

**EFFECT OF SELECTED MACROECONOMIC VOLATILITY ON  
FINANCIAL PERFORMANCE OF THE REAL ESTATE SECTOR  
IN KENYA**


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## DECLARATION

I, the undersigned, declare that this is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

Signed:  \_\_\_\_\_ Date: 18 November 2022

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This research project has been submitted for examination with my approval as the University Supervisor.

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## **DEDICATION**

This research project is dedicated to my lovely wife who has been a constant pillar in supporting me through this journey. I drew motivation and enthusiasm from her cheerleading spirit that enabled me to undertake this task with determination. Her support and love throughout the process made the submission of this project possible.

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## **LIST OF ABBREVIATIONS**

<b>ANOVA</b>	Analysis of Variance
<b>APT</b>	Arbitrage Pricing Theory
<b>CAPM</b>	Capital Asset Pricing Model
<b>CBOE</b>	Chicago Board Options Exchange
<b>CPI</b>	Consumer Price Index
<b>FDI</b>	Foreign Direct Investments
<b>GDP</b>	Gross Domestic Product
<b>JSE</b>	Johannesburg Stock Exchange
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>MPT</b>	Modern Portfolio Theory
<b>REIT</b>	Real Estate Investment Trusts
<b>ROA</b>	Return on Assets
<b>ROE</b>	Return on Equity
<b>SPSS</b>	Statistical Package for Social Sciences
<b>USD</b>	United States Dollar
<b>VIF</b>	Variance Inflation Factors

## ABSTRACT

The Kenyan real estate sector has experienced accelerated growth since the turn of the millennium. However, in the last 5 years (2017 to 2021), the performance of the real estate sector in Kenya has slowed down. This can be explained by several factors and macroeconomic volatility is hypothesized to be one of these factors. The real estate sector has faced increasing prices of goods and services due to rising inflation, unpredictability of interest rates and fluctuation in exchange currencies. Such unfavorable macroeconomic factors may cause great problems in real estate sector financial performance in Kenya. The objective of this research was determining the effect of selected macroeconomic volatility on Kenya's performance of the real estate sector. The study was based on capital asset pricing model and supported by arbitrage pricing theory as well as modern portfolio theory. The independent variables were interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility. The dependent variable that the research endeavored to describe was the financial performance of the Kenyan real estate industry. The data was obtained on a quarterly basis for a ten-year duration (Jan. 2012 to Dec. 2021). A descriptive research technique was applied in the research, with a multivariate regression model utilized in examining the link between the research variables. The research conclusion resulted in 0.761 R-square figure, signifying the selected independent variables could account for 76.1% in the Kenya financial performance variation in the real estate sector, while the other 23.9 percent was as a result of other factors not explored in this research. The F statistic was significant at a 5% extent possessing a  $p=0.000$ . This indicates that the model was effective in explaining how Kenya's real estate market performed. Further, the conclusions demonstrated that higher inflation rate volatility and economic growth volatility yields a substantial rise in performance in the real estate sector while interest rate volatility and exchange rate volatility did not possess significant effect on real estate sector financial performance. The research recommends that there is need to manage inflation rate volatility and economic growth volatility since they have a major impact on real estate sector performance. The research further acclaims the necessity for future researchers to conduct a study for a longer period of time to capture the effects of economic cycles like recessions and booms.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the Study

The market's current economic circumstances possess a significant impact on the organization's performance, either positive or negative. Inflation rate, exchange rate, and interest rate are the three main macroeconomic variables that have a substantial impact on a company (Witkowski, Cheba, & Kiba-Janiak, 2017). Scholars who aim to comprehend the elements that influence or boost to a company's financial performance are just as interested in it as investors and businesses. How a company uses its resources determines its efficiency and effectiveness which possess substantial impact on both its financial performance and its role in the national economy (Ruhomaun, Saeedi, & Nagavhi, 2019).

This research was anchored on Capital Asset Pricing Model (CAPM) and supported by Arbitrage Pricing Theory (APT) as well as Modern Portfolio Theory (MPT). CAPM by Sharpe (1964) was the anchor theory as it forecasts a firm's expected rate of return based on statistics about the market's expected rate of return and also takes into account the market risk and systematic risk. According to APT by Ross (1976), both fundamental and statistical factors influence market returns. The return of a specific asset is a linear function of factors in the economic environment that affect all securities. The MPT by Markowitz (1952) holds that securities and firms' performance is influenced by both systematic and unsystematic risk and that diversification helps eliminate the unsystematic risk. These theories will be used in explaining the nexus between macroeconomic volatility and real estate segment performance.

Kenya's real estate industry has risen swiftly to be one of the country's most significant economic contributors. According to Kiunuhe, Doshi, Ngumy, and Karugu (2016), there is a growing middle class, which has resulted in an active property market with corresponding increases in demand for residential, commercial, and retail properties. As a result of this demand, individual investors, institutional investors, and even private and public companies listed to the Nairobi Securities Exchange have increased their investment in real estate projects, resulting in the creation and adoption of new real estate investment models such as Real Estate Investment Trusts (REITs) in Kenya. The macroeconomic factors in Kenya have however been volatile and this poses a threat to the real estate industry financial performance.

### **1.1.1 Selected Macroeconomic Volatility**

Macroeconomic volatility refers to the large fluctuations of a macroeconomic variable arising from domestic or external shocks that are unpredictable or unforeseen (David & Ampah, 2018). An economic variable's volatility pertains to the idea of disequilibrium and is determined by the variance between the values it takes and a trend or reference value (Cariolle, 2012). Macroeconomic volatility also indicates constant fluctuations in the key macroeconomic variables like interest rate, exchange rate and commodities price (Chow et al., 2018). The evolution of external imbalances in a large cross section of nations can be explained by macroeconomic volatility (Hjalmarsson, 2013).

Macroeconomic volatility is both a reflection and underdevelopment source, and a major worry for several developing nations (David & Ampah, 2018). A blend of volatile macroeconomic policies, large external shocks, microeconomic rigidities and weak institutions results to their high growing instability. Risk-averse individuals

incur a direct cost from volatility, and indirect costs from its adverse effects on economic development and growth (Loayza, Ranciere, Servén & Ventura, 2007). Over the long term, macroeconomic volatility results in a decrease in investment levels, consumption and factor productivity, to a heightened level of volatility and economic policy unpredictability, and corrosion in the institutional environment (Cariolle, 2012).

The current research operationalized macroeconomic volatility in terms of inflation volatility, exchange rate volatility, interest rate volatility and economic growth volatility due to their wider use in previous literature. Inflation is a proxy for macroeconomic volatility and economic uncertainty as high inflation volatility reduces economic activity and volatility in inflation rate is the standard deviation of the consumer price index (Hjalmarsson, 2013). Exchange rate is a measure of the currency value against the standard deviation of exchange rates and the weighted average of a number of foreign currencies is normally used to proxy for exchange rate volatility while volatility in interest rate is measured using annual lending rates the standard deviation (David & Ampah, 2018). Economic growth volatility is often measured using GDP growth rate the standard deviation. Conventionally, volatility indicators measure the mean deviation range of the variable relative to the reference value generally based on standard deviation (Cariolle, 2012).

### **1.1.2 Financial Performance**

Financial performance is the firms' potential to satisfy a couple of financial objectives (Abernathy & Utterback, 2015). The extent to which the financial standards of an entity have been satisfied is known as financial performance. It is an outline of how well financial objectives have been fulfilled (Nzuve, 2016). Investors, shareholders

and, by extension, the general economy requires financial performance in decision making. A good institution is great for higher alongside long-term revenue for investors which results to return on investment which is completely worthwhile to individuals who invested (Fatihudin & Mochklas, 2018). The health in addition to existence of an entity is dependent on its financial performance. The effectiveness besides efficiency of an organization in managing its assets during financial transactions, operations also investments is shown through its excellent performance (Karajeh & Ibrahim, 2017).

Financial performance is very significant since it assists in measuring institutional efficiency, firm competency along with the productivity. Also, it is considered as a determination for efficiency including effectiveness of resources which have been utilized in production of output or products of the preferred type by customers plus society in the long run (Bain, 2016). Financial performance aids in revealing the organization's profitability which is determined using income as well as expense. Business managers have a very important duty of enhancing the performance of the company since enterprise survival is dependent on its profitability (Chakravarthy, 2016). Moreover, firm performance reveals how an enterprise is fairing in its methods of attaining objectives, mission as well as vision (Eisenhardt & Schoonhoven, 2018).

Several ratios are utilized in measuring financial performance. In relation to Mwangi and Murigu, (2015), the often used metrics for evaluating financial performance are ROA and ROE. In contrast to the ROE, which looks at how a firm is using shareholders' equity, the ROA measures a company's profitability using all of its assets. Market-based indicators including market capitalization, dividend yield, market to equity par value, and earnings per share can also be used to measure

financial performance (Baba & Nasieku, 2019). In the Kenyan real estate sector, the Hass Consult composite index has often been used and this measure was adopted in the current study.

### **1.1.3 Selected Macroeconomic Volatility and Financial Performance**

Arbitrage portfolio theory acknowledges the numerous elements that contribute to daily stock and bond price volatility, but concentrates on the major dynamics affecting huge portfolios' aggregate assets (Kim, Korajczyk & Neuhierl, 2020). By recognizing these forces, we can have a better sense of how they affect portfolio results. The ultimate goal is to improve overall portfolio design and performance by gaining a better grasp of portfolio construction and evaluation. The theory states that variables such as inflation, exchange rate and inflation can affect performance of firms (Gan, Lee & Zhang, 2006).

McKinnon (1973) theory states, variables like inflation, exchange rate and real interest rate should have close monitoring since they impact various economic fundamentals and performance of firms. They argue, for example, that increasing interest rates beyond market equilibrium will simply increase demand for investments rather than actual investments. Contrarily, the market efficiency theory states that all the variable prices ought only to be impacted by demand and supply and not any other factors. Consequently, macroeconomic variables impact individuals' investment choice and influence numerous scholars to survey the link between performance and these variables.

The key premise of Modern Portfolio Theory is that investors prefer higher returns to lower returns and are also risk averse. This is due to the fact that higher levels of return allow the investor to spend more on consumption and, when given the option to

invest, they will choose the investments with the lowest risk. Diversification can be used to eliminate unsystematic risk. By carefully selecting proportions of varied investments, this approach attempts to optimize returns at a certain risk level or, alternatively, to reduce risk at a predicted level of returns. Variations in macroeconomic factors could provide opportunities and threats to industry players at the same time; those with adequate preparations will gain from opportunities thereby improving their performance (Grasse, Whaley & Ihrke, 2016).

#### **1.1.4 Real Estate Sector in Kenya**

In Kenya, the demand for commercial and residential houses has gone up and real estate property prices have subsequently shot up by double and even triple the price in the last 5 years. Moreover, with the construction of the Mombasa-Nairobi standard gauge railway, counties have opened up and this has meant that real estate sector has had more activities for the past 5 years. This has led various multinationals venturing to start businesses in Kenya and this has posed an opportunity for real estate developers to sell properties to such corporations. The achievement of sustainable development is inextricably linked to construction sustainability performance, and numerous strategies have been created in the past to enhance sustainability when conducting construction projects (Keli, 2021).

Purchasing shares of investment firms that focus on real estate has grown in popularity since now people can invest indirectly in property. This has made Real Estate Investment Trust (REIT) an attractive investment for people to grow their portfolio as a competitive and comparative advantage over stocks (Kiunuhe et al., 2016). For real estate sector to progress well, it is essential to determine and understand the link between macroeconomic volatility like inflation rate, interest rate,



exchange rate and economic growth and to what degree they influence the valuation process of real estate investments.

Kenya's macroeconomic indicators have changed over time as a result of governmental actions and forces of supply and demand. Some of the macroeconomic issues that the nation has faced include rising prices, fluctuating interest rates, rising external debt, and exchange rate volatility. Along with a growing current account deficit, the value of the Kenyan shilling has recently declined significantly against the majority of the traded international currencies. These adverse macroeconomic trends could cause serious issues with the real estate sector's expansion (World Bank, 2018).

## **1.2 Research Problem**

The performance of a corporation is significantly correlated with the currency rate, interest rate, inflation rate, and GDP volatility, as has been established around the globe (Poudel, 2017). Money supply, price of goods, real activity, political risk interest rate, exchange rate, oil prices, unemployment, domestic consumption, imports, trade deficits, budget deficits, the trade sector, imports, real wage, and regional stock market indices are the main macroeconomic factors that affect a firm's performance (Haider, Anjum, Sufyan, Khan & Khan, 2018).

The Kenyan real estate sector has experienced accelerated growth since the turn of the millennium. The real estate segment performance in Kenya has well been above the Sub-Saharan Africa average in the last decade (World Bank, 2020). However, in the last 5 years (2017 to 2021), real estate sector performance in Kenya has slowed down. This can be clarified by several factors and macroeconomic volatility is hypothesized to be one of these factors. The real estate sector has faced increasing prices of goods and services due to rising inflation, unpredictability of interest rates and fluctuation in

exchange currencies. Such unfavorable macroeconomic factors may cause great problems in real estate sector financial performance in Kenya.

Several investigations have been done in this area internationally. Benson, Habanabakize and Fortune (2022) studied selected macroeconomic indicator volatility impact on the performance of South Africa's JSE-listed firms: a pre-and post- Covid-19 research. According to the study's findings, economic growth, the value of the currency, and stock prices all has a positive effect on asset returns. Prasad, Bakhshi and Seetharaman (2022) sought to establish various macroeconomic factors impact on the CBOE volatility index in the United States. According to the findings, economic policy uncertainty indicators, the price of gold, the USD Index, and crude oil are all considered to be reliable forecasters. Chimkono (2020) did an investigation aimed on determining how macro and microeconomics variables impact commercial banks performance in Malawi. It was brought to light by the findings that the independent variables (lending interest rate, cost efficiency, and asset quality) significantly impact the commercial banks performance. Though the studies correlate to the current research, they are done in a varied setting and their focus was not real estate sector.

Locally, Wanjiku, Bosire and Matanda (2021) pursued to establish the macroeconomic effect on Registered REITs financial performance in Kenya. The findings revealed that money supply and inflation affect the financial performance of REITs in Kenya. Njambi (2020) pursued to assess selected macroeconomic determinants effect on performance of Kenyan real estate sector. This study showed that GDP, credit growth rate, and inflation rate positively related to growth in real estate industry. However, both money supply growth and interest rate are negatively associated with growth of Kenya's real estate industry. Gwadiwa (2017) explored how

FDI inflows impact Kenya's financial performance of the real estate industry. Conclusions showed that individually, FDI inflows and inflation were not substantial determinants of Kenya's real estate performance.

Despite preceding research in this area has been done, the results have been mixed. This can be explained by the differences in operationalization of the variables. In addition, some macro-economic variables have been left out. Further, the studies have not focused on the macroeconomic volatility and financial performance of the Kenya real estate sector. This research sought to contribute to this argument by replying to the research question: What is the influence of macroeconomic volatility on financial performance of real estate sector in Kenya?

### **1.3 Research Objective**

The study's objective was to assess the effect of selected macroeconomic volatility on financial performance of Kenya's real estate sector.

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

The research results will have implications for the administration of real estate companies, decision-making bodies, and the finance literature. The management of real estate firms may use the conclusions and research recommendations to formulate effective strategies which will mitigate the macro-economic factors impact, enhance financial performance of the sub-sector.

The research will too be valuable to policy makers like the governments and other economic bodies responsible for the formulation of various policies on macroeconomic factors and financial performance. This study is useful to the bodies in charge of policy-making who may use the recommendations from the study to design effective macroeconomic strategies that would enhance financial performance.

Finally, this review will enhance to the theoretical existing discussion on the arbitrage pricing theory, modern portfolio theory, and international fisher effect theory. The research will as well add value to the practical publications on macroeconomic factors and financial performance. In addition, studies may also be conducted in line with the recommendation as well as further research suggestions.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

The primary goal of this chapter is to reviewing theories forming the basis of the study. The chapter too surveys previous empirical research that was conducted on the research issue and topics that were linked to it. The chapter also includes sections that focus on the factors that affect financial performance, display the conceptual framework that describing interactions between the research variables, address study gaps, and conclude with a review of the literature.

### **2.2 Theoretical Framework**

This section reviews vital theories explaining link between macroeconomic volatility and financial performance. CAPM, APT, and MPT are among the addressed theoretical review.

#### **2.2.1 Capital Asset Pricing Model**

William Sharpe (1964) as well as John Lintner (1965) founded Capital Asset Pricing Model (CAPM) and is the anchor theory of the current study. The Capital Asset Pricing Model predicts how to assess risk and the expected return-risk relationship. A mean-variance efficient portfolio with the same mean-variance is often used to calculate the CAPM. To explain why some assets have higher expected returns than others, asset pricing theorists employ the CAPM (Rossi, 2016). The portfolio includes risky capital assets that are weighted by their market value, and these portfolios include both classic and non-traditional asset classes such as real estate and commodities. Sharpe (1964) introduces the implications that, regardless of risk preferences, an investor will keep hazardous assets in their portfolio whose individual

risk profiles are defined by their covariance with the market and the reward to investors for bearing systematic risk.

CAPM critics argue that the model is oversimplified as a result of its two essential assumptions. The model makes one assumption investors can borrow or lend any money at a risk-free rate and the rate is consistent across all investors regardless of the amount borrowed or lent. Second, all investors have equal expectations, resulting in comparable probability distributions for future returns over the same time span. As a result, CAPM can calculate the risk price and risk measure for a given asset (Elbannah, 2015). No taxes or transaction costs associated with the acquisition or sale of assets, no inflation impacts or interest rate adjustments, and the capital markets are in equilibrium, with all investments priced properly.

Despite this, CAPM was important to the current research since it is used to aid decision-making when deciding between different real estate investments and assets in the face of risk and uncertainty. It attempts to explain asset prices while they are in a state of equilibrium. It recognizes that the performance of real estate securities is dependent on the prevailing level of macroeconomic volatility. This theory proposes that macroeconomic volatility and financial performance have a negative association.

### **2.2.2 Arbitrage Pricing Theory**

Arbitrage Portfolio Theory (APT) was coined by economist Stephen Ross (1976). It explains the relationship between portfolio asset returns and the linear combination of numerous independent macroeconomic variables. This theory is a one-period model that predicts an asset's returns using different risk variables and the same asset. Its focus is different from typical investment analysis and it is best suited for managing enormous pools of money. It is crucial to know how much risk your company is

exposed to before deciding on the appropriate degree of risk (Ross, 1976). APT's core discovery is that the long-term average returns of financial assets are determined by a few stable factors.

The theory has been critiqued because it does not rely on predicting how the market will operate. Instead, it publicly links the price of an asset to the underlying factors that influence it. The problem is that the theory doesn't specify what these components are, thus they have to be discovered through experimentation (Kim, Korajczyk & Neuhierl, 2020). Furthermore, APT is based on three major assumptions: perfect capital market competition, assurance that investors would always want more wealth, and that the stochastic process that creates asset returns can be described as a linear function of a set of risk factors (Reilly & Brown, 2012).

Certain macroeconomics parameters impacting asset prices of financial instruments like: government internal borrowing, balance of payment, inflationary rate, investor confidence level, prevailing unemployment levels, alteration in anticipated returns on securities as well as interest rate yield curve shifts (Amarasignhe, 2015). Based on linear connection among stock price and macroeconomic variables, macroeconomics factor may be assumed to have an impact on securities value. The asset's or security's monetary worth may thus be called the entire anticipated return and any unanticipated return on the assets (Cuthbertson, 2004). This study relates macroeconomic factors to returns of firms and therefore it is relevant to the current study. The research hypothesizes a negative impact on interest rate, inflation, exchange rate and unemployment rate on financial performance.

### **2.2.3 Modern Portfolio Theory**

The theory was founded by Markowitz (1952) in his publish for the portfolio mixture. This theory put an emphasis on how it is possible to maximize expected returns by creating weighted portfolio utilizing risks thresholds. The theory stated that institution may build portfolio that optimize anticipated return at specified risk levels. This theory states that profit can be maximized by choosing proportions of different investments that will lower the investment risk level.

Unsystematic risks and systematic risks were defined by the theory as the two categories of hazards that investors should be aware of. Unsystematic risk is linked to the degree of volatility of a single investment, whereas systematic risk is inherent in market volatility across the board or in particular segments of it. Investors are consequently advised to combine their portfolios by ensuring that any specific risks incurred by one investment are mitigated by fewer specific risks in other investments (Cuthbertson, 2004).

This theory is critiqued by behavioural finance theorists for its assumptions and failure to consider the role of human behaviour in maximizing returns. Brueggeman and Fisher (2011) claim that macroeconomic factors typically have an impact on the business environment within the economy. The rewards to businesses, and financial institutions in particularly, will vary in an environment of fluctuating economic variables, notably inflationary pressures and volatile exchange rates. Unstable returns thus control performances of financial firm like environment fluctuate hence affecting their financial performance. Macroeconomic factors ought to be carefully considered by policy makers since they may have an impact on financial performance. This research has contribution to the current research as it identifies macro-economic



factors as variables that can influence financial performance. The theory is relevant as it relates variables like interest rates, exchange rates, unemployment and inflation with financial performance of firms or sectors.

### **2.3 Determinants of Financial Performance**

The variables that influence production level may be internal as well as external to the business. Internal variables vary from one company to the next and influence financial performance in various ways. Such variables derive from decisions made by management in collaboration with the board of directors. Financial performance is inclined to a number of external factors, comprising among others interest rates, exchange rate volatility, economic growth, inflation (Athanasoglou et al., 2005).

#### **2.3.1 Interest Rates**

Interest rates have a significant impact on both domestic and international product and service pricing. The quantity of money in the economy has a significant impact on interest rates. For example, when the economy is flooded with cash, borrowing rates are more likely to drop, which will have an impact on how a company does on the market. As a result, the market will grow and become more appealing to tourists to the nation. If the amount of money in the economy decreases, the opposite will occur (Barksenius & Rundell, 2012)

Interest rates establish real estate financial performance. Interest rate normally influences a real estate developer to provide housing for the real estate market in a huge way (Li, 2016). When interest rate goes up, the construction costs for the developers decreases such that prices in the real estate market increase. High interest rates also lead to increased cost of buying houses by buyers and this discourages buyers from taking loans to purchase houses. Therefore, the demand for housing

decreases when interest rate increases and there's a general decrease of the trend in prices in this industry.

### **2.3.2 Inflation Rate**

The economy of a nation can be significantly impacted by inflation rates. For instance, home values will rise during periods of price fluctuations and increases. When a result, the overall cost of goods is likely to grow as inflation develops in an economy. This will consequently have an effect on how profitable businesses are. As a result, many investors who participate in the market's sale of goods and services typically make an inflation allowance (Biller, 2007).

The real estate market exhibits a long-term relationship with inflation. Blanchard (2010) posits presence of a positive impact of increased demand on prices of products. This theory further suggests that increase in output and the level of income create demand since higher levels of investment and consumption will be experienced. The general level of prices was greatly lower than that of the stock prices before the crisis period.

### **2.3.3 Exchange Rates**

Exchange rates possess a substantial impact on the financial performance of the economy. Variations in currency's exchange rate have an impact on import prices, which include CPI and production costs. Its inconsistencies are transmitted to local pricing via a network of imported consumer goods prices. Variation in exchange rate has a direct effect on the economy on local pricing. Increases in demand for local goods is observed when factors that influence prices causes prices of imported goods and services to increase thereby reducing completion (Magweva & Marime, 2016).

Shift equilibrium causes an increase in pressure on local prices and nominal wages with an increase in demand. Additional increases in pressure will be transferred to local prices resulting from increases in wages. Depreciation in the exchange is a minor guarantee to the domestic industry since domestic costs of production rises at a slower depreciation rate in comparison to comparable import prices, which rises by complete depreciation. This scenario of depreciation in the currency creates a favorable condition production among local industry (Nwankwo, 2006).

#### **2.3.4 Economic Growth**

Economic growth is viewed as an important overall measure of an economy's wellbeing. It is thus used to track the overall economic growth trend of an economy over time and can thus be used to track the effectiveness of economic policies instigated with an aim of enhancing growth overtime. Achieved positive economic growth may help in the realization of various macro-economic objectives that include poverty reduction, increased employment, public services improvement and reduced debt balances to GDP ratios (Phimmarong & Kinnalone, 2017).

Economists have often recognized that capital is a key component of enhancing economic growth, via its deployment to productive investments. Capital is thus required for both public and private sector investments that enhance local economic growth. Public investments include infrastructure projects that support and stimulate growth, along with employment creating public projects that reduce poverty by increasing incomes and thereby raising standards of living. The private sector requires capital for such needs like supplementing production resources and expanding business activity (Onyinye, Orji, Jonathan & Emmanuel, 2018).

## **2.4 Empirical Review**

International and local research have been performed supporting link among macroeconomic variables and financial performance, however the findings are mixed.

### **2.4.1 Global Studies**

Prasad, Bakhshi and Seetharaman (2022) pursued to establish numerous macroeconomic factors impact on the CBOE volatility index in the United States. For the analysis, data from May 2007 to December 2021 were taken into account. The selected models are trained using twenty-four daily features as well as twenty-four plus nine weekly features. The findings show that economic policy uncertainty indexes, the price of gold, the USD Index, and crude oil are all considered to be reliable forecasts. The CBOE volatility index is slightly less affected by various rates on fixed income assets than it is by the financial distress index, initial claims, money supply, Fed rate, as well as credit spread.

Benson, Habanabakize and Fortune (2022) studied selected macroeconomic indicators' volatility impact on the performance of South Africa JSE-listed firms: a pre-and post- Covid-19 study. The research used annual panel data ranging 2010 - 2020 to use the panel autoregressive distributed lag model in examining the short- and long-term effects of macroeconomic variables on a company's performance. The study's findings indicated that economic growth, exchange rates, and stock prices all possess positive effect on asset returns, whereas economic growth and stock prices, over time, improve a company's equity return.

Chimkono (2020) did an investigation aimed on determining how macro and microeconomics variables impact commercial banks performance of Malawi accredited by the Malawi central bank. Secondary data was gathered from the audited

financial reports and covered a fifteen-year period between 2000 and 2014. Publications prepared by the World Bank and reserved bank of Malawi were also used as sources of data. It was brought to light by the findings that the independent variables (lending interest rate, cost efficiency, and asset quality) significantly impact the performance of commercial banks. Moderating variables exhibited substantial impact on the independent variables. Further, it was discovered that the credit risks have a negative influence of performance of banks.

In Sri Lanka, using secondary data collected between 1990 and 2012, Badullahewage (2020) investigated how macroeconomic variables impacted the performance of stock market. Macroeconomic variables comprised of inflation, GDP, money supply, interest and exchange rate. A strong relation was found between performance stock market and macroeconomics indicators. Rate of exchange and inflation had comparatively higher effects on performance.

Baba and Nasieku (2019) using explanatory research design examined how Nigerian banks financial performance is impacted by macroeconomic factors. The research made use of secondary data gathered from banks annual reports, World Bank, Nigerian bureau of statistics and research centers. 23 licensed banks in Nigeria participated in this research. The study applied return on equity (ROE) as performance measurement. The empirical outcome indicated unemployment rate, exchange rates, and interest rates are inversely and substantial associated with the performance of banks whereas inflation has an insignificant link. An increment in exchange rate positively influences the performance of banks while an increment in the interest rates worsens performance.

### **2.4.2 Local Studies**

Wanjiku, Bosire and Matanda (2021) sought to establish macroeconomic impact on Kenyan REITs financial performance. The financial performance of the REIT was described using a causal research design. Thirteen Kenyan REITs companies were the sample for this research. The study made use of the population as a whole (census). Secondary sources of data were used in this research to obtain the data needed to meet the study's objectives. In order to calculate REITs' financial performance time series data during a four-year duration from January 1, 2016, to December 31, 2019, four data points were used. The findings revealed that money supply and inflation affect the financial performance of REITs in Kenya.

Njambi (2020) pursued to assess the effect of selected macroeconomic determinants on performance of Kenyan real estate sector. The study adopted correlation research design. The Hass Consultancy, the CBK and the KBS offered secondary data and data collected was from 2007 to 2016 on a quarterly basis. The research utilized regression analysis. This study showed that capital, GDP, credit growth rate, and inflation rate positively related to growth in real estate industry. However, both money supply growth and interest rate had negative coefficients indicating that they negatively associated with growth of Kenya's real estate industry.

Using inferential and descriptive statistics, Kamamia (2020) did an investigation how investment banks performance is affected by certain macroeconomics indicators. A descriptive survey design was adopted. The time frame 2008-2017 was period of the study and secondary data was acquired on a quarterly basis. Both inferential and descriptive statistics being utilized in analyzing the data. The outcome demonstrated that independently, interest rate, inflation rates and exchange rate are substantial

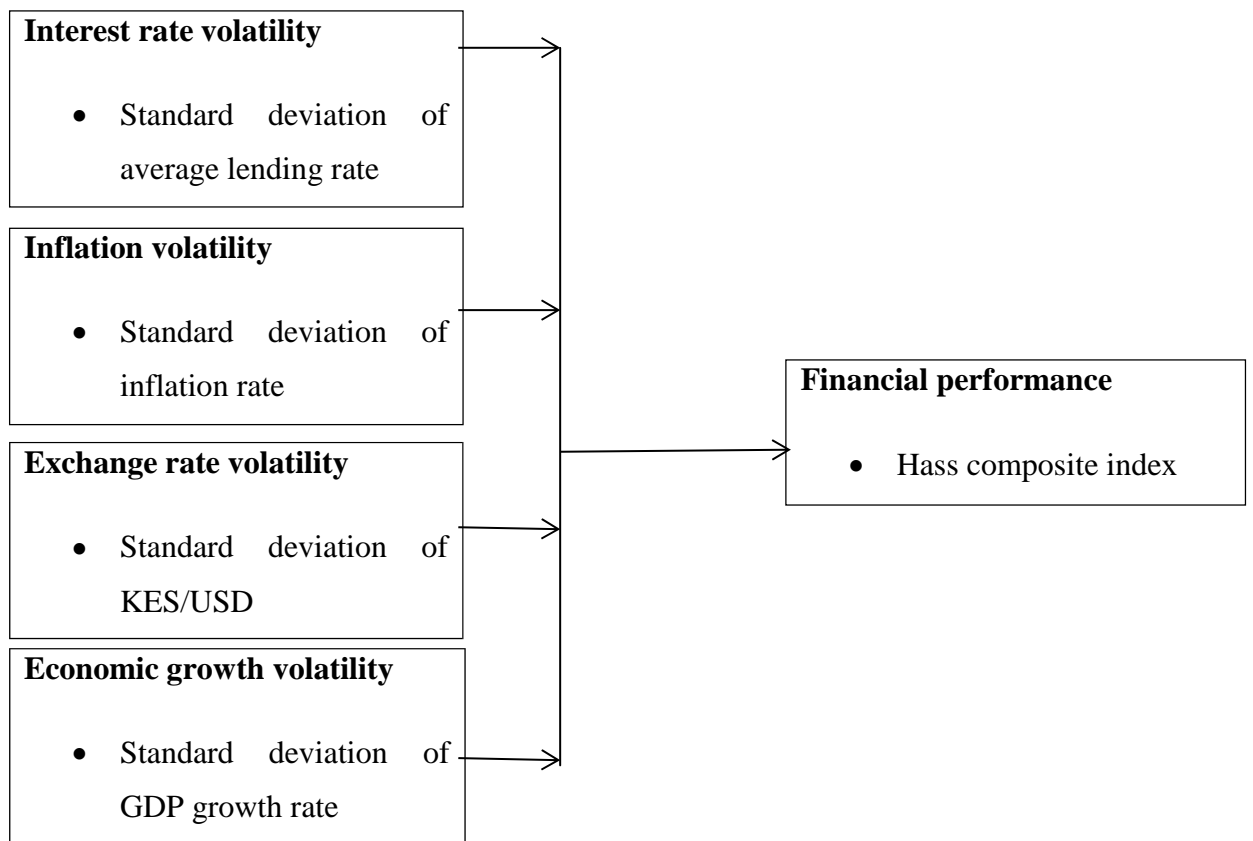
determinants of investment banks performance in Kenya whereas economic financial performance is not a substantial determinant.

Nderitu (2020) aims to determine to what degree macro-economic factors influence Kenya's banking sector performance. The period from 2009 to 2018 included inferential and descriptive statistic to examine the data gathered. SPSS software version 22 was applied in analyzing data and the outcomes were displayed in tables and graphs. The findings show that interest rate and economic expansion have a favorable effect on business banking performance, whereas exchange rates and inflation has serious undesirable impact on success in the banking system.

Gwadiwa (2017) explored how FDI inflows impact Kenya's financial performance of the real estate sector. The 80 companies that make up the real estate composite index served as the study's population. During January 2007 to December 2016, secondary data collection was undertaken in quarterly periods. The link was examined using a descriptive cross-sectional approach and a linear regression model. Findings showed that exclusively, FDI inflows, rates of interest, exchange rates and inflation were not substantial determinants of Kenya's real estate performance.

## **2.5 Conceptual Framework**

The model beneath reveals the study variables anticipated link. The independent variables for the research was interest rate volatility given by the standard deviation of average lending rate, inflation volatility given by standard deviation of inflation rate, exchange rate volatility measured as the rate of Kes to Usd standard deviation on a given quarter, and economic growth volatility given by the GDP standard deviation growth rate. The dependent variable was financial performance of the real estate sector as measured by the Hass composite index.



**Independent variables**

**Dependent variable**

**Figure 2.1: The Conceptual Model**

**Source: Researcher (2022)**

## **2.6 Summary of the Literature Review and Research Gaps**

A few theoretical frameworks have elaborated on the theorized link between macroeconomic volatility and financial performance. Theories reviewed were; CAPM, APT and modern portfolio theory. The Key financial performance factors too have been in this segment considered. More so, a few empirical research carried out only not locally though globally too on macro-economic volatility and financial performance have been deeply scrutinized. These research conclusions were fiercely disputed.

The evaluation of empirical research reveals limits in methodology, context, and



concepts. The contradictory conceptual results of the existing empirical investigations may be justified by the various operationalization of variables. Previous research has employed various approaches, extending from time series to panel analysis, and this can aid in describing why diverse results were obtained. Contextually, the majority of the local studies that are currently accessible have concentrated on industries other than real estate, which was the subject of the current research.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

The chapter highlights the steps and methods embraced in the execution of the proposed study. It particularly covers the data collection techniques, research design, variables operationalization as well as data analysis techniques.

### **3.2 Research Design**

The descriptive study design was applied in this research to estimate the effect of Kenya's macroeconomic volatility on financial performance. Cooper and Schindler, (2008), suggest that the most systematic research design is the descriptive one as it consists of a practical inquiry whereby the researcher does not directly control the independent variable due to their manifestation having previously arose or their inherent inability to manipulate. A defining study method was the most suitable as the research sought to creating a profile about the link between Kenya's macroeconomic volatility on financial performance.

### **3.3 Data Collection**

Secondary data from the Kenyan Central Bank, KNBS and Hass Consult was used in this study, which was on a quarterly basis spanning 10 years (2012-2021). Hass Consult provided information on the dependent variable, the performance of Kenya's real estate sector and for each quarter, the Hass index was collected. Data acquired from CBK was used to compute the country's interest rates which was the quarterly average bank lending rate and the exchange rate that was Kes/Usd. KNBS provided inflation statistics on the quarterly inflation rate, and economic growth data on the quarterly GDP growth rate.

### 3.4 Diagnostic Tests

The linear regression is based on a number of assumptions including no autocorrelation, no multi-collinearity, stationarity and normality. The diagnostic tests performed are outlined in Table 3.1

**Table 3.1: Diagnostic Tests**

Test	Meaning	Statistical method	Interpretation	Diagnosis
Autocorrelation	Occurs when the residuals lack independence from each other.	Durbin-Watson statistic	When the test outcomes fall within critical values ( $1.5 < d < 2.5$ ) there is no autocorrelation	Correlogram (Auto Correlation Function-ACF plot) Review model specifications
Multicollinearity	How closely related are the independent variables of the study	Variance Inflation Factors (VIF)	VIF less than 10 implies that there is no multicollinearity	Data causing Multicollinearity was adjusted using log transformation
Normality Test	When linear regression analysis for all variables is multivariate normal	Goodness of fit test Shapiro-Wilk test	Kolmogorov-Smirnov test prob. > 0.05. If the test is not substantial, the distribution is possibly normal.	Data that was not normally distributed was adjusted for using log transformation and non-linear log transformation.
Stationarity	a unit-root test to establish if the data was stationary	Jarque Bera unit root test	A p value less than 0.05 implies that the data is stationary	Robust standard errors were utilized wherever data failed the test.

### 3.5 Data Analysis

Data analysis was done via the SPSS software version 24. Tables presented the quantitative conclusions. Measures of central tendency and dispersion were calculated using descriptive statistics, and standard deviation was provided for all the variables. Correlation was used to gauge the degree of link between research variables, and regression was used to identify cause-and-effect relationships. Relationship between research variables established by multiple regression using linear regression.

#### 3.5.1 Analytical Model

The following regression model was utilized:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon.$$

Where: Y = Financial performance of the real estate sector given by the composite index on a quarterly basis.

$\alpha$  = Constant value in predicator variables absence

$\beta_1 \dots \beta_4$  = are the regression coefficients

$X_1$  = Interest rate volatility computed as the standard deviation of the average bank lending rate on a quarterly basis

$X_2$  = Inflation volatility given by standard deviation of inflation rate for every quarter

$X_3$  = Exchange rate volatility given by standard deviation of KES/USD on a quarterly basis

$X_4$  = Economic growth volatility as measured by standard deviation of quarterly GDP growth rate

$\varepsilon$  = error term

### **3.5.2 Tests of Significance**

The relevance of the overall model and every specific variable was established via parametric testing. ANOVA was used to do the F-test, which established the overall model relevance, and a t-test, established the coefficients significance.

## CHAPTER FOUR: DATA ANALYSIS, RESULTS AND FINDINGS

### 4.1 Introduction

This chapter offers the findings of this research. The main aim of the study was to determine how selected macroeconomic volatility influences financial performance of the real estate sector in Kenya. The following sections consist of descriptive statistic, diagnostic test, correlations analysis, regression as well as results discussion.

### 4.2 Descriptive Analysis

Descriptive statistics of all variables on which analysis was done are tabulated below. Quarterly information was gathered and analyzed using SPSS version 24 software during a ten-year duration (2012 to 2021).

**Table 4.1: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Financial performance	40	.0520	.1228	.101725	.0177192
Interest rate volatility	40	.0595	2.7978	1.129075	.9423197
Inflation rate volatility	40	.0500	3.5610	1.763273	1.0266183
Exchange rate volatility	40	.0024	.0451	.022663	.0158266
Economic growth volatility	40	.0000	.0214	.016712	.0078708
Valid N (listwise)	40				

**Source: Research Findings (2022)**

### 4.3 Diagnostic Tests

Before even handling the regression model, diagnostic tests were run. Autocorrelation, Multicollinearity, normality, and stationarity tests were conducted in the survey.

#### 4.3.1 Autocorrelation Test

A serial correlation test established the relationship of error terms for diverse times. For the research to obtain the desired model parameters, the Durbin Watson serial

correlation test was utilized to carry out the analysis of data autocorrelation, which is a major shortcoming in the data analysis that must be examined. The findings are shown in Table 4.2.

**Table 4.2: Autocorrelation Results**

Durbin Watson Statistic
1.923

**Source: Research Findings (2022)**

From the null hypothesis, no first-order serial/auto correlation exists. The 1.923 Durbin Watson statistical varies from 1.5 to 2.5 indicating no serial correlation.

#### 4.3.2 Multicollinearity Test

In a multiple regression model, multicollinearity is displayed whenever predictor variables exhibit a substantial relationship. An event where independent variables have great correlations is unfortunate. Parameters are said to have multicollinearity if they have a perfect linear connection. Outcomes for the test on multicollinearity were displayed in Table 4.3.

**Table 4.3: Multicollinearity Test**

	Collinearity Statistics	
	Tolerance	VIF
Interest rate volatility	0.426	2.347
Inflation rate volatility	0.472	2.119
Exchange rate volatility	0.358	2.793
Economic growth volatility	0.411	2.433

**Source: Research Findings (2022)**

VIF value is used where values that fall below 10 are not multi-linear. One condition for multiple regressions to occur is that no strong connection should be evidenced

among variables. Given by the outcomes, every VIF variable is below 10 as indicated in table 4.3 which shows independent variables in the study experience no substantial statistical multi-linearity.

### 4.3.3 Normality Test

To establish if the data was normally distributed, the researcher used the Jarque-Bera tests. If the p-value exceeds 0.05, we conclude that there is normal distribution of data and vice versa. The test results are listed in Table 4.4.

**Table 4.4: Normality Test Results**

	<b>Jarque-Bera Coefficient</b>	<b>P-value</b>
Financial performance	3.586	0.101
Interest rate volatility	6.303	0.303
Inflation rate volatility	2.765	0.076
Exchange rate volatility	3.152	0.098
Economic growth volatility	5.473	0.284

**Source: Research Findings (2022)**

Since the data displayed a p value of above 0.05 therefore having a uniform distribution, the researcher adopted the alternative hypothesis. This data was fit to be subjected to tests and analysis like variance, regression as well as Pearson Correlation.

### 4.3.4 Stationarity Test

The research variables were subjected to a unit-root test to establish if the data was stationary. The unit root test was ADF test. With a standard statistical significance level of 5%, the test was compared to their corresponding p-values. In this test, the null hypothesis states that every variable has a unit root, and the alternative hypothesis is that the variables are stationary. Findings portrayed in Table 4.5.



**Table 4.5: Stationarity Test**

	<b>Statistic</b>	<b>P-value</b>
Financial performance	-3.271	0.000
Interest rate volatility	-3.337	0.000
Inflation rate volatility	-4.748	0.000
Exchange rate volatility	-3.755	0.000
Economic growth volatility	-5.364	0.000

**Source: Research Findings (2022)**

As demonstrated in Table 4.5, this test concludes that the data is stationary at a 5% level of statistical significance since the p-values all fall below 0.05.

#### **4.4 Correlation Analysis**

Pearson correlation was employed to establish the relationship linking performance of the real estate sector in Kenya to the characteristics of the study (interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility). From the study's findings, a strong positive that is statistically significant relationship exists between interest rate volatility and performance of the real estate sector ( $r = .631$ ,  $p = .000$ ). The correlation results further revealed a strong positive and significant statistical connection between inflation volatility and performance of the real estate sector ( $r = .632$ ,  $p = .000$ ). Exchange rate volatility unveiled a robust positive as well as significant association with performance of the real estate sector in Kenya ( $r = .701$ ,  $p = .000$ ). Economic growth volatility displays a significant and positive interrelationship to performance of the real estate sector in the Kenyan economy ( $r = .816$ ,  $p = .000$ ). The outcomes are as revealed in Table 4.6.

**Table 4.6: Correlation Analysis**

		Financial performance	Interest rate volatility	Inflation rate volatility	Exchange rate volatility	Economic growth volatility
Financial performance	Pearson Correlation	1				
	Sig. (2-tailed)					
Interest rate volatility	Pearson Correlation	.631**	1			
	Sig. (2-tailed)	.000				
Inflation rate volatility	Pearson Correlation	.632**	.622**	1		
	Sig. (2-tailed)	.000	.000			
Exchange rate volatility	Pearson Correlation	.701**	.663**	.665**	1	
	Sig. (2-tailed)	.000	.000	.000		
Economic growth volatility	Pearson Correlation	.816**	.617**	.456**	.705**	1
	Sig. (2-tailed)	.000	.000	.003	.000	

\*\* . Correlation is significant at the 0.01 level (2-tailed).  
b. Listwise N=40

**Source: Research Findings (2022)**

#### 4.5 Regression Analysis

Interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility were utilized as agents to predict performance of the real estate sector in Kenya. The test was done at 5% significance level. Table 4.7 to 4.9 displays the results.

**Table 4.8: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.872 <sup>a</sup>	.761	.733	.0091476

a. Predictors: (Constant), Economic growth volatility, Inflation rate volatility, Exchange rate volatility, Interest rate volatility

**Source: Research Findings (2022)**

The R squared indicator indicates how the explanatory variables may describe variations in the response variable. As indicated in Table 4.7, the R square was 0.761, indicating that changes in interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility account for 76.1 percent of the real estate sector's performance. Factors not encompassed in this research account for 23.9 percent of the variance in real estate sector performance in Kenya. The correlation coefficient (R) of 0.872 showed a significant connection amongst predictor factors and real estate sector performance.

**Table 4.8: Analysis of Variance**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.009	4	.002	27.833	.000 <sup>b</sup>
	Residual	.003	35	.000		
	Total	.012	39			

a. Dependent Variable: Financial performance  
b. Predictors: (Constant), Economic growth volatility, Inflation rate volatility, Exchange rate volatility, Interest rate volatility

**Source: Research Findings (2022)**

The value of P obtained by ANOVA is 0.000, which is less than  $p=0.05$ . This establishes that the model's importance described how interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility affect Kenya real estate sector performance.

The relevance of various variables was determined using the model coefficients. The statistics of t and values of p were used to accomplish this. This study is significant since it allowed the researcher to determine which independent variables were chosen (interest rate volatility, inflation rate volatility, exchange rate volatility and economic

growth volatility) significantly influences the performance of the real estate sector of the Kenyan economy. The results are summarized in Table 4.9.

**Table 4.9: Model Coefficients**

Model	Unstandardized Coefficients		Standardize	t	Sig.
	B	Std. Error	d Coefficients Beta		
(Constant)	.065	.004		15.692	.000
Interest rate volatility	-.004	.004	-.212	-1.112	.274
Inflation rate volatility	.008	.003	.457	3.011	.005
Exchange rate volatility	.031	.211	.027	.145	.886
Economic growth volatility	1.619	.269	.719	6.014	.000

a. Dependent Variable: Financial performance

**Source: Research Findings (2022)**

Table 4.9 shows that inflation rate volatility and economic growth volatility, with p values less than 0.05, were significant predictors of real estate sector performance in Kenya while interest rate volatility and exchange rate volatility did not possess significant impact on real estate performance in Kenya.

The following regression was established:

$$Y = 0.065 + 0.457X_1 + 0.719X_2$$

Where,

Y = Performance of the real estate sector

X<sub>1</sub> = Inflation rate volatility

X<sub>2</sub> = Economic growth volatility

Using the constant = 0.065, we can see that if selected independent variables (interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility) were rated zero, the real estate sector industry would increase by 0.065. Increasing inflation volatility by one unit would increase performance by 0.457 while increasing economic growth volatility by one unit would cause the real estate sector performance to rise by 0.719.

#### **4.6 Discussion of Research Findings**

This research had an aim of establishing the way in which the predictor variables impacted the performance of the real estate sector in the Kenyan context. Independent variables included interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility. This research tried to show performance of the real estate sector being a dependent variable. The Hass consult index measured performance of the real estate sector. Correlation as well as regression analysis being utilized to show the connection linking the independent to dependent variables.

The Pearson model showed a strong positive that is statistically significant relationship exists between interest rate volatility and performance of the real estate sector. The correlation results further revealed a strong positive and significant statistical connection between inflation volatility and performance of the real estate sector. Exchange rate volatility revealed a strong positive as well as significant link with performance of the real estate sector in Kenya. Economic growth volatility displays a significant and positive interrelationship to performance of the real estate sector in the Kenyan economy.

The independent variables accounted for 76.1% of variances in performance of the real estate sector, in accordance with the summary of the model. The predictor

variables of this research had explanatory power that fitted a 95% confidence level like indicated by the 0.000 p value that was way below the threshold of significance that is 5%. Therefore, the overall model employed in this study is a good and sufficient prediction model to determine the performance of the real estate sector in Kenya.

This research is in agreement with Wanjiku, Bosire and Matanda (2021) who sought to establish macroeconomic impact on Registered Real Estate Investments Trusts (REITs) financial performance in Kenya. The financial performance of the REIT was described using a causal research design. Thirteen Kenyan REITs companies were the sample for this research. The study made use of the population as a whole (census). Secondary sources of data were used in this research to obtain the data needed to meet the study's objectives. In order to calculate time series data on REITs' financial performance during a four-year period from January 1, 2016, to December 31, 2019, four data points were used. The findings revealed that money supply and inflation affect the financial performance of REITs in Kenya.

This research too in agreement with research by Kamamia (2020) who did an investigation how investment banks performance is affected by certain macroeconomics indicators. A descriptive survey design was adopted. Both inferential as well as descriptive statistics being utilized in analyzing the data. The outcome demonstrated that independently, interest rate, inflation rates and exchange rate are substantial determinants of investment banks performance in Kenya.

## **CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

The major motive of this study was to investigate the way selected macroeconomic volatility influences the performance of the real estate sector in Kenya. The conclusions from the above sections are outlined in this chapter together with the conclusions and limitations of this study. This section also outlines the strategies that can be adopted by policymakers. It also carries the recommendations.

### **5.2 Summary of Findings**

The study assessed how selected macroeconomic volatility influenced the performance of the real estate sector in Kenya. Interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility were adopted to be the predictor variables of the research. The research utilized descriptive design to do analysis and data collecting. Secondary data was obtained from CBK as well as KNBS and prepared using SPSS version 24 program. The study used data of 10 years compiled quarterly.

The Pearson model showed a strong positive that is statistically significant relationship exists between interest rate volatility and real estate sector performance. The correlation results further revealed a strong positive and significant statistical connection between inflation volatility and performance of the real estate sector. Exchange rate volatility displayed a strong positive as well as significant link with performance of the real estate sector in Kenya. Economic growth volatility displays a significant and positive interrelationship to performance of the real estate sector in the Kenyan economy.

The independent variables accounted for 76.1% of variances in performance of the real estate sector, in accordance with the summary of the model. The predictor variables of this research had explanatory power that fitted a 95% confidence level like indicated by the 0.000 p value that was way below the threshold of significance that is 5%. Therefore, the overall model employed in this study is a good and sufficient prediction model to determine the performance of the real estate sector in Kenya.

The regression results further discovered that if the selected independent variables (interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility) were rated zero, the real estate sector industry would increase by 0.065. Increasing inflation volatility by one unit would increase performance by 0.457 while increasing economic growth volatility by one unit would cause the real estate sector performance to increase by 0.719.

### **5.3 Conclusion**

The research findings show that the erratic growth of the economy and the rate of inflation have a substantial impact on Kenya's real estate performance. The research finds that higher inflation rate volatility and economic growth volatility leads to a significant rise in performance in the real estate sector.

The research discovers that the factors under research – interest rate volatility, inflation rate volatility, exchange rate volatility and economic growth volatility – affect real estate sector performance by describing 76.1% of the variations. This means that the non-model variables are only responsible for 23.9% of variations of performance of the real estate sector in the country. It is therefore substantial to infer



that the outlined factors impact real estate sector performance as shown in the p values below 0.05 ANOVA summary.

The conclusions of this research concurred with Njambi (2020) who pursued to assess the effect of selected macroeconomic determinants on performance of real estate sector in Kenya. The study adopted correlation research design. The Hass Consultancy, the CBK and the KNBS offered secondary data and data collected was from 2007 to 2016 on a quarterly basis. The research utilized regression analysis. This study showed that capital, GDP, credit growth rate, and inflation rate positively related to growth in real estate industry.

#### **5.4 Recommendations**

This study demonstrated that inflation rate volatility impacts positively on performance of the real estate sector. This implies that higher inflation volatility is likely to possess positive influence on performance of the Kenyan real estate sector. The research suggests that policy makers ought to let demand and supply take control so that commodity prices move in tandem with changes in the market as this will have a positive effect on the performance of the real estate sector.

This study has demonstrated that economic growth volatility possesses positive and significant impact on the performance of the real estate sector in the country. It therefore recommends that several approaches are required to make sure that the factors that lead to changes in economic growth are improved as this will lead to better performance of the real estate sector.

#### **5.5 Limitations of the Study**

This study embraced a 10-year period (2012-2021). It gives no substantial evidence that in an added timeframe, the findings will not change. Additionally, it is not certain

that these findings will be sustained after 2021, things might change. Extra timeframe is reliable because it comprises instances with economic shifts like recessions and booms.

The main drawback of the study was the quality of data. It is not possible to reliably state the results obtained in the survey as the correct reflection of the general situation. Accuracy and reliability of the data collected are assumed to a certain point. Additionally, because of the existing circumstances, computing the data has been incoherent. This study uses secondary data as opposed to primary data. The determinants of performance have been partially considered because of unavailability of data for all determinants.

Regression models were used to conduct data analysis. It might be impossible for the researchers to generalize outcomes because of the setbacks accruing from model utilization like erroneous and deceptive conclusions ensuing from alteration in variable value. Whenever data is put in a regression model, it is impossible to process it through another prior model.

### **5.6 Suggestions for Further Research**

The objective of the study was to determine selected macroeconomic volatility impact on performance of the real estate sector of the Kenyan economy. A research that focuses on primary data or mixes primary data with secondary data is recommended so as to recognize qualitative elements that might have been overlooked in the current research.

This research failed to consider all independent variables impacting performance of the real estate sector of an economy. A suggestion therefore arises to include other factors in future studies in order to come up with more specific findings. These factors

include money supply, balance of payments, corruption, unemployment rate among others. Providing details how each of them affects performance of the real estate sector will enable policymakers make decision on the steps to take in order to control their performance of the real estate sector.

Because of unavailability of data, this study focused on the latest 10 years. Other future studies should employ a wider range to come up with a valid conclusion. This study was also under restriction because it only focused solely on Kenya. Additional survey should be conducted in other nations to determine results. In conclusion, the investigator adopted a regression model to do a confirmation or rejection of the findings. Any studies in future should adopt other independent methods to confirm or reject their findings.

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## APPENDICES

### Appendix I: Research Data

Year	Quarter	Financial performance	Interest rate volatility	Inflation rate volatility	Exchange rate volatility	Economic growth volatility
2012	1	0.1121	2.7978	3.5610	0.0451	0.0210
	2	0.1071	2.7974	3.3149	0.0448	0.0211
	3	0.1191	2.7904	3.0852	0.0442	0.0212
	4	0.1228	2.7543	2.9759	0.0429	0.0211
2013	1	0.1114	2.7115	2.9791	0.0410	0.0209
	2	0.1136	2.6529	3.0204	0.0393	0.0211
	3	0.1188	2.5955	3.0530	0.0381	0.0212
	4	0.1224	2.5476	3.0612	0.0372	0.0213
2014	1	0.1063	2.4424	3.0451	0.0360	0.0211
	2	0.1072	2.0410	3.0283	0.0351	0.0212
	3	0.1126	1.4522	3.0616	0.0350	0.0214
	4	0.1174	1.0342	3.1054	0.0355	0.0214
2015	1	0.1097	0.9712	3.0091	0.0362	0.0212
	2	0.1072	0.9890	2.6028	0.0355	0.0212
	3	0.1114	0.9995	1.9455	0.0347	0.0213
	4	0.1140	0.9984	1.2938	0.0337	0.0213
2016	1	0.1094	0.9954	1.0123	0.0328	0.0214
	2	0.1083	0.9900	1.0200	0.0322	0.0214
	3	0.1071	0.9814	0.9986	0.0304	0.0214
	4	0.1053	0.9687	0.9276	0.0293	0.0214
2017	1	0.1065	0.9507	0.9105	0.0272	0.0214
	2	0.1057	0.9255	0.9286	0.0246	0.0214
	3	0.1056	0.9269	0.9532	0.0215	0.0212
	4	0.1037	0.8691	0.9698	0.0178	0.0209
2018	1	0.1028	0.7861	0.9953	0.0135	0.0209
	2	0.1045	0.6604	1.0278	0.0080	0.0207
	3	0.1044	0.5941	1.0637	0.0042	0.0203
	4	0.0987	0.5487	1.1024	0.0042	0.0196
2019	1	0.0993	0.4758	1.1464	0.0044	0.0192
	2	0.1001	0.4544	1.1952	0.0045	0.0181
	3	0.1001	0.4167	1.2536	0.0045	0.0159
	4	0.0938	0.3468	1.3207	0.0046	0.0115
2020	1	0.0968	0.1821	1.3988	0.0048	0.0026
	2	0.0985	0.0595	1.4942	0.0048	0.0028
	3	0.0984	0.0634	1.5430	0.0047	0.0027
	4	0.0919	0.0680	1.4260	0.0041	0.0019
2021	1	0.0550	0.0736	1.1069	0.0024	0.0015

<b>Year</b>	<b>Quarter</b>	<b>Financial performance</b>	<b>Interest rate volatility</b>	<b>Inflation rate volatility</b>	<b>Exchange rate volatility</b>	<b>Economic growth volatility</b>
	2	0.0530	0.0801	0.4873	0.0024	0.0008
	3	0.0520	0.0850	0.0500	0.0026	0.0005
	4	0.0550	0.0853	0.0567	0.0027	0.0000