AN EVALUATION OF THE EFFECT OF MACROECONOMIC FACTORS ON THE RETURNS OF THE REAL ESTATE MARKET IN NAIROBI

BY

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ADMISSION NUMBER 110387

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR COMMERCE AT STRATHMORE UNIVERSITY.

STRATHMORE UNIVERSITY BUSINESS SCHOOL

STRATHMORE UNIVERSITY

NAIROBI, KENYA

OCTOBER, 2021

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the research proposal contains no material previously published or written by another person except where due reference is made in the research proposal itself.

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ACKNOWLEGEMENTS

I would like to thank everyone who helped me and supported me throughout the research process. My supervisor Mr. John Waweru, for his guidance over the full duration of my research which enabled me to complete my project in good time. I am grateful to my family and colleagues who supported and assisted me during my research period. I am grateful to Strathmore University for providing me with the knowledge required to carry out the research process prior and during the research period.

DEDICATION

This study is dedicated to the Almighty God for helping me reach this far in the research project and moreover to my family and friends for assisting me through the difficult times that occurred during the period.

ABSTRACT

Kenya's real estate sector has undergone a boom that began in the mid to late 2000s as the property market adapted to growing demand. Nairobi was named the fastest-growing real estate market in the world by real estate management firm Knight Frank in its 2012 Wealth Report, outperforming cities like Miami. Since 2000, property values have climbed 4.44 times. The real estate sector is pivotal to the development of any home nation. Property prices, in specific, are affected by changes in macroeconomic variables for example GDP, interest rates, inflation, money supply and unemployment. Kenya's real estate market is growing swiftly in comparison to other African emerging countries, despite high inflation, high unemployment, high interest rate volatility, and other economic obstacles. The study sought to evaluate the effect of macroeconomic factors on the returns of the real estate market in Nairobi, Kenya. Specifically, the study sought to examine the effect of inflation on the returns in the real estate market in Nairobi; to evaluate the effect of GDP on the returns in the real estate market in Nairobi; to assess the effect of interest rates on the returns in the real estate market in Nairobi and to establish the effect of money supply on the returns in the real estate market in Nairobi. The study included household income as a moderator variable. The study was anchored on the modern portfolio theory as well as the arbitrage pricing theory. A descriptive research design was used in the study. Secondary data from the Central Bank of Kenya, KNBS and Hass Consult Index was used. The study found that interest rate and property rates were positively and significantly related (β=0.692, P=0.007) and that money supply has a positive and significant effect on property prices (β=0.321, P=0.000). Also, economic growth (GDP) was positively and significantly related to property prices (β=0.326, P=0.015). In addition, inflation was found to have a positive and significant effect on property prices in Nairobi (β=0.298, P=0.004). Finally, household income was positively and significantly associated with property prices in Nairobi (β=0.285, P=0.008). The research study concluded that inflation, GDP, interest rates, money supply and household income all have a positive and significant effect on the returns of the real estate market in Nairobi.

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LIST OF ABBREVIATIONS

APT	Arbitrage Pricing Theory
ANOVA	Analysis Of Variance
CAPM	Capital Asset Pricing Model
CBK	Central Bank of Kenya
GDP	Gross Domestic Product
HI	Household Income
KNBS	Kenya National Bureau of Statistics
MPT	Modern Portfolio Theory
I-REIT	Income-Real Estate Investment Trust
ROI	Return on Investment

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Real estate is typically defined as structures and buildable land, which includes offices, industrial buildings, warehouses, multifamily buildings, and retail space. Property, as well as any permanent improvements related to the land, whether natural or man-made, such as water, trees, minerals, buildings, dwellings, fences, and bridges, is referred to as real estate (Safia, 2015). Vehicles, yachts, jewels, furniture, and farm equipment are examples of personal property that are not permanently tied to the land. Real estate is a fascinating topic of study that gives investors the knowledge they need to make informed decisions about real estate construction, purchase, usage, and disposal.

Real estate is classified into five segments; Residential real estate is property that is used solely for residential purposes. Single-family homes, condos, cooperatives, duplexes, townhouses, and multifamily housing with fewer than five individual units are examples (Akumu, 2014). Apartment buildings, gas stations, grocery shops, hospitals, hotels, offices, parking facilities, restaurants, shopping centers, stores, and theaters are examples of commercial real estate. Industrial real estate is property used for manufacturing, production, distribution, storage, and research and development (Arte, 2017). Factories and electricity plants are two examples. Land, which consists primarily of undeveloped property, vacant land, and agricultural land (farms, orchards, ranches, and timberland). Finally, special purpose property which could well be defined as public property such as cemeteries, government buildings, libraries, parks, religious institutions, and schools.

Kenya's real estate sector has undergone a boom that began in the mid to late 2000s as the property market adapted to growing demand. Nairobi, Kenya's capital and largest city, has one of the continent's largest expatriate communities, thanks to the high number of international corporations that have selected Nairobi as their African or East and Central African center. The resurgence of real estate development in Nairobi has drawn international attention. Nairobi was named the fastest-growing real estate market in the world by real estate management firm Knight Frank in its 2012 Wealth Report, outperforming cities like Miami (Muthee, 2012). Since 2000, property values have climbed 4.44 times. According to the Hass Property Index,

Hass Consult (2020), property prices fell -1.22 percent in the last quarter and 0.17 percent fall in the last year.

Despite the sector's outstanding reputation, the market is severely lacking in terms of pricing and valuation frameworks for all types of real estate property assets. In this type of scenario, investors and purchasers have little understanding of the sector's characteristics. This is the context for a study of how macroeconomic variables significantly affect real estate property returns in Kenya.

1.1.1 Macroeconomic Variables

Macroeconomics has been defined as the study of the overall economy (Romer, 2012). Macroeconomics assesses the elements that are primarily utilized by the government in its decision-making process. Changes in these variables have a direct link with changes in the real estate sector, notably residential property prices, on a worldwide scale. Understanding crucial real estate relationships in relation to these variables is thus a strategic real estate investment decision (Lu & Tang 2014). The variables in the case of the real estate sector are inflation, GDP, interest rates and money supply.

1.1.1.1 Inflation

In economics, inflation is defined as a general rise in prices and a decrease in the purchasing power of money. When the general price level rises, each unit of currency purchases fewer products and services; hence, inflation reflects a decrease in purchasing power per unit of money (Xiao et al., 2017). This is a loss of real value in the economy's medium of exchange and unit of account. Deflation, or a sustained reduction in the general price level of goods and services, is the inverse of inflation. The inflation rate, which is the annualized percentage change in a general price index, usually the consumer price index, over time, is a standard metric of inflation (Barksenius & Rundell, 2012). Developers will invest heavily on new properties since construction materials will be highly expensive. This will undoubtedly create an increase in the price of new real estate properties. Furthermore, because of the finite supply of new constructions, the value of existing properties will soar (Gaspareeniene, Remeikiene & Skuka, 2016).

Inflation is known to have various adverse effects on the economy hence in turn it affects returns of investors in the real estate market. As a result of inflation, Developers will make significant investments in new properties as construction materials become much more expensive. The price of new real estate properties will surely rise as a result of this.

Furthermore, due to a limited supply of new buildings, the value of existing properties will surge (Gaspareeniene, Remeikiene & Skuka, 2016). Additionally, as a consequence of inflation, the country's borrowing rate will rise. This, in turn, will have an impact on investors, as they will spend their money on inflated goods and services in the country rather than investing in the real estate market (Safia, 2015).

1.1.1.2 GDP

Gross domestic product (GDP) is the total market value of all finished products and services produced in a country. It serves as a comprehensive scorecard of a country's economic health because it is a wide measure of entire domestic production (Mwangi, 2013). A change in the GDP per capita of an economy would make an impact on the returns in the real estate sector. GDP per capita generally translates into the national wealth that is inside a country's borders.

Moreover, public debt is a significant factor that tends to influence the GDP of an economy. The debt-to-GDP ratio is a measure that compares a country's public debt to its Gross Domestic Product (GDP). The debt-to-GDP ratio accurately predicts a country's ability to repay its debts by comparing what it owes to what it generates. Both internal and external debt bring out changes in the GDP of an economy (Wanyama, Byaruhanga & Ngala, 2020). An increased rate of external borrowing by the government would lead to adverse effects in the GDP of an economy.

A growth in a country's GDP leads to an increase in demand for real estate, which leads to an increase in property value as well as returns on investment in real estate properties (Mwangi, 2013). An increase in debt in the country, as a result of external borrowing of loans, leads to increased taxes on citizens in the country since the government needs to generate money to pay the loans (Wanyama, Byaruhanga & Ngala, 2020).

1.1.1.3 Interest Rates

The amount of interest due every period expressed as a percentage of the amount lent, deposited, or borrowed is referred to as the interest rate. The total interest on a lent or borrowed amount is dictated by the principal amount, the interest rate, the compounding frequency, and the length of time it is lent, deposited, or borrowed (Barksenius & Rundell, 2012). Interest rates can influence home prices in a variety of ways. Interest rates can have an impact on the cost of borrowing and mortgage rates. Changes in capital flows can also have a direct impact on a property's supply and demand dynamics (Makena, 2012).

Mortgage rates are merely among the many other interest-related factors that influence property values. Interest rates will influence property values in a variety of ways because they affect capital flows, the supply and demand for capital, and investors' expected or required rates of return on investment. Mortgage facilitates market investors' access to funds, which are repaid with interest rates, bringing in profits for mortgage institutions (Gaspareeniene, Remeikiene & Skuka, 2016).

High interest rates in an economy will generally affect returns from properties. This is because high interest rates tend to discourage potential borrowers from approaching mortgaging institutions because the payments will exceed their threshold (Barksenius & Rundell, 2012).

1.1.1.4 Money Supply

Liow, Ibrahim and Huang (2005), posit that a disproportionate increase in money supply may lead to an inflationary situation that affect investments since investors require higher discount rates. Money Supply is a standard measure of money in the economy. Increase in money supply has a direct adverse effect on real estate market as it gives rise to greater inflation uncertainty (Zheyu, 2015). According to economics, money supply is the whole reserve of currency and cash equivalent instruments that is circulating within the economy of a country at a given time. Money supply includes monetary assets such as currency, printed notes, money in checking and savings accounts as well as liquid assets held as short term investments.

Representing almost 10% of the GDP, the property market has engaged large amounts of cash. Due to the fact that there was a turnover and the market was vibrant with a quite reasonable balance of trade between construction, purchases and sales, things were moving. At the macro level, real estate is directly allied to real and financial sector. Its trend coincides with the economic expansion trend. According to Mwangi (2002), real estate investment is considered for its capability to provide returns in form of income, capital, income and any other intangible benefits (Gatauwa and Murungi, 2015). Real estate offers business investors an established basis of earnings through expected sharing of underlying rental income. Real estate investment is still a relatively emerging venture that enables individuals to own pieces of land and build residential homes in the urban and peri-urban locale.

1.1.2 Returns in the Real Estate Market

The returns in the real estate sector or market basically refers to the Return on Investment. The term ‘return on investment’ or ROI refers to how much money one makes over the duration of owning a property. Among the five segments, real estate consists of two main forms which are

residential real estate and commercial real estate. There are numerous options for investors under either category, including raw land, individual houses, apartment structures, and large commercial office buildings or shopping complexes. Investors can choose to invest directly in residential or commercial real estate or in the stocks or bonds of real estate companies. Residential real estate refers to housing units to primarily shelter individuals and families and are not intended for commercial usage (Li, 2015). In Kenya, the majority of land in towns across the country is typically used for residential purposes. These include residences that house folks who work in those towns (Makena, 2012). Commercial real estate refers to property units that are mainly intended to be utilized for business purposes (Ojetunde, 2013).

In Kenya, real estate has traditionally been a popular investment option. It provides real capital appreciation while presenting a low risk of capital loss. With the establishment of REITs in Kenya, investors can now reap a variety of benefits, making REITs an appealing alternative. Currently, in Kenya, there are around five REITs, but only one is listed on the NSE. The Stanlib Fahari I-REIT was added to the list in 2015 (Arte, 2017).

1.2 Research Problem Statement

The real estate sector is pivotal to the development of any home nation. Property prices, in specific, are affected by changes in macroeconomic variables for example GDP, interest rates, inflation, money supply and unemployment (Bulloch & Sullivan, 2010). The great deal of research on how macroeconomic variables affect house prices has been conducted in developed economies. In Kenya, demand for residential and commercial units is greater than supply, resulting in price increases over the last decade. As a result of this excess demand in the market, property prices have soared significantly fast as compared to other sector counterparts in the economy (Juma, 2014). Kenya's real estate market is growing swiftly in comparison to other African emerging countries, despite high inflation, high unemployment, high interest rate volatility, and other economic obstacles.

For the last four decades, global real estate returns have been uneven. These variations in property returns across countries have piqued the interest of researchers examining the impact of macroeconomic factors on property markets. According to Bulloch and Sullivan (2010), unemployment, interest rates, the interest rate spread, unforeseen inflation, and dividend yield have no substantial impact on the volatility of filtered residential and commercial property returns. Whereas studies done by Gram and Govekar (2016) concluded that the impact of macroeconomic factors such as labor market conditions/rate of employment, and GDP in a

number of European countries have a strong and clear positive relationship and Housing prices were found to be higher in countries where the economy was at full employment, according to the study.

The Kenyan property market has performed exceedingly well in line with global property returns. This trend has stimulated the interest of many scholars who want to know what is triggering this exceptional performance. According to Muli (2011), it was concluded that GDP, interest rates, and inflation rates were the important motivators of real estate investment. The negative impact of population increase on real estate investment was statistically insignificant. The research tackled GDP based on population but not with regards to public debt and GDP per capita. Nzalu (2013) carried out research to find out what elements are driving real estate investment growth in Kenya. As independent variables in the study, population growth, GDP, and inflation were used. Changes in inflation and interest rates have a substantial impact on real estate growth, while population increase has a negative impact on real estate growth, according to the study. The study indicated that GDP and population growth were separate variables and not factors influence each other, that is, population growth influencing GDP. Researchers Wanyama, Byaruhanga and Ngala (2020) examined the effect of external debt on real estate investment in Kenya that included GDP and external debt as examples of variables. The regression results indicated a statistically significant negative effect of external debt on real estate investment in Kenya. The study only included external debt in the research but not internal debt.

In line with prior studies and the current research topic, this research attempts to bridge that gap that other studies left by not using all macroeconomic variables or factors to determine their impact on returns in the Kenyan real estate market and also the enhanced effect of these variables during the aftermath of COVID-19. Therefore, this study seeks to answer the following question: Are changes in macroeconomic factors such as GDP, interest rates, inflation, and money supply responsible for fluctuations in the returns in Nairobi's real estate market?

1.3 Research Objectives

1.3.1 General Objective

The general objective for the study is to evaluate the effect of macroeconomic factors on the returns of the real estate market in Nairobi, Kenya.

1.3.2 Specific Objectives

This study will contain four specific objectives. These are;

i. To examine the effect of inflation on the returns in the real estate market in Nairobi.
ii. To evaluate the effect of GDP on the returns in the real estate market in Nairobi.
iii. To assess the effect of interest rates on the returns in the real estate market in Nairobi.
iv. To determine the effect of money supply on the returns in the real estate market in Nairobi.

1.4 Research Questions

The study seeks to answer the following questions;

i. What is the effect of inflation on the returns in the real estate market in Nairobi?
ii. What is the effect of GDP on the returns in the real estate market in Nairobi?
iii. What is the effect of interest rates on the returns in the real estate market in Nairobi?
iv. What is the effect of money supply on the returns in the real estate market in Nairobi?

1.5 Scope of the Study

This research study will attempt to investigate the macroeconomic factors that influence the returns in the real estate market i.e. inflation, GDP, interest rates and money supply. The research will only focus on these factors. The data collection process will take place in Nairobi, Kenya and will mostly use secondary data from the Central Bank, Kenya Bureau of Statistics and the renowned Hass Consult Property Index.

The research will also be grounded on two theories. One of which is the Modern Portfolio theory, MPT. This theory tends to explain how to assemble a portfolio of assets that are expected to provide a high return but are also risk-free and how diversifying is beneficial for investors as it allows them to take on different types of risk (Hines, 2009). The other theory that the research is based on is the Arbitrage Pricing Theory, APT. This theory is basically a multi-factor approach that takes into account various macroeconomic factors and the expected return of an asset (Singh, Mehta & Varsha, 2011).

1.6 Significance of the Study

1.6.1 Significance to investors in the real estate market

The findings of this study will assist property investors, including first-time home buyers, in making informed investment judgments. Understanding how macroeconomic factors influence

property returns and prices can aid investors in determining correct valuations for their investments while considering the driving factors of the pricing in mind. Moreover, the results from this study may help the investors in the market mitigate risks that emerge from various macroeconomic factors and guarantee high returns from the market in the process.

1.6.2 Significance to the government

This study will benefit Kenya's national and county governments in assessing the impact of macroeconomic factors on property prices and, as a result, formulating appropriate policy mechanisms for the real estate sector's growth and development.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to get the gist of the various research variables in the study. This chapter will elicit the vast theories that harbor the study in question as well as the empirical studies. Furthermore, the chapter will incorporate the conceptual framework of the study and also the operationalization of the variables of the said study.

2.2 Theoretical Review

The theoretical framework is the foundation that supports and holds the theories of a research study. It establishes the existing theories and the relationship that exists between them and the research gap of the study. The research of this study in question is harbored between two theories, the Modern Portfolio Theory (Markowitz, 1952) and the Arbitrage Pricing Theory (Ross, 1976).

2.2.1 Modern Portfolio Theory

This is an investment theory that was set in motion by Harry Markowitz (1952). According to Eric Hines, the modern portfolio theory, MPT in short, is a theoretical framework that explains how to assemble a portfolio of assets that are expected to provide a high return but are also risk-free (Hines, 2009). It shows how diversifying is beneficial for investors as it allows them to take on different types of risk. Since investors are risk averse, they will prefer the less risky option over the higher expected return. This means that if an investor has a higher expected return, he or she must accept more risk.

Before 1960, there was no specific measure of risk. Investors need to quantify their risk variables in order to build a portfolio model. Markowitz shows that the variance of a portfolio's return is a meaningful measure of risk. It also shows how important it is to effectively diversify your investments to reduce total risk (Markowitz, 1952). However, Markowitz's model is based on several assumptions regarding the behavior of fellow investors. Investors consider each investment alternative as being presented by a probability distribution of expected returns over some holding period. As they consider various investment alternatives, investors tend to maximize one-period expected utility and minimize the marginal utility of wealth. Investors would tend to estimate the risk of the portfolio on the basis of the variability of expected returns. Finally, investors normally base decisions solely on expected return and risk, so their utility

curves are a function of expected return and the expected variance or standard deviation of returns only (Markowitz, 1952).

With this, one can formulate a thesis or a conjecture that there is a strong correlation between risks and returns from real estate market, and these risks are factored by the investors' decision making skills which can be mitigated through diversification (Safia, 2015). Hence, the MPT buttresses that diversifying your assets or holding various assets in the real estate market can aid one in mitigating some of the systematic risk equated with macroeconomic factors/variables. It is important to note that it is impossible to completely eradicate or remove all systematic risk, because investments in the market have their own risk.

2.2.2 Arbitrage Pricing Theory

This theory was pioneered by an economist known as Stephen Ross (1976). It was brought about as an alternative to the Capital Asset Pricing Model, CAPM in short. Unlike the CAPM, APT assumes that markets are efficient and that they occasionally misprice securities. The concept of asset pricing theory or Arbitrage pricing is a multi-factor approach that takes into account various macroeconomic factors and the expected return of an asset. This method can be used to identify securities that are likely to be mispriced. The APT shows that the macroeconomic variables that affect the market are those that firms have no control over. They can affect the prices that consumers pay (purchasing power) and the savings that the citizens have (Singh, Mehta & Varsha, 2011).

Even though the APT model is more convenient and flexible than the CAPM, it is very complex as it tends to tackle on multiple factors in the market system. The theory states or rather assumes that the returns in the market are affected by unexpected variations of factors such as inflation changes, variations in interest rates and growth production output in the given country. This means that these variables ultimately affect the real estate market/investments (Manne & Chane-Teng, 2008). Hence, this theory takes a considerable amount of time and research to establish how sensitive a security is to the various macro-economic factors.

2.3 Empirical Review

According to Penn State University, empirical research is based on "seen and quantified social phenomenon." Its expertise is based on actual experience rather than theory or belief." Within a research paper, the empirical review is constructed to answer key research questions.

2.3.1 Effect of Inflation on the Returns in the Real Estate Market in Nairobi

Juma (2014) analyzed the impact of macroeconomic variables on the real estate sector's growth in Kenya. A descriptive research design was adopted in this study. There was a considerable significant positive correlation between factors and real estate investments, according to the study. Inflation and exchange rates have a substantial impact on the real estate market, according to the research.

Loyford and Moronge (2014) investigated effect of economic factors on performance of real estate in Kenya. According to the research, inflation has a negative and significant relationship with the performance of Nairobi real estate organizations. Lu and Tang (2014) employed an integration model to investigate the factors of UK real estate prices. The integration test shows that building costs, credit, GDP, interest rates, and the unemployment rate all have a positive impact on property values, whereas disposable income and money supply have a negative impact.

De Bernardi & Rodenholm (2013) contrasted the influence of macroeconomic factors on securities in the real estate sector in two European countries: Sweden and Switzerland. The analysis indicated that macroeconomic repercussions differ between small economies. A regression analysis revealed a high positive correlation link between the variables inflation, unemployment, and exchange rates in the study.

Arte (2017) analyzed the effects of macro-economic variables on the real estate market investments in Kenya. The data analytics was through descriptive and inferential statistics. The study indicated a weak correlation between CPI, GDP and exchange rates. However, the research also indicated a strong positive correlation between the CPI and money supply.

2.3.2 Effect of the GDP on the Returns in the Real Estate Market in Nairobi

Muli (2011) concluded that GDP, interest rates, and inflation rates were the important motivators of real estate investment utilizing a quantitative research methodology in the research paper. Apart from GDP growth, the fastest growing factor in Kenyan real estate is

population expansion. The negative impact of population increase on real estate investment was statistically insignificant.

Wanyama, Byaruhanga and Ngala (2020) examined the effect of external debt on real estate investment in Kenya that included GDP and external debt as examples of variables. The regression results indicated a statistically significant negative effect of external debt on real estate investment in Kenya.

Kamau (2011) explored the factors influencing investment in real estate in Nairobi. Population, GDP, and inflation were employed as independent variables in the study. According to the study, fluctuations and volatility in inflation and interest rates have a significant impact on real estate growth, whereas population growth has a negative impact on real estate growth.

Grum and Govekar (2016) analyzed the impact of macroeconomic factors, labor market conditions/rate of employment, and GDP in a number of European countries. The investigation discovered a strong and clear positive relationship between these characteristics. Housing prices were found to be higher in countries where the economy was at full employment, according to the study.

Nzalu (2013) carried out research to find out what elements are driving real estate investment growth in Kenya. As independent variables in the study, population growth, GDP, and inflation were used. Changes in inflation and interest rates have a substantial impact on real estate growth, while population increase has a negative impact on real estate growth, according to the study.

2.3.3 Effect of Interest Rates on the Returns in the Real Estate Market in Nairobi

Kirungu (2013) looked into the link between interest rate volatility and real estate returns in Kenya. It was discovered that real estate returns and interest rates have an inverse connection. This basically actively demonstrates that when interest rates are rising, the returns from the real estate market are decreasing respectfully.

Ngumo (2012) evaluated the impact of interest rates on the financial performance of Kenyan mortgage lenders. The research discovered a link between returns and performance and the volume of mortgage loans provided by lending institutions.

Kamweru and Ngui (2017) investigated the effect of interest rates on the performance of real estate industry in Kenya. The study findings revealed that lending interest rates had a negative

and significant relationship with real estate growth in Nairobi. The findings show that deposit interest rates were insignificantly related to growth of the real estate firm in Nairobi.

Based on Omengo (2012), Kenya's high lending rates are affecting real estate investment. Developers factor the cost of borrowing into the supply of properties, which indicates that as interest rates climb, the cost of servicing loans and potential loan advances rises as well. As the cost of materials and labor rises, high interest rates will have an impact on ongoing projects.

Ojetunde (2013) employed auto regression as well as econometrics to analyze the relationship between the macro economy and the performance of the Nigerian real estate market. The study found a substantial positive and direct correlation between property prices in the country and the study's findings. In addition, the study discovered a robust link between interest rates and rent.

2.3.4 Effect of Money Supply on the Returns in the Real Estate Market in Nairobi.

Mathenge (2017) investigated the effects of money supply on residential real estate prices in Nairobi. A quantitative research design was used in the study. The study found that the level of money in supply and GDP growth rate have significant negative relationship with the growth in real estate prices. In addition, the study found that real estate prices growth rate has positive relationships with inflation and Commercial Bank lending rates. The study also indicated that an overall increase in property prices with time hence the real estate market in Kenya is expected to continue to grow.

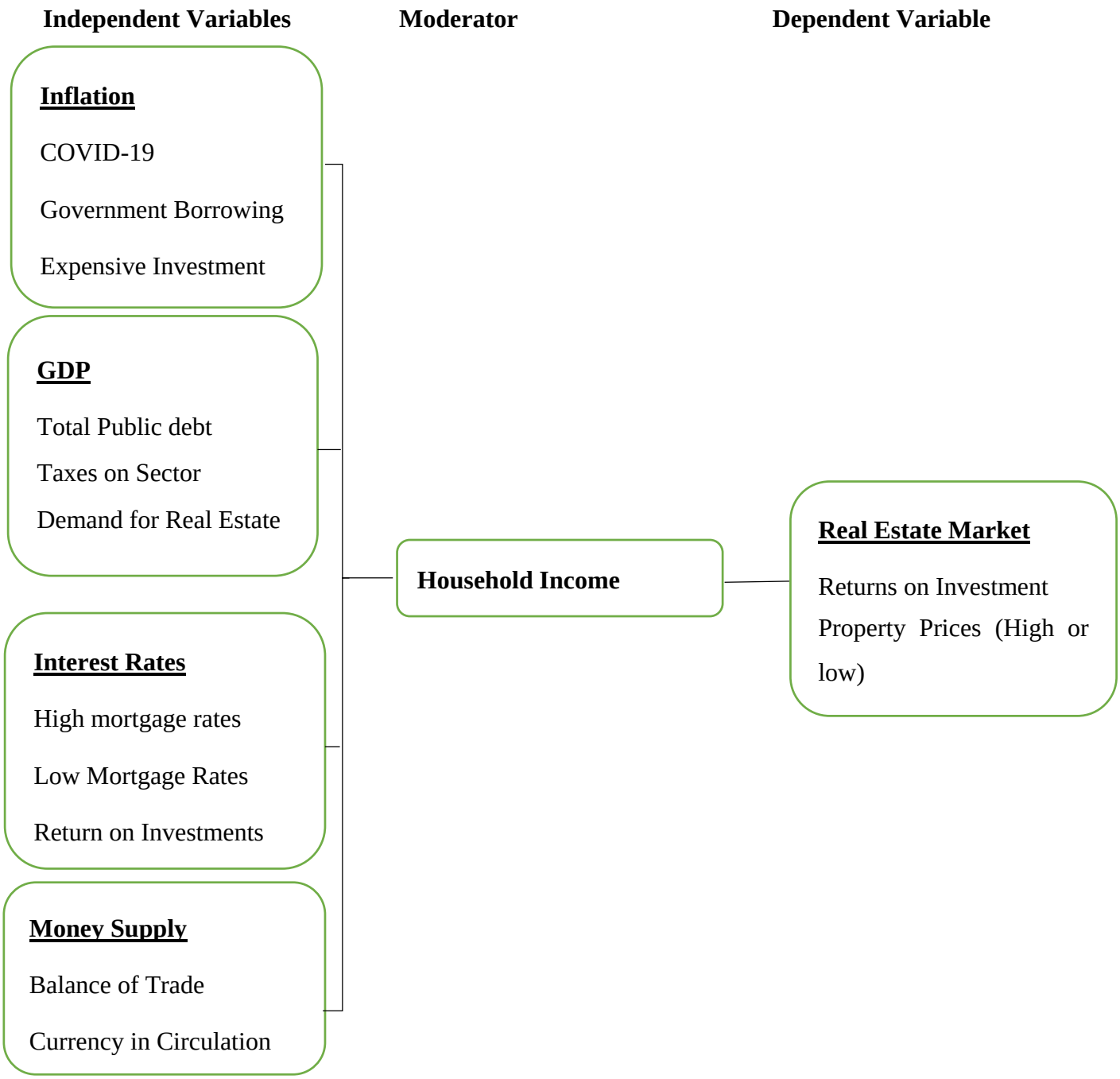
Makena (2012) investigated the determinants of residential real estate prices in Nairobi. In this study a quantitative approach was followed. The study used secondary data which was mainly quantitative and descriptive in nature. The study found that the level of money in supply information can allow economists and financial analysts a better understanding of the real estate market and its influence on real estate prices.

Muthee (2012) used a descriptive research design to establish the effect of macro-economic variables on the growth of real estate investment in Kenya. The study found that there is a positive and significant relationship between macro-economic variables and the growth of real estate in Nairobi. The study established that the growth in real estate is not influenced individually by growth in the exchange rate, diaspora remittances, money supply in circulation, the rate of inflation and GDP. However, the combined effect of macroeconomic variables affects the growth of real estate.

Karoki (2013) investigates the determinants of residential real estate prices. The study used secondary data. The study showed that interest rates and real estate prices are negatively correlated while GDP and money supply have a positive relationship with residential real estate prices. In addition, the study found that interest rates have the most significant effect on house prices followed by GDP and level of money supply and as such macro-economic variables can explain the rise in property prices.

2.4 Conceptual Framework

In literature review, conceptual framework is a model that shows the understanding of the researcher on how particular variables are in the study are connected. Hence, it identifies variables required in the research investigation. Below is the conceptual framework that shows the interaction between independent variables and their relationship with the dependent variable and with household income as a mediator/moderator variable.



Source: Author 2021

2.5 Summary of Knowledge Gaps

This research has taken into account previous studies done by various scholars who had similar interest in the research topic. Wanyama, Byaruhanga and Ngala (2020) examined the effect of external debt on real estate investment in Kenya. The study used debt as one of its variables that affect GDP. The study however does not use internal debt as a variable but only uses external debt. This creates a gap as public debt is made up of both external and internal debt and the research done does not state whether internal debt has an effect on real estate investment in Kenya.

Kirungu (2013) looked into the link between interest rate volatility and real estate returns in Kenya. This previous study only used one macroeconomic variable which is insufficient in determining the effect on returns in the real estate market. The current research being done will include other macroeconomic factors and their effect on returns in real estate in Nairobi.

Most previous research by the various scholars were done before the COVID-19 period. Their research does not include the effect of the pandemic created by the COVID-19 has on the macroeconomic factors, especially inflation, and ultimately its effect on the returns in the real estate market in Nairobi. This current research however will tackle on the effect that the COVID-19 had on the various factors as well as the returns of property prices.

2.6 Operationalization of Variables

Table 1:Operationalization of Variables

Variable	Type of variable	Indicators	Measurement	Data Collection tool	Data Analysis
Inflation	Independent	• COVID-19 • Government Borrowing • Expensive investments	Consumer Price Index	Secondary data	Descriptive Analysis
GDP	Independent	• Total public debt • Taxes on sector • Demand for Real estate	Real GDP rate	Secondary data	Descriptive Analysis
Interest Rates	Independent	• High Mortgage rates • Low Mortgage rates • Return on Investments	Bank and mortgage Lending Rates	Secondary data	Descriptive Analysis
Money Supply	Independent	• Currency and Cash Equivalents	Money in Circulation as a % of GDP – World Bank	Secondary data	Descriptive Analysis

		in circulation			
Household Income	Moderator	• High income • Low income	% growth in income in Kenya	Secondary data	Descriptive Analysis
Real Estate Market	Dependent	• High returns • Low returns	Hass Price Index	Secondary data	Descriptive Analysis

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The overall technique employed in the project was detailed in this chapter. It incorporates the researcher's research design, target population, data collection methods, and data analysis methodologies regarding the effect of macroeconomic factors on the performance of Kenya's real estate sector.

3.2 Research Design

According to Kothari (2014), research design is the arranging of settings for data collection and analysis in a way that tries to combine relevance to the study goal with procedural efficiency. It is the conceptual framework that the research is carried out inside, and it serves as the blueprint for data collection, measurement, and analysis. It refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem. Donald R. Cooper and Pamela S. Schindler talks of research design being a blueprint for fulfilling objectives and answering questions (Cooper & Schindler, 2013). The study used secondary data as its main source of information because of the time frame of the study as well as the constraints brought about by the COVID-19 pandemic. The study employed a descriptive research design since it allowed for analysis for both the macroeconomic factors and the returns at the same time.

3.3 Population and Sampling

3.3.1 Population

A population is a well-defined collection of people, services, elements, events, and groups of entities or houses undergoing investigation (Kothari & Garg, 2014). The elements that have the answers to the study questions are referred to as the target population (Cooper & Schindler, 2013).

The population for this study entailed the registered real estate firms in Kenya and the data was obtained from the Hass Consult Index between 2011 and 2020.

3.3.2 Sampling

Sampling is the process of selecting a subset of items from a large group of elements (population) so that the samples obtained have the same characteristics as that of the population

(Devkota, 2020). According to Groves (2010), sampling is the process of selecting a sufficient number of the suitable candidates from a population. The study used convenience sampling as its technique.

3.3.2.1 Sampling Frame and size

This refers to the rundown of likely components from which the sample in question might be acquired to do the investigation or research (Cooper & Schindler, 2013). It is likewise seen as a rundown of units in the populace from which the exploration test will be picked. (Devkota, 2020).

The sampling frame and size in this study was obtained from the Hass Consult, which is the only publicly available index in Kenya at the moment.

3.3.2.2 Sampling Technique

The sampling technique describes ways for selecting a sufficient number of items from a population in order to have a better knowledge of the sample's attributes and to generalize to the entire population (Groves, 2010). The sampling technique used was convenience sampling. Convenience sampling is a research approach whereby a researcher collects market research data from a pool of respondents who are freely reachable. It is the most often used sample technique because it is incredibly efficient, simple, and cost-effective.

3.4 Data Collection

Data collection is the gathering of empirical facts with the goal of acquiring new insights into the situation and answering the issues that prompted the study (Flick, 2009). The research employed secondary data from the Central Bank of Kenya, World Bank, Kenya National Bureau of Statistics, and Hass Consult Property Index with regards to GDP, inflation, interest rates, property prices, supply of money, exchange rates, and household income. The secondary data was collected from documentation of the previous studies, property reports, journals and magazines from the firms mentioned above.

The study used this secondary data covered for a period of 10 years from January 2011 to December 2020. The study analyzed data quarterly for the entire period.

3.5 Data Analysis

The technique of systematically applying statistical and/or logical techniques to describe and exhibit, condense and recap, and appraise data is defined as data analysis. The analysis was

done using a multiple factor linear regression model. Through the use of coefficients such as correlation, coefficient of determination, and degree of significance, the regression model is good at explaining the amount and direction of association between the macroeconomic variables in the study. Therefore, the multi linear regression model that relates to APT was the best regression function to be used here to measure the historical data.

The regression function can be written as;

$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e$

Where;

Y = Returns from Real Estate Market (Property Prices)

X_1 = Economic Growth (% Change in GDP)

X_2 = Inflation (% Change in Inflation Rate)

X_3= Interest Rates (% Change in interest rates)

X_4= Household Income (% Change in Household Income)

X_5=Money Supply (as a % of GDP)

e = Residual Error

3.5.1 Diagnostic Test

The study checked for normality using the Jacque-Bera test for normality, that is, skewness and kurtosis. The assessment or quantification of the relationship between variables was done using the generalized method of moments.

3.6 Research Quality

Right quality research includes providing a research design that is appropriate for the research question, maximizing the sponsor's value for the resources spent, and using data-handling and data-reporting techniques that are appropriate for the data collected (Cooper & Schindler, 2013). Only relevant data from trustworthy sources was collected for this study. Validity and reliability was determined by the type of data collected and the sources from which the data was obtained.

3.6.1 Validity

The term "validity" refers to an instrument's ability to accurately measure what it is designed to assess. It's a decision based on a variety of evidence (Chiang, 2015). Validity assesses if the

research participants completely comprehended the questions posed. The content validity of this study was also considered. The amount to which a measure covers the constructions of interest is called content validity (Chiang, 2015). The study looked at how secondary data might be used to bridge that gap in research questions. The documented data had to communicate issues on inflation, money supply, GDP, income and property prices.

3.6.2 Reliability

It refers to how well a research approach provides consistent and reliable outcomes. It is a measure of constancy (Chiang, 2015). The consistency of documents from various sources was used to assess reliability in this study. This can be achieved through inter-raters/observers. Because of its use of statistical tools to directly estimate the given data, it will add value to the approach of measuring the reliability of secondary data. This will serve as a base for other researchers to improve on the study of assessing the reliability of secondary data (Olabode, Oluwaseun, Olateju & Bakare, 2019).

3.7 Ethical Issues

This research ensured that all ethical guidelines are adhered to in the course of the research. That is, in selection of the research topic itself, selection of research design, selection of the research population and sample, data collection methods and procedures and finally analysis of the data that was collected. Since the research mainly relied on secondary data it looked for consent in the providers privacy policy and terms of use. The research also ensured proper citation all through the document. Any third party individual involved in this research was made aware of their involvement in questions asked and that their answers was on voluntary basis and they were free to withdraw from the participation at any stage during the study. Confidentiality and anonymity of information gained in the research was only used for the purpose of this research.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This section presented the results and the discussion of the study. Particularly, the study looked at the descriptive statistics, the correlation analysis and the diagnostics results. The panel regression analysis before and after the moderation was also analyzed.

4.2 Descriptive Statistics

Table 4.1: Descriptive Statistics

This part displays the clear outcomes for the factors. Clear measurements utilized were mean, minimum, maximum and standard deviation. The outcomes are as displayed below.

Table 2: Descriptive Statistics

	GDP	Household Income	Inflation Rate	Interest Rate	Money Supply	Property Prices
Mean	1.06677	4.083	7.16792	9.77083	39.6468	1.341
Median	1.07847	4.72	6.455	9	39.56	1.4
Maximum	3.44981	6.31	16.29	18	42.92	4.2
Minimum	-6.7068	-4.66	4.15667	5.83333	36.52	-3.1
Std. Dev.	1.46329	2.57645	2.90464	2.74094	1.9747	2.21442

GDP= Percentage growth in GDP, Household Income=% growth in household income, Inflation Rate %, Money Supply as a % of GDP, Percentage growth in Property Prices

Source: Author (2022)

On Economic Growth, the descriptive results showed that the average GDP growth in percentages was 1.06677% from the year 2011 to 2020. The minimum and the maximum of GDP growth between the year 2011 and 2020 were -6.7% and 3.4% respectively. Its standard deviation was 1.46329 which indicated that gross domestic product varied throughout the measurement period.

Growth in household income averaged 4.083% between 2011 and 2020. The minimum and the maximum of household income between the year 2011 and 2020 were -4.66 and 6.33 respectively. Its standard deviation was 2.57645 which indicated that growth in household income varied throughout the study period. The average Inflation rate was 7.16792 from the year 2011 to 2020. The lowest Inflation Rate was 4.15667 whereas the highest inflation rate

was 16.21. The standard deviation was 2.90464 an indication that the inflation rate varied throughout the measurement period.

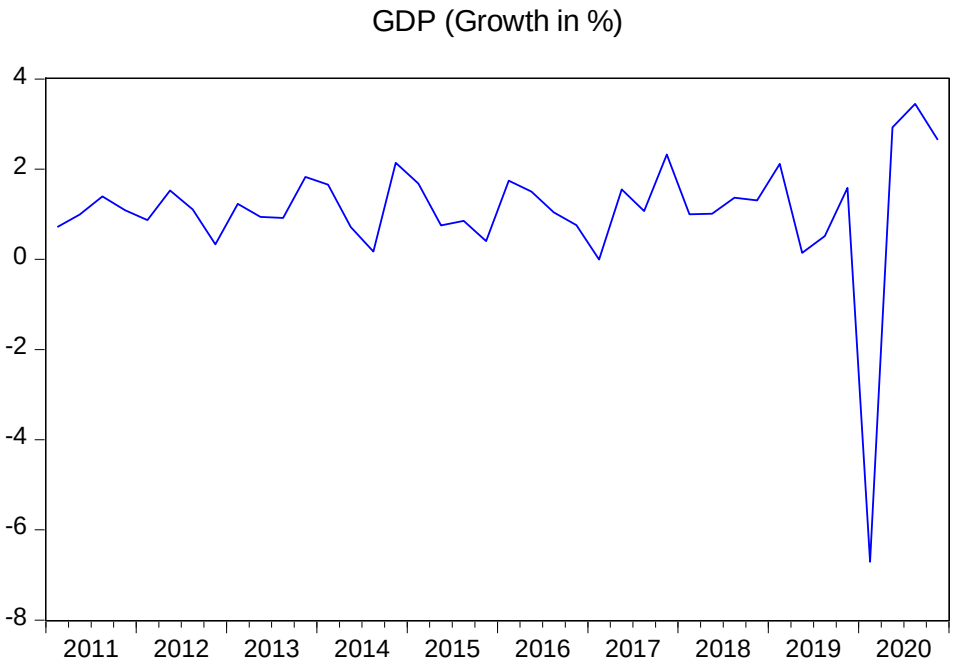
The average Interest Rate was 9.78% from the year 2011 to 2020. The lowest interest rate was 5.83 whereas the highest interest rate was 18%. The standard deviation was 2.74094 an indication that interest rate varied throughout the measurement period.

Money Supply as a percentage of GDP averaged 39.65% between 2011 and 2020. The minimum and the maximum of money supply between the year 2011 and 2020 were 35.52% and 42.92% respectively. Its standard deviation was 1.9747 which indicated that money supply varied throughout the study period. Finally, average rise in property prices was 1.341% for the years 2011 to 2020. Minimum growth was a decline in property prices by -3.1% while the highest rise in property prices was 4.2%. The standard deviation was 2.21442 indicating that property prices varied throughout the measurement period.

4.3 Trend Analysis

Trend analysis was conducted for economic growth, inflation rate, interest rate, money supply as a percentage of GDP, household income and change in property prices in Nairobi. The trend lines were presented in form of line graphs. It should be noted that the trends have been plotted on a quarterly basis and the annual compounded growth rates mostly show a smooth and steady charts. Figure 4.1 show trend line for economic growth.

Figure 4.1:Percentage Growth in GDP

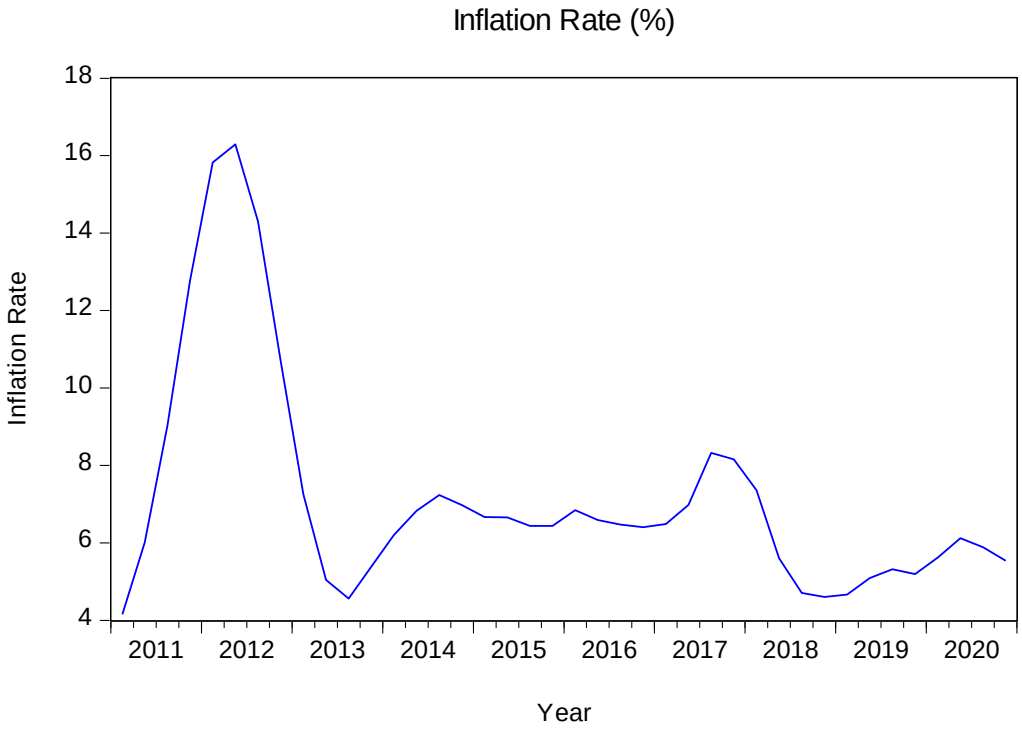


Source: Author (2022)

Figure 4.1: Percentage growth in GDP

The quarterly percentage growth in GDP averaged between 0.5% and 1.5% showing steady but significant progress. The growth rate was close to zero on a few occasions in the last quarter of 2012 second quarter of 2014 as well as in 2017. The dip in the growth rate in 2012 and 2017 can be as a result of it being an election year. The sharpest decline in GDP however was witnessed in the first quarter of 2020 as a result of the Covid-19 pandemic that halted economic operations in the country.

Figure 4.2: Inflation Rate

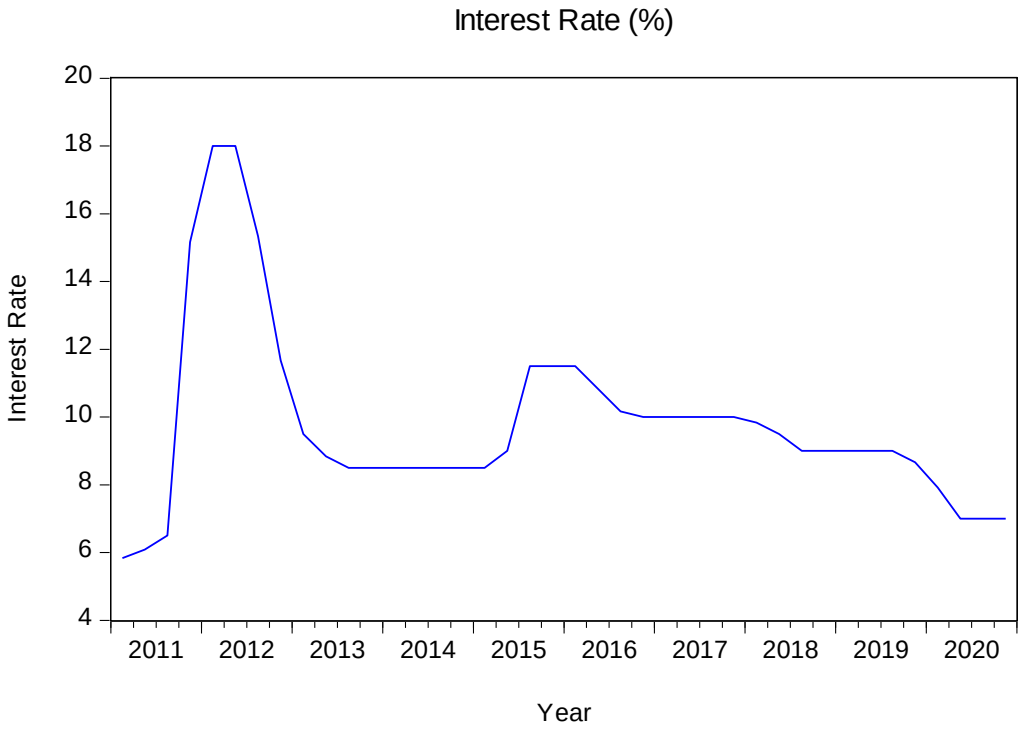


Source: Author (2022)

Figure 4.2: Inflation Rate

Figure 4.2 shows the trend in the rate of inflation between 2011 and 2020. The rate of inflation in Kenya was slightly above 4% at the start of 2011 then rose sharply through 2011 and to reach an all-time high of around 16% in mid-2012. From then, the rate of inflation sharply declined to just above 4% by the end of 2013 after which it rose slightly to just above 6% where it remained steady up to the start of 2017. It rose to its highest point in more than 5 years at 8% then declined to below 5% in 2018 after which it rose to 6% in 2020.

Figure 4.3:Interest Rate

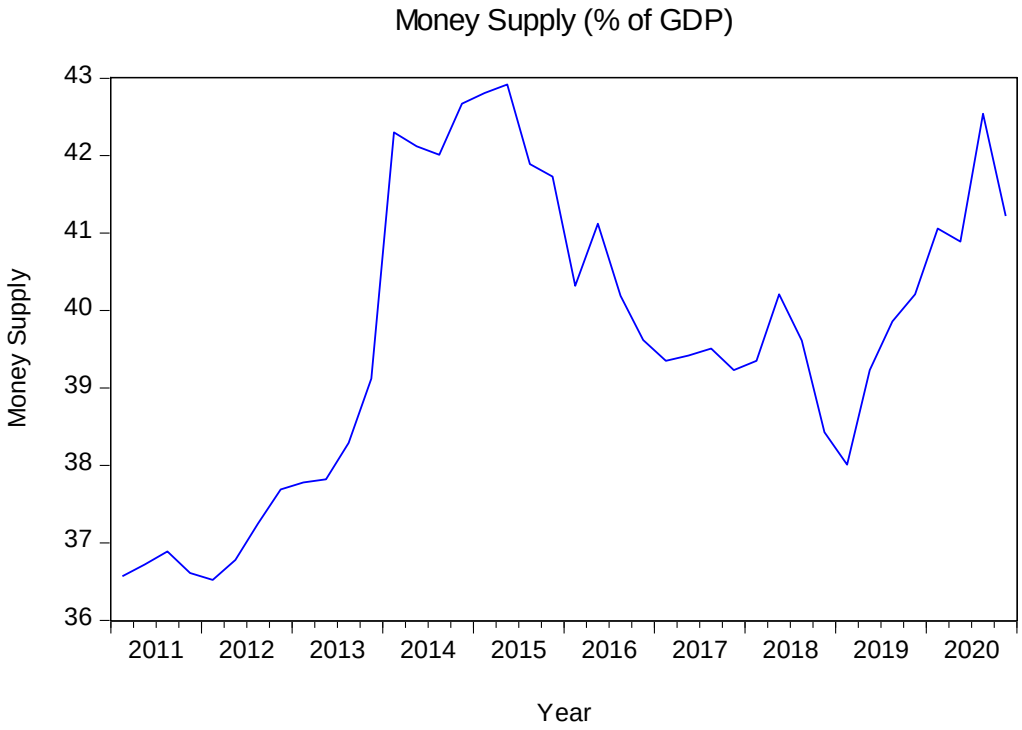


Source: Author (2022)

Figure 4.3: Interest Rate

Figure 4.3 shows the interest rate between the years 2011 and 2020. The interest rate at the start of 2011 was just below 6% then rose to close to 18% by the end of 2011 which was the highest point throughout the duration considered in the study. A sharp decline followed to slightly above 8% in 2013 and the interest rate remained steady through to mid-2015 after which it rose to about 11.5%. A slow and steady decline in interest rates followed to just above 7% in 2020.

Figure 4.4:Money Supply

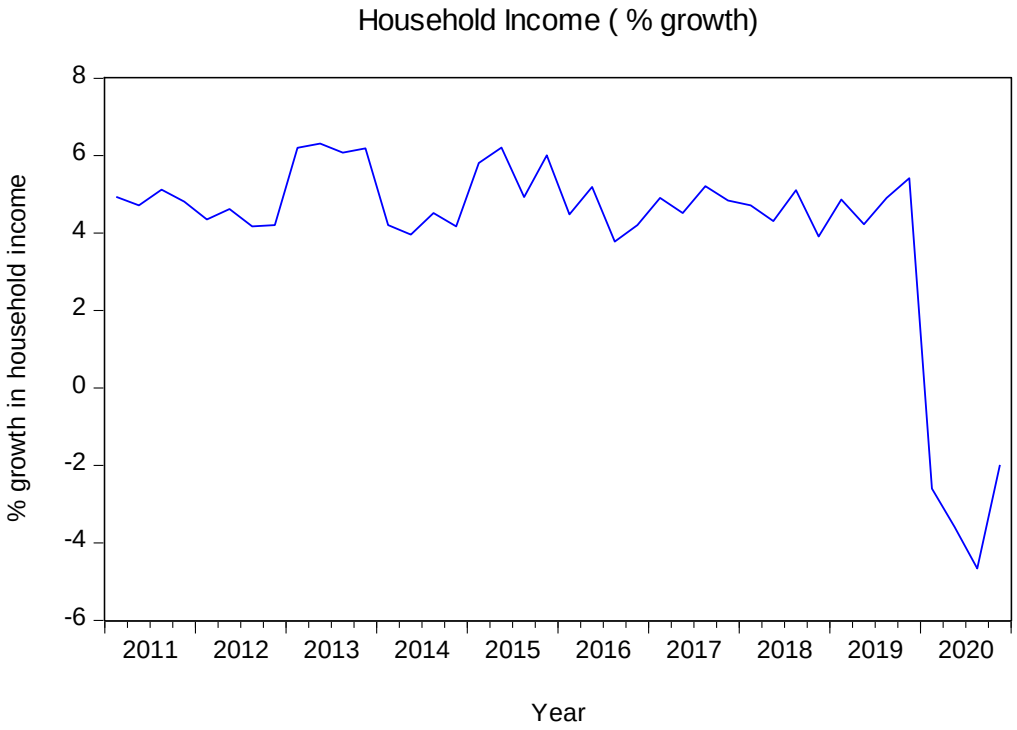


Source: Author (2022)

Figure 4.4: Money Supply (% of GDP)

Figure 4.4 presents the trends in money supply as a percentage of GDP. In 2011, money supply was at an all-time low of 36% and rose at the start of 2012 to about 38% before a sharp increase to 42% towards the end of 2013. By the second quarter of 2015, money supply relative to GDP was at a high of just below 43%. This can be attributed to the adoption of county governments between 2013 and 2014 leading to increased government expenditure at the time. From 2015, there was a steady decline in Money supply to 40% in 2016 before a further decline to 38% in the first quarter of 2019. From 2019, money supply increased steadily to 42% in the second quarter in 2020 before a slight drop to 41% by the end of 2020.

Figure 4.5:Household Income

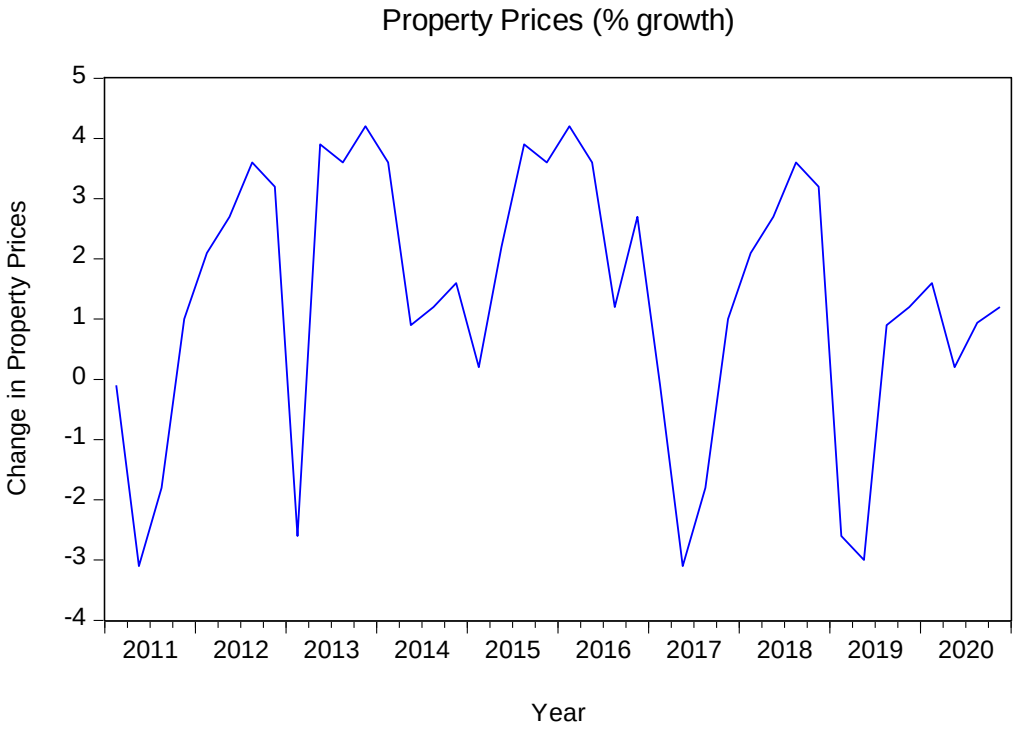


Source: Author (2022)

Figure 4.5: Household Income

Figure 4.5 shows the percentage growth in household income between 2011 and 2020. In 2011, household income was growing at a steady quarterly rate of just above 4%, Household income grew by 6% in the first quarter of 2013 and maintained the same rate throughout the year before it dropped to a quarterly rate of 4% throughout up to the start of 2015. The growth rate of household income fluctuated between 4% and 6% up to 2017 where it dropped to just below 4%. The growth rate remained relatively steady until the first quarter of 2020 where the rate dropped to about -4% owing to the pay cuts and job losses brought about by the Covid-19 pandemic.

Figure 4.6:Change in Property Prices



Source: Author (2022)

Figure 4.6: Change in Property Prices

Figure 4.6 presents the quarterly trends in property prices between 2011 and 2020. Property Prices dropped by 3% in the first quarter of 2011 then rose steadily to just above 3% by the second quarter of 2012. The last quarter of 2012 witnessed a drop in property prices by 3%. The first quarter of 2013 resulted in a growth in property prices by 4%. The growth rate was maintained throughout the year before it dropped to about 1% between 2014 and 2015. The growth rate fluctuated between 1% and 4% until the second quarter of 2017 where property rates dropped by 3%. From then, there was a steady rise in the growth of property rates up to about 3.5% in mid-2018 before another drop in prices at the start of 2019 by 3%. The change in prices rose to just below 1% and remained steady through most of 2020.

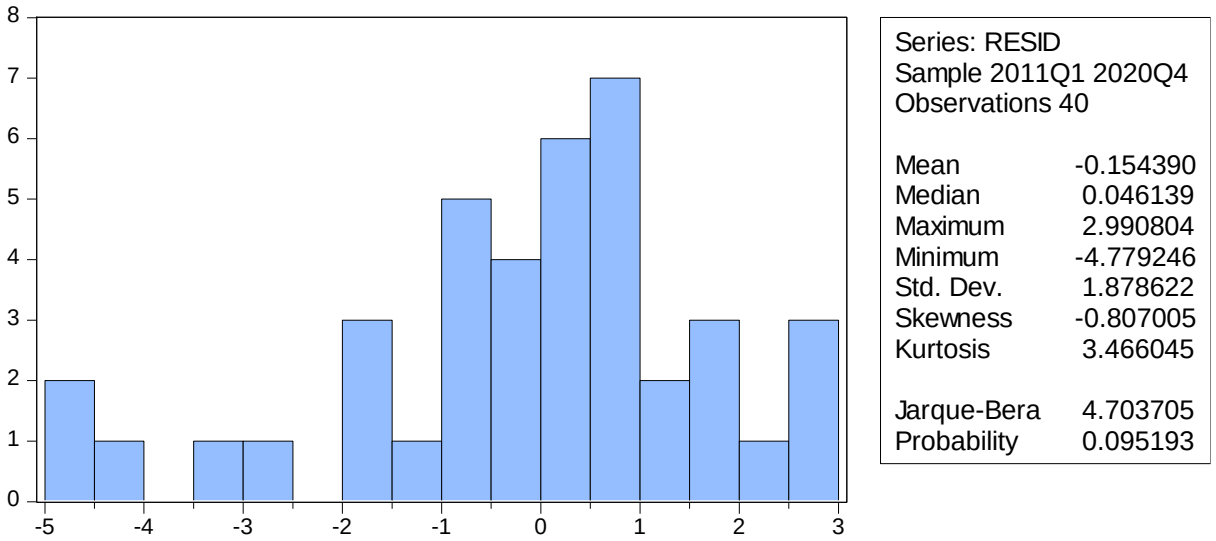
4.4 Diagnostic Tests

Prior to running a regression model diagnostic tests were conducted. The tests conducted in this case was the Jacque-Bera normality test. This is usually performed to avoid spurious regression results from being obtained and to ensure that parameter estimates are precise and accurate.

4.4.1 Normality Tests

Normality test is conducted so as to ensure that the variables used in the analysis are distributed normally. The Jarque-Bera test was used to test the normality of the residuals since it is more conclusive tests. The Jarque-Bera statistic is distributed with 2 degrees of freedom under the null hypothesis of a normal distribution. The reported probability is the probability that a Jarque-Bera statistic exceeds (in absolute value). The data is considered to be normally distributed if the probability is greater than 0.05.

Figure 4.7:Jacque-Bera Normality Test



Source: Author (2022)

Figure 4.7: Jacque-Bera Normality Test

Figure 4.7 indicates that the residuals originating from the model were normally distributed. This was supported by a Jarque-Bera statistic of 4.703705 and a p-value of 0.095193 which was greater than 0.05. The Kurtosis was 3.466045 while Skewness was -0.807005 implying that at 5% significance level the null hypothesis of normality of the data is accepted and the data is considered to be normal. Kline (2011) suggests that Skewness and Kurtosis values that lie within a range of ≤ 3 and ≤ 10 respectively are considered to be approximately normal. This data can therefore be subjected to parametric statistical analysis test that include time series regression models.

4.5 Correlation Analysis

Correlation analysis predicts the association between research variables. Correlation table was employed to establish the association between variables. Table 4.2 shows the findings of the correlation matrix.

Table 4.2: Correlation Analysis

Table 3: Correlation Analysis

		Property Prices	GDP	Inflation Rate	Interest Rate	HI	Money Supply
Property Prices	Pearson Correlation	1					
Sig. (2-tailed)							
GDP	Pearson Correlation	.721**	1				
Sig. (2-tailed)		0.000					
Inflation Rate	Pearson Correlation	.645*	.529**	1			
Sig. (2-tailed)		0.041	0.000				
Interest Rate	Pearson Correlation	.320*	.232**	.853**	1		
Sig. (2-tailed)		0.044	0.000	0.000			
Household Income	Pearson Correlation	.396**	.165**	.085**	.248*	1	
Sig. (2-tailed)		0.000	0.000	0.001	0.003		
Money Supply	Pearson Correlation	.211*	.114*	.423**	.345*	.291*	1
Sig. (2-tailed)		0.005	0.033	0.007	0.029	0.008	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Property Prices= % Change in the price of property, GDP= % change in economic growth, Money Supply (% of GDP), Household Income (HI) (% Growth), Interest Rate (%), Inflation Rate (%)

Source: Author (2022)

The dependent variable in the study is property prices which is a measure of the returns from the real estate market in Nairobi. The correlation analysis results in Table 4.2 show that there was a strong positive and significant association between economic growth (GDP) and property prices ($r=0.721$, $p<0.05$) at 5% level of significance. This implies that an improvement in economic growth results into an improvement in property prices. These findings are in line with the study by Grum and Govekar (2016) which found that property prices were much higher in economically advanced countries.

The study also found a strong positive and significant association between inflation and property prices in Nairobi (r=0.645, p<0.05) at 5% level of significance. This implies that an increase in inflation results in an increase in property prices . This concurs with the findings of Arte (2017) who established that inflation and property prices and rates are positively related.

In addition, the study found a strong positive and significant association between interest rates and property prices in Nairobi (r=0.320, p<0.05) at 5% level of significance. This implies that an increase in interest rates results in an increase in property prices. This backed the findings of Omengo (2012) who established that interest rate and price of property was positively related.

In addition, the study found that there was a positive and significant association between household income and the price of property in Nairobi (r=0.396, p<0.05) at 5% significance level. This implies that an increase in household income results in an increase in property prices. This is in line with the findings of Muli (2011) who found that income levels is positively related with property prices.

Finally, the study found that there was a strong positive and significant association between money supply and property prices in Nairobi (r=0.211, p<0.05) at 5% level of significance. This implies that an improvement in money supply results in an increase in property prices in Nairobi. This are in line with the findings of Arte (2017) who found that money supply positively affects property rates.

4.6 Regression Analysis

Analysis was conducted to establish the association between the macroeconomic variables in the study. The results presented in Table 4.3 indicate the fitness of model used of the regression model in explaining the study phenomena.

Table 4.3: Model Fitness

Table 4: Model Fitness

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.632a	0.583	0.478	2.00789

a Predictors: (Constant), Money Supply (% of GDP), GDP (Growth in %), Household Income (% growth), Interest Rate (%), Inflation Rate (%)

Source: Author (2022)

From the results on Table 4.3, money supply as a percentage of GDP, economic growth (GDP), household income, interest rate and inflation were found to be satisfactory variables in explaining prices of property in Nairobi. This fact is supported by coefficient of determination also known as the R square of 0.583. This implies that money supply as a percentage of GDP, economic growth (GDP), household income, interest rate and inflation explain 58.3% of the variations in the dependent variable, which is prices of property. Table 4.4 gives the results of the analysis of variance (ANOVA).

Table 4.4: ANOVA

Table 5: ANOVA

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	54.167	5	10.833	2.687	.000[b]
	Residual	137.075	34	4.032		
	Total	191.242	39			

a Dependent Variable: Property Prices (% growth)
b Predictors: (Constant), Money Supply (% of GDP), GDP (Growth in %), Household Income (% growth), Interest Rate (%), Inflation Rate (%)

Source: Author (2022)

The outcomes of the analysis of variance show that the general model was statistically significant. Further, the outcomes suggest that money supply as a percentage of GDP, economic growth (GDP), household income, interest rate and inflation are satisfactory indicators of property prices in Nairobi. This was supported by an F statistic of 2.687 and the reported p value (0.008) which was less than the conventional probability of 0.05 significance level. The regression of coefficient table is presented in Table 4.5.

Table 4.5: Coefficient Table

Table 6: Coefficient Table

Coefficient Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.158	0.42		-0.376	0.709
	GDP (Growth in %)	0.326	0.118	0.371	2.763	0.015
	Inflation Rate (%)	0.298	0.129	0.27	2.312	0.004
	Interest Rate (%)	0.692	0.243	0.857	2.853	0.007
	Household Income (% growth)	0.285	0.131	0.195	2.175	0.008
	Money Supply (% of GDP)	0.321	0.19	0.286	2.417	0.000

a Dependent Variable: Property Prices (% growth)

Source: Author (2022)

The beta coefficients of the multiple régression model predicting property market returns are :

$Y=-0.158 + 0.326X_1 + 0.298X_2 + 0.692X_3 + 0.285X_4 + 0.321X_5$

Where

Y = Returns from Property Market (Property Prices)

X_1 = Economic Growth (GDP)

X_2 = Inflation

X_3= Interest Rates

X_4 = Household Income

X_5= Money Supply

4.7 Interpretation of findings

Basing on the predictive model, interest rates (β=0.692) had a positive and significant effect on property prices in Nairobi. The regression coefficients indicate that if interest rates rise with one unit, real estate returns increase by 0.692 units. This backed the findings of Omengo (2012) who established that interest rate and price of property was positively related. Money Supply also had a positive and significant effect (β=0.321) on property prices in Nairobi. This implies that if money supply relative to GDP increases by one unit, then real estate returns increase by

0.321 units. This are in line with the findings of Arte (2017) who found that money supply positively affects property rates.

The results also revealed that economic growth (GDP) had a positive and significant effect on property prices in Nairobi (β=0.326). This means that a unit increase in economic growth results in an increase in property prices by 0.326 units. These findings are in line with the study by Grum and Govekar (2016) which found that property prices were much higher in economically advanced countries. Inflation also had a positive and significant effect on the prices of property in Nairobi (β=0.298) If inflation increases by 1 unit, real estate returns measured through property prices increases by 0.298 units. This is in line with the findings of Arte (2017) who established that inflation and property prices and rates are positively related.

Finally, Household income was found to have a positive and significant effect on the returns from the real estate market (property prices) in Nairobi (β=0.285). A unit increase in household income resulted in an increase in returns in real estate market by 0.285 units. This is in line with the findings of Muli (2011) who found that macroeconomic variables such as GDP, inflation and income levels are positively related with property prices.

CHAPTER FIVE

SUMMARY, CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

5.1 Introduction

This chapter provides a summary of the findings, the conclusion, recommendations, drawbacks/limitations, and areas which require additional studies and research.

5.2 Summary of the findings

The purpose of this study was to evaluate the effect of certain macroeconomic factors on the returns of the Nairobi real estate market. GDP, inflation, interest rates, money supply, and a moderator variable, household income, were among the factors considered. The Modern Portfolio Theory and the Arbitrage Pricing Theory were employed in the study. The study adopted a descriptive research design utilizing quarterly secondary data from January 2011 to December 2020, a ten-year timeframe. Descriptive statistics and inferential statistics were used to analyze the acquired data. The descriptive statistics featured measures of central tendency like mean, median, and standard deviation, whereas the inferential statistics included regression and correlation analysis.

The summary of the descriptive statistics analysis conveyed that for the economic growth, the descriptive results showed that the average GDP growth in percentages was 1.06677% whereas the statistics for household income averaged 4.083% between 2011-2020. The statistical analysis for the average inflation rate from 2011 through 2020 was 7.16792 while the average interest rate was 9.78%. Finally the summary statistics showed that money supply as a percentage of GDP averaged 39.65% between 2011 and 2020 and the average rise in property prices was 1.341% for the years 2011 to 2020.

According to the correlation analysis results, there is a strong positive and substantial relationship between economic growth (GDP) and property prices. The study also discovered a strong positive and substantial relationship between inflation and Nairobi property prices. Additionally, the study discovered a strong positive and substantial relationship between interest rates and Nairobi property values. Likewise, the study discovered a strong and significant relationship between household income and property prices in Nairobi. Finally, the analysis discovered a strong positive and substantial relationship between money supply and Nairobi property values. Furthermore, the findings indicate that money supply, economic growth (GDP), household income, interest rate, and inflation are good predictors of Nairobi

property prices. This was supported by a F statistic of 2.687 and the reported p value (0.008). The coefficient analysis revealed a positive and significant relationship between GDP, interest rates, money supply, inflation, household income and property prices which is measurement of returns .

5.3 Conclusion

The findings of the study revealed that interest rates had a positive and significant effect on Nairobi property prices. It means that for every unit increase in interest rates, real estate returns increase by 0.692 unit. The study discovered that money supply has a positive and significant effect on Nairobi property values, implying that if money supply relative to GDP increases by one unit, real estate returns increase by 0.321 units.

Moreover, the research findings also demonstrated that economic growth (GDP) has a positive and significant effect on Nairobi property prices. This means that every unit rise in economic growth translates in a 0.326 unit increase in property values. Furthermore, the study discovered that inflation had a positive and significant effect on Nairobi property values. If inflation rises by one unit, real estate returns as measured by property prices rise by 0.298 unit.

Finally, household income was discovered to have a positive and significant effect on real estate market returns (property prices) in Nairobi. A unit increase in household income resulted in a 0.285 unit rise in real estate market returns. All the research results can conclude that the factors/variables GDP, inflation, interest rates, money supply and household income all have a direct and significant effect on the returns of the real estate market in Nairobi.

5.4 Recommendations

The study found that interest rates had a direct and significant effect on the returns of the real estate market in Nairobi. This leads to the recommendation that the lending institutions and the government should keep the interest rates and mortgage rates at an optimal level so as not to affect the flow of returns from the real estate sector.

Furthermore, the study revealed that money supply has a direct and significant effect on the returns of the Nairobi real estate market. The recommendation is that the CBK in Nairobi ensures that there is enough cash in circulation in the country so that additional investments and profits in the real estate sector can be increased.

The research also concluded that GDP has a direct and significant effect on the returns in the real estate market in Nairobi. The recommendation was the government should ensure that

there is good economic growth in all public sectors and avoid conflicts that would hinder economic development, especially during election periods.

Likewise, the study indicated that inflation has a direct and significant effect on the returns of the Nairobi real estate market. This resulted in the recommendation that the government, as well as institutions such as the CBK, guarantee that the country's inflation levels are adequately monitored so that they do not impede the real estate sector, which is detrimental to the Kenyan economy.

Lastly, the research concluded that household income has direct and significant effect on the returns of the real estate market in Nairobi. This led to the recommendation that the government should ensure that citizens are earning above the minimum wage and have additional income to save so as to invest in sectors such as the real estate sector and boost the economy in general.

5.5 Limitations of the research

This study's time frame may have been short and constrained. The ten-year span is also insufficient because most policy actions can take years to have an impact on the economy. However, the study chose the period 2011 to 2020 because it is when the real estate business has developed the most. Moreover, the timeframe was affected by unforeseen events such as the COVID pandemic and general elecctions in the years 2012 and 2017 that normally affect policy decisions and economic growth.

The research study also used the Hass Consult Index to analyze property prices but had intended to use other indices from other firms. This was difficult to do as Hass Consult is the only publicly available index, and other firms restrict their property indices and are only available to their own investors.

5.6 Suggestions for further research

The time constraints of this research did not permit for an in-depth examination of many of the factors that potentially account for variances in housing prices. Also, the conclusions were based on a rather small sample size, Hass Consultant firm, which could have impacted the nature of the results produced. As a result, there is a need to increase the sample size to include other real estate firms and do similar study on the real estate market.

The study also focused on property prices in Nairobi as a measure of returns. There is a need for further research that includes other cities in the country so as to find out how their property prices affect the Kenyan real estate sector as a whole.

Finally, this research dwelt on inflation, GDP, interest rates, money supply and household income as factors affecting the returns of the real estate market in Nairobi. Despite this, there are other macroeconomic factors that may affect the sector, such as exchange rates, unemployment and population. Further research is recommended to be done and to include the factors that were not considered in this particular study using different models of analysis also.

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APPENDICES

Appendix I: Macroeconomic Data

Quarter	GDP (Growth in %)	Inflation Rate (%)	Interest Rate (%)	Property Prices (% growth)	Household Income (% growth)	Money Supply (% of GDP)
2011-1	0.716367	4.156667	5.833333	-0.1	4.94	36.57
2011-2	0.995688	6.013333	6.083333	-3.1	4.72	36.72
2011-3	1.395294	9.02	6.5	-1.8	5.12	36.89
2011-4	1.088928	12.77667	15.16667	1	4.81	36.61
2012-1	0.871187	15.82667	18	2.1	4.35	36.52
2012-2	1.526324	16.29	18	2.7	4.62	36.78
2012-3	1.109101	14.29667	15.33333	3.6	4.17	37.25
2012-4	0.334121	10.69667	11.66667	3.2	4.21	37.69
2013-1	1.233347	7.256667	9.5	-2.6	6.2	37.78
2013-2	0.940632	5.043333	8.833333	3.9	6.31	37.82
2013-3	0.915982	4.563333	8.5	3.6	6.08	38.29
2013-4	1.825829	5.386667	8.5	4.2	6.19	39.12
2014-1	1.657358	6.203333	8.5	3.6	4.21	42.3
2014-2	0.714828	6.826667	8.5	0.9	3.96	42.12
2014-3	0.171462	7.236667	8.5	1.2	4.52	42.01
2014-4	2.142462	6.976667	8.5	1.6	4.17	42.67
2015-1	1.678074	6.666667	8.5	0.2	5.81	42.81
2015-2	0.753806	6.656667	9	2.2	6.21	42.92
2015-3	0.850144	6.44	11.5	3.9	4.93	41.89
2015-4	0.400794	6.436667	11.5	3.6	6.01	41.73
2016-1	1.742919	6.84	11.5	4.2	4.48	40.32
2016-2	1.504279	6.59	10.83333	3.6	5.19	41.12
2016-3	1.039978	6.47	10.16667	1.2	3.78	40.19
2016-4	0.75676	6.403333	10	2.7	4.21	39.62
2017-1	-0.00333	6.483333	10	-0.1	4.91	39.35
2017-2	1.550741	6.98	10	-3.1	4.52	39.42
2017-3	1.068008	8.323333	10	-1.8	5.21	39.51
2017-4	2.323441	8.153333	10	1	4.84	39.23
2018-1	1.000125	7.36	9.833333	2.1	4.72	39.35
2018-2	1.013175	5.6	9.5	2.7	4.31	40.21
2018-3	1.366292	4.703333	9	3.6	5.11	39.61
2018-4	1.305639	4.603333	9	3.2	3.91	38.43
2019-1	2.119835	4.666667	9	-2.6	4.87	38.01
2019-2	0.145201	5.09	9	-3	4.23	39.23
2019-3	0.515962	5.32	9	0.9	4.91	39.86
2019-4	1.584488	5.193333	8.666667	1.2	5.42	40.21
2020-1	-6.70684	5.616667	7.916667	1.6	-2.6	41.06
2020-2	2.925117	6.123333	7	0.2	-3.59	40.89
2020-3	3.449807	5.89	7	0.94	-4.66	42.54

2020-4	2.647468	5.536667	7	1.2	-1.99	41.22

Source: ***CBK, World Bank, Hass Property Index, Kenya National Bureaus of Statistics***