation of 4.20. The data was quarterly data over a period 10 years hence a total of 40 market observations.

Correlations						
		Average Prices	Interest Rates	GDP	MS	Inflation
Pearson Correlation	Average Prices	1.000	.051	.310	.915	-.501
	IR	.051	1.000	-.428	.136	.406
	GDP	.310	-.428	1.000	.086	-.496
	MS	.915	.136	.086	1.000	-.422
	Inflation	-.501	.406	-.496	-.422	1.000
Sig. (1-tailed)	Average Prices	.	.377	.026	.000	.000

	IR	.377		.003	.201	.005
	GDP	.026	.003		.298	.001
	MS	.000	.201	.298		.003
	Inflation	.000	.005	.001	.003	
N	Average Prices	40	40	40	40	40
	IR	40	40	40	40	40
	GDP	40	40	40	40	40
	MS	40	40	40	40	40
	Inflation	40	40	40	40	40

Table 4.2 : Correlations

Correlations in the main diagonals are all equal to 1, indicating that the dependent variable, real estate prices in perfectly correlated to itself.

Correlation between Price and Interest Rate is $r = 0.051$, indicating that there is a very weak positive correlation between the real estate prices and Interest rates. Considering p value of 0.05, the p value for real estate prices and Interest rate is ($P > 0.05$). This proves that the correlation is not statistically significant meaning that there is no enough evidence to that the correlation between the 2 variables exist.

The correlation between real estate prices and GDP is $r = 0.310$, which indicates a weak positive correlation between real estate prices and GDP. The p value < 0.05 , indicating that the correlation between real estate prices and GDP is statistically significant, therefore enough evidence to prove that the correlation exists in the population

The correlation between real estate prices and Money Supply is $r = 0.915$. This indicates a strong positive correlation between real estate prices and Money Supply. The p value < 0.05 , indicating that the correlation between real estate prices and GDP is statistically significant, there is enough evidence to prove that the correlation exists in the population

The correlation between real estate prices and Inflation Rate is $r = -0.501$. This indicates a strong negative correlation between real estate prices and Inflation Rate. The p value < 0.05 , indicating that the correlation between real estate prices and GDP is statistically significant, there is enough evidence to prove that the correlation exists in the population

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Inflation, Interest Rates, Money Supply, GDP ^b		Enter
a. Dependent Variable: Average Prices			
b. All requested variables entered.			

Table 4.3: Variables entered / removed

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.945 ^a	.893	.881	1.58306	.893	73.222	4	35	.000
a. Predictors: (Constant), Inflation, Interest Rates, Money Supply, GDP									

Table 4.4: Model summary

Taking into consideration all the variables, interest rates, GDP, money supply and inflation; correlation coefficient ($R^2 = 0.893$) meaning that 89.3% of variation in real estate prices can be attributed to changes in Average inflation, Average interest rates, Average money supply and GDP

ANOVA Analysis Results						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	734.006	4	183.502	73.222	.000 ^b

Effects of Macro-Economic Variables on Real Estate Residential Property Prices in Kenya.

Residual	87.713	35	2.506	
Total	821.720	39		
a. Dependent Variable: Average Prices				
b. Predictors: (Constant), Inflation, Interest Rates, Money Supply, GDP				

Table 4.5 ANOVA

ANOVA, the regression model $F(4,35) = 73.222$, $p < 0.05$ meaning that the correlation coefficient ($R^2 = 0.893$) is significant proving the strong relationship between the dependent variable, real estate prices and independent variables Average inflation, Average IR, Average MS, GDP .

Table 4.6 OLS

Model 4: OLS, using observations 2009:1-2018:4 (T = 40), dependent variable: Average Price

HAC standard errors, bandwidth 2 (Bartlett kernel)

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
Const	1.06813e+06	3.63635e+06	0.2937	0.7707	
Average GDP	2.74906e+06	767418	3.582	0.0010	***
MS	5.41271	0.314543	17.21	<0.0001	***
Inflation	39969.8	36632.3	1.091	0.2827	
Interest rate	-251386	116380	-2.160	0.0377	**

Mean dependent var	25650887	S.D. dependent var	4588579
Sum squared resid	1.04e+14	S.E. of regression	1725525
R-squared	0.873092	Adjusted R-squared	0.858588
F(4, 35)	157.8086	P-value(F)	7.12e-22
Log-likelihood	-628.5286	Akaike criterion	1267.057
Schwarz criterion	1275.502	Hannan-Quinn	1270.110
Rho	-0.107239	Durbin-Watson	2.206498

White's test for heteroskedasticity -

Null hypothesis: heteroskedasticity not present

Test statistic: LM = 16.2814

with p-value = $P(\text{Chi-square}(14) > 16.2814) = 0.296491$

Non-linearity test (logs) -

Null hypothesis: relationship is linear

Test statistic: LM = 6.24868

with p-value = $P(\text{Chi-square}(4) > 6.24868) = 0.18133$

LM test for autocorrelation up to order 4 -

Null hypothesis: no autocorrelation

Test statistic: LMF = 0.259994

with p-value = $P(F(4, 31) > 0.259994) = 0.901298$

Variance Inflation Factors

Minimum possible value = 1.0

Values > 10.0 may indicate a collinearity problem

Average GDP 1.640
 MS 1.475
 Inflation 2.106
 Interest rate 2.313

VIF(j) = 1/(1 - R(j)²), where R(j) is the multiple correlation coefficient between variable j and the other independent variables

Summary

Model	Unstandardized Coefficients		Coefficients ^a		T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta				Lower Bound	Upper Bound
1	(Constant)	11.983	1.807		6.632	.000	8.314	15.651
	Interest Rates	.066	.094	.047	.701	.488	-.125	.257
	GDP	.596	.167	.238	3.579	.001	.258	.935
	MS	3.813	.286	.875	13.315	.000	3.232	4.395
	Inflation	-.036	.083	-.033	-.429	.671	-.205	.134

a. Dependent Variable: Average Prices

Table 4.7: Coefficients

The researcher up with a regression equation to define our data using β values :

$$RE\ prices = 11.983 + (0.505 * Average\ IR) - (0.596 * GDP) + (3.813 * MS) - (0.036 * inflation)$$

The standardized coefficients, Beta, is used to determine how the variables contribute to the regression model. This is irrespective of the signs. From table 4.6, it shows that Money Supply contributes the most and Inflation contributes the least to the regression model.

P values for Money supply, GDP and Inflation are (P<0.05), indicating that they are statistically significant hence has a contribution to the prediction model

P values for Interest rate are (P>0.05), indicating that they are statistically insignificant hence has no contribution to the prediction model

Using the Std. Errors, we are 95% confident that the β values for the coefficients will be within the following range for each variable:

- Constant (8.314, 15.651)
- Average IR (-.125, 0.257),
- GDP (.258, 0.935),
- Money Supply (3.232,4.395)
- Inflation (-0.205, 0.134).

V. Summary Conclusions And Recommendations

5.1. Introduction

The study sought to find out effects of macroeconomic variables on the real estate property prices in Kenya. The study compares the relationship between real estate prices to Kenya’s GDP, interest rates, money supply and inflations rates in Kenya. This chapter gave a summary of the findings deducted from the data collected and analyzed. Conclusions on the study were also made on this chapter and recommendations on the same were made. The researcher has also suggested areas that need further studies and research for clearer and better understanding of the real estate industry.

5.2 Summary of Findings

The findings are based on the research objectives of the study. The study aimed on finding the effects of macroeconomic variables on real estate property prices. The findings revealed that there is a correlation between the dependent and the independent variables. These relationships however are of different strengths and directions and depend on each particular independent variable.

From the study’s descriptive statistics, average real estate property prices rose from 19M in 2009 to 31M. Over the years interest rates fluctuated with the highest year being 2012 where the rates hit 12.75% and

the lowest year was 2010 where the rates went to 3.59%. Annual GDP has also been fluctuating over the years with the highest point being 2010 at 8.4% and lowest point being 2009 at 2.7%. The average annual money supply has been on a constant rise over the years and as at the end of 2018 it was at 4.3M. The average annual rate of inflation has been fluctuating over the years with the highest being 2011 where the rates were at 13.98% and the lowest being 2010 at the rate of 3.97%.

5.2.1 Interest Rates and Real Estate Prices

The first objective sought to find out the effect of interest rate on real estate property prices in Kenya. Results of the study and analysis recorded a positive correlation between interest rates and real estate property prices. Correlation between Price and Interest Rate is 0.051, indicating that there is a very weak positive correlation between the real estate prices and Interest rates. This means that variable interest rate in the study had an effect on the real estate residential property prices. The effect is however very minimal as explained above.

These results were in agreement with (Alma, 2009; Alman and Udin, 2009) who found a positive effect of interest rate on real estate prices growth rate. These results were in agreement with the past studies because the current study evaluated the effect of 91 day Treasury bill rate, which ought to have an inverse relationship since when the Treasury bill rate increases then investors may tend to switch from real estate to government short term borrowing. This was however in contrast with another study. There were a negative influence of growth rate and interest rate (Hsing, 2004).

5.2.2 GDP and Real Estate Prices

The second objective of the study sought to examine effect of GDP on residential real estate property prices. Results of both regression analysis and correlation showed a positive and significant relationship between real estate prices and GDP. The correlation between real estate prices and GDP is 0.310, which indicates a weak positive correlation between real estate prices and GDP. 1 unit increase in GDP results into an increase in real estate prices by 0.310. This means that the variable GDP has an effect on real estate residential property prices in Kenya. The effect is not so strong however.

These findings were in agreement (Tursoy, Gonsel and Rjoub, 2008; Osamuonyi and Evbayiro, 2012) who found positive relationship between GDP and growth rate

5.2.3 Money Supply and Real Estate Prices

The correlation between real estate prices and Money Supply is 0.915. This indicates a strong positive correlation between real estate prices and Money Supply. 1 unit increase in Money Supply results into an increase in real estate prices by 0.915. This means that the variable money supply has an effect on real estate property prices. The impact is strong as a small change in money supply causes a change in property prices. When the economy has an increase in money circulation, then the same is felt in real estate property prices.

5.2.4 Inflation and Real Estate Prices

The fourth objective of the study sought to examine the effect of inflation rate on real estate growth rate. The correlation between real estate prices and Inflation Rate is -0.501. This indicates a strong negative correlation between real estate prices and Inflation Rate. 1 unit increase in Inflation Rate results into a decrease in real estate prices by -0.501. This means that inflation a negative relationship with real estate property prices. These findings were in agreement with (Choundhry, 2001; Maswere and Kaberuka, 2013), both found that inflation rate had positive effect on real estate growth

5.2. Conclusion

From the foregoing results we can conclude that there was a positive effect of interest rate on real estate growth. This implies that the more the government borrows on short run locally it discourages real estate growth rate since there are increased borrowing charges thus the government should devise measures of borrowing externally as such to promote real estate growth. Secondly, the results revealed that GDP had a positive influence on real estate growth rate. This implies that in order for the country to ensure that positive strides are made in relation to real estate then GDP acceleration strategies should be pursued which will ensure that the real estate grows at faster rates. Finally, inflation rate influence real estate growth rate positively. This implies that there an increase in inflation rate increases growth rate, there are various factors which influences an increase in inflation. An increased amount of money borrowed increases inflation though in most cases real estate is financed using debt financing. There is need to control inflation levels as such to eliminate the chances of increased cost as real estate grows. Interest rates, GDP, money supply and inflation have been changing over the years. Residential real estate property prices have also been changing since 2009. The study sought to find out whether the dependent variables and independent variables have a relationship, hence the data collection,

analysis and interpretation. From the study, it is clear that all the macroeconomic variables have an impact in the residential real estate property prices. The different variables have different effects on the dependent variables. There was a moderate positive relationship between prices and interest rates. There is a strong positive relationship between prices and GDP. There is also a strong relationship between prices and money supply. The relationship between inflation and prices is a weak negative relationship.

5.3. Policy recommendations

From the foregoing results the study recommends that; the foreign exchange policy ought to be determined by the forces of demand and supply, thus the status quo remains as such to attract investment in the real estate segment. Secondly, the both national and county government ought to be discouraged from borrowing locally as such to increase the prospect of real estate growth. Thirdly, there is need to devise measures and mechanisms of improving the GDP so as to ensure there is a positive trend in the real estate sector. Finally, measures ought to be taken as such to control the level of inflation even if it increases the prospect of real estate growth.

The government should work on availing data on real estate property prices. The data available is inconsistent and very inadequate. The data is very important for policy making as well as for investors' decision making. For policy making, when one variable clearly has a very strong correlation with real estate property prices, then the government should be able to intervene and protect the citizens from getting exploited and spending a lot of money when interested in getting a real estate unit. The government can also regulate the real estate market in order to cushion the citizens from exploitation and from investing into substandard property.

Availing data on residential real estate property prices will be helpful to the investors as they will be able to predict the returns in a year or two if all other factors are held constant. They may be able to know the exact areas that they can invest in to maximize the highest returns, the exact unit typology that is under the highest demand and has the highest rental yields. This will enable the investors make decisions on calculated risks.

Both local and international investors can also use these findings to make decisions on whether the returns they aim at making can be attained through investing in real estate. They can use the trends to predict the future returns and plan around debt payment, best times to get into the industry and best times to exit the industry.

Financial sector players can also use the information from this research to make policies and regulations revolving around the sector. The banking sector can use the data to formulate funding policies for developers, mortgages to aspiring home owners. With the data they would tell the best repayment periods for the specific kind of borrower.

5.5. Suggestion for further research

Future research should adopt the use of primary data to examine the determinants of real estate growth in Kenya. From this study it would be appropriate to retrieve first-hand information from those who are actively involved real estate development and also gather information from those who benefits from real estate investment in Kenya.

In addition, the government has a role in promoting real estate growth more so it ought to ensure that all are housed in good housing conditions. Through government planning, future studies ought to examine the role of government on real estate development and what it can do as such to trigger faster growth and development in the real estate sector. The research shows that the relationship between inflation and prices is negative which contradicts most studies. Previous study on the same have given the same results but very little explanation have been given to explain the findings. Further studies on the area can be done in order to explain in details the findings.

The research only covered four macroeconomic variables, interest rates, GDP, money supply and inflation. Further research on the other variables like unemployment and exchange rates among other variables should be done in order to exhaust on the factors that affect residential real estate property prices in Kenya. Further studies can also be done on microeconomic factors in order to comprehensively exhaust the factors that affect the residential real estate pricing in Kenya.

Further research and publications on the real estate property prices should be done and the results should be published by the government in order to ease future research that revolve around these prices. These data is useful to a lot of players, both internationally and nationally

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APPENDICES

Appendix 1: Data Sheet

The table below was used to collect data from the Hass consult composite index, KNBS, CBK and other minor journals and publications.

<u>Year</u>	<u>Average Prices</u>	<u>Interest Rates</u>	<u>GDP</u>	<u>Money Supply</u>	<u>Inflation</u>
2009 Q1	17.09	7.77%	5.6	1.10	16.83
2009 Q2	17.56	7.37%	0.9	1.15	15.92
2009 Q3	18.20	7.26%	0.5	1.21	13.39
2009 Q4	19.16	7.10%	3.6	1.26	10.30
2010 Q1	19.21	6.25%	6.6	1.32	7.85
2010 Q2	19.24	4.12%	7.6	1.40	5.87
2010 Q3	19.62	1.82%	7.9	1.49	4.71
2010 Q4	30.93	2.20%	11.6	1.54	4.03
2011 Q1	21.64	2.61%	7.8	1.60	4.16
2011 Q2	22.22	5.85%	6.6	1.67	6.01
2011 Q3	22.25	10.05%	5.8	1.76	9.02
2011 Q4	21.95	16.41%	4.2	1.85	12.78
2012 Q1	22.03	19.35%	4.5	1.89	15.83
2012 Q2	22.48	12.43%	4.3	1.95	16.29
2012 Q3	23.55	10.22%	4.5	2.03	14.30
2012 Q4	24.03	9.03%	4.6	2.12	10.70
2013 Q1	24.15	8.78%	6.3	2.17	21.77
2013 Q2	24.87	8.68%	7.3	2.28	5.04
2013 Q3	25.24	8.51%	6.2	2.37	4.56
2013 Q4	24.99	9.73%	3.2	2.49	5.39
2014 Q1	25.49	9.13%	5.2	2.59	6.20
2014 Q2	25.64	9.14%	6	2.70	6.83
2014 Q3	26.44	8.82%	4.6	2.87	7.24
2014 Q4	27.07	8.63%	5.6	2.93	6.98
2015 Q1	26.97	8.56%	5.7	3.02	6.67
2015 Q2	27.56	8.31%	5.6	3.15	6.66
2015 Q3	27.95	12.24%	6.1	3.25	6.39
2015 Q4	28.55	14.60%	5.5	3.35	6.44
2016 Q1	29.75	10.24%	5	3.40	6.84
2016 Q2	30.82	8.11%	6.2	3.54	6.59
2016 Q3	31.19	7.57%	5.2	3.62	6.47
2016 Q4	31.22	8.14%	7.2	3.69	6.40
2017 Q1	31.16	8.64%	5.2	3.75	6.48
2017 Q2	30.22	8.64%	4.5	3.89	7.72
2017 Q3	29.68	8.17%	4.5	3.98	8.32
2017 Q4	29.98	8.04%	5.3	4.06	8.15
2018 Q1	30.70	8.03%	6.6	4.14	7.36
2018 Q2	31.80	7.94%	6.4	4.32	5.68
2018 Q3	32.15	7.66%	6.4	4.45	4.70
2018 Q4	31.32	7.42%	5.9	4.51	4.60

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