

**RELATIONSHIP BETWEEN MACROECONOMIC FACTORS AND
GROWTH OF MORTGAGE FINANCING IN KENYA**

ELIAS M. MUNGAI

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DECLARATION

I declare that this dissertation is my original work and has not been previously published / submitted elsewhere for award of a degree. I also declare that this research proposal / dissertation contains no material written or published by other people, where due reference is made and author duly acknowledged.

ELIAS M. MUNGAI

REG NO: 16/00014

Sign..... Date: 21/11/2022

I do hereby confirm that I have examined the masters [Dissertation] of

ELIAS M. MUNGAI

And have approved it for examination

Sign..... Date.....

Dr. Peter Kariuki

Dissertation Supervisor

ABSTRACT

The government of Kenya has put a lot of initiatives to provide affordable housing and increase housing ownership through mortgages by setting up the Kenya Mortgage Refinancing Company to manage low-cost liquidity for mortgages. However, the mortgage industry has seen a case of urban housing being unaffordable stemming from the high cost of mortgages/high cost of properties. The current study, therefore, sought to investigate the macro-economic factors affecting growth of mortgage financing in Kenya. That is to determine the effect of quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate and Quarterly M3 (M2 plus large time deposits in banks) on quarterly growth of mortgage financing in Kenya. This study was guided by the monetary theory of inflation, the loanable funds theory, the classical growth theory and the quantity theory of money. The study took a quantitative approach drawn from the positivism research philosophy. Therefore, the study was a time series research design which was used to track the growth of mortgage financing in Kenya for the last 20 years – from the year 2002 to 2021. The study targeted the time-series quarterly data from CBK for the last 20 years. Items to be collected included the following: quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate, Quarterly M3 (M2 plus large time deposits in banks) and quarterly growth of mortgage financing. The study used secondary data which was extracted from CBK quarterly data reports website for the period 2002 to 2021. The quantitative secondary data was analyzed by use of descriptive and inferential statistics. A 95% confidence interval was the statistical error variance used. Data was coded and analyzed using STATA 14 (or EViews 14.0). The findings were displayed in the form of spreadsheets, tables, graphs and charts. The findings indicate that lending interest rate and growth of mortgage financing in Kenya are negatively and significantly related. Likewise, inflation rate and growth of mortgage financing in Kenya are negatively and but insignificantly related. However, the findings show that money supply (M3) and growth of mortgage financing in Kenya are positively and but insignificantly related. GDP growth rate and growth of mortgage financing in Kenya from the regression findings are positively and significantly related. Therefore, the study concludes that lending interest rate and inflation rate are negatively and significantly related to the growth of mortgage financing in Kenya. On the other hand, GDP growth rate and money supply (M3) are positively and significantly related to the growth of mortgage financing in Kenya.

Keywords: *Mortgage Financing, Inflation Rate, Interest Rate, GDP Growth Rate, Money Supply.*

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DEDICATION

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ACRONYMS AND ABBREVIATIONS

SDG	Sustainable Development Goal
UNDP	United Nations Development Programme
GDP	Gross Domestic Product
CFA francs	African Financial Community
CBK	Central Bank of Kenya
KMRC	Kenya Mortgage Refinance Company Plc
SACCOs	Savings and Credit Cooperatives
QTM	Quantity Theory of Money
REITs	Real Estate Investments Trusts
VIF	Variance Inflation Factor
OLS	Ordinary Least Squares
ADF	Augmented Dickey-Fuller
ECM	Error-Correction Model

OPERATIONAL DEFINITION OF TERMS

A **mortgage** can be defined as a loan/debt instrument, secured by individuals and businesses to make large real estate purchases where the borrower, has an obligation to repay the amount in predetermined installments (plus interest).

GDP growth rate is the quarterly average rate of change of the gross domestic product (GDP) at market prices based on constant local currency, for a given national economy, during a specified period of time. It takes the difference between the current and prior GDP level and divides that by the prior GDP level.

Inflation rate is the percentage change in the quarterly consumer price index (CPI). That is the rate of increase in prices over a given period of time.

Lending interest rate is the amount charged by lenders for a certain period as a percentage of the amount lent or deposited. That is the amount a lender charges a borrower and is a percentage of the principal—the amount loaned.

Money supply is the total amount of money—cash, coins, and balances in bank accounts in circulation in an economy. The money supply is the total volume of currency held by the public at a particular point in time.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Mortgages are important for households, financial institutions and macroeconomic stability. As the population grows, so does the need for affordable housing as one of the basic physiological needs of man as categorized by Maslow. The need for decent and affordable housing is, therefore, important for people and this affects their daily lives (Maqbool et al., 2015). This important factor is underscored in that, globally, decent and affordable housing is one of the goals under the seventeen sustainable development goals (SDGs). Sustainable Development Goal (SDG) number 11 relates to sustainable cities and communities. The construction of houses is a capital-intensive venture. Many people do not have the resources through which they can construct houses without taking a loan or mortgage facility. This, therefore, necessitates the need for the acquisition of mortgage facilities (UNDP, 2020).

Globally, mortgage lending is the primary tool for encouraging the advancement of the Russian real estate market, which is currently expanding as a result of state assistance in the manner of preferential mortgage loans for households with young kids, inhabitants of the far Eastern Federal district, and governmental home loan tax subsidies programs. To minimize the creation of a mortgage bubble, the Russian mortgage market has huge potential that must be handled. Despite significant growth rates, Russia's mortgage market share is nonetheless low at 6 per cent (Kadochnikova et al., 2020). Mortgages account for 6% of GDP in the Russian Federation, but it accounts for 25% in other nations. Nonetheless, it is critical to creating loans in an elevated area with managing risk, as this presents a threat to the whole financial industry (Jordi, 2008; Lou & Yin, 2014). Because of the effect of macroeconomic, political, and social variables, Russia's mortgage lending industry is growing at a rapid pace.

Declining oil prices and the buying power of the ruble can have a substantial impact on the government's mortgage loan market's development pace (Bulatova et al., 2019).

Up until 2017, Swedish home prices climbed every year due to the economy's interest rate levels. Likewise, mortgage debt has skyrocketed. Over the era, reduced interest rates have supported both high property values and large family debt. The reduced interest atmosphere is mainly attributable, to the goal of raising inflation to 2 per cent every year. Similarly, Yang et al. (2017) report that demand, earnings, property prices, and rate of interest all influence mortgage lending in China (or money supply). However, the impact of interest rate changes is far more pronounced in first-tier cities like Shanghai and Beijing. One explanation for this is that the level of house prices differs between cities. Christidou et al. (2018) observed that while both real estate prices and residential developments would be influenced at the national level, there will be a considerable regional variance. Monetary policy has a very limited influence in certain states, while it has a significant impact on others. Property pricing is treated as exogenous by Piskorski and Tchisty (2017), Favilukis et al. (2017), and Guren et al. (2021), who overlook possible feedback effects from consumer expenditure and loan defaulting to home prices.

Residential funding in Sub-Saharan Africa is currently in its infancy, with a scarcity of financial methods adapted to people's requirements, while the corporate housing industry is still in its infancy. Low salaries, restricted access to credit solutions, and insufficient financial structures sometimes impede access to house financing. The funding of mortgage portfolios is heavily reliant on consumer deposits for credit intermediaries. Limited access to long-term capital, as well as institutional and legal obstacles such as issues securing ownership titles and lengthy eviction proceedings in the case of failure, have stifled the expansion of the African mortgage sector. Therefore, impoverished and perhaps even middle-

class individuals seeking homes frequently resort to the informal financial sector, which is typically pricey (Banking in Africa, 2020).

Even though a long-run link has been established between home price fluctuations and the macro-economic variables, Kamati (2020) demonstrated that in Namibia, house prices are turbulent and the volatility is particularly persistent. It was also discovered that instability, GDP, and mortgages all have a major impact on home inflationary pressures (price volatility). Furthermore, disruptions to the examined macroeconomic parameters, except for the lending rate, were shown to amplify the unpredictability of mortgages. It was also established that mortgages and present price fluctuations are the most important factors explaining variation in residential market volatility.

South Africa is, to some extent, starting to address the limits in its lending and house prices. Many other African economies, meantime, are striving to modify their residential assistance schemes. In West Africa, for instance, the Regional Mortgage Refinancing Fund's actions in the region have enabled refinanced banking institutions to award more mortgages at lower interest prices and with long-term bonds/maturities. Since 2012, this regional organization has raised a total of 162.3 billion CFA francs, or about USD 300 million, via eight (8) issuances in the sub-regional financial sector with maturity periods spanning between 10 and 15 years (Banking in Africa, 2020).

Tanzania's financial industry has seen considerable growth, notably since the 2000s, resulting in financial developments, especially in banking technologies and mortgages. Nevertheless, in areas where the move to price-based monetary policy instruments is popular, there is a shortage of understanding of how fiscal and monetary policy operations affect, among other things, the rate of interest, currency rate, and, eventually, prices (inflation) (Mwankemwa & Ndanshau, 2021). Along the same vein, Balele (2019) stated that Sub-Saharan African nations might boost economic growth by using financial technology, notably

by increasing financial access and usage among economic actors. Likewise, to improve the growth of mortgage financing in Africa, Banking in Africa (2020) has recommended the rolling out of mobile banking; mortgage financing; consumer credit/credit cards; leasing products; e-banking services among other technologies.

In Egypt, the Egyptian Mortgage Refinancing Company (EMRC), in an effort to reduce informal and quasi-legal land procedures, the government proposed contracting out a nationwide simplification and digitalization of the existing property registration system in 2015. Unfortunately, this has not yet taken effect, and only around 7% to 10% of Egyptian property is formally registered. The challenges confronting the mortgage market's expansion required the government to intervene and try to create a more conducive climate for lenders to provide house mortgages at competitive rates. The EMRC's goal was to create a low-risk residential mortgage finance system in which mortgage lenders may compete on a market basis to offer housing credit on economically appealing terms and conditions.

1.1.1 Macro-economic Factors

Issues of mortgage lending are the subject of numerous discussions to many economists and it has been a concern to the current study to provide the theoretical and empirical backgrounds to the issue. Among the factors that affect mortgage financing are the macroeconomic factors.

The worldwide real estate sector has seen substantial adjustments in recent years as a result of financial market liberalization, a precipitous drop in interest rates, the obsolescence of existing housing stock, and a shift in consumer conventions about home usage. Furthermore, the housing market has been a focus of government fiscal and monetary policy to achieve low inflation, low unemployment, and balanced growth rates. A rapid increase in the money supply, for instance, lowers interest rates, while *ceteris paribus*, the user prices of housing products decrease while the quantity required of housing services rises.

Because housing services are connected one-to-one to housing units, the real prices of housing units rise as well (Apergis, 2003; Owuor, 2017).

Aside from the money supply, other economic variables such as employment and mortgage interest rates can have an impact on both housing prices and new home development. Different perspectives have been expressed on the impact of inflation on the housing sector. Feldstein (1992) shown, in particular, that rising inflation reduces people's incentive to invest in real estate, lowering housing demand. Inflation, on the other hand, raises nominal housing payments, implying reduced housing demand.

Among other macroeconomic indicators, (according to Kadochnikova) the largest direct linear relationship between the increase in the volume of mortgage loans granted is observed with an increase in the average monthly nominal wage, gross domestic product, and the reverse – with the average price of a square meter in the housing market (Kadochnikova et al., 2020). According to Antonsson (2018) GDP, home price index and unemployment rate are some of the macroeconomic elements influencing credit portfolio.

While GDP reflects a country's output, real GDP is GDP corrected for inflation, which informs the monetary worth of output while price fluctuations are taken into consideration. When consumption falls, it signals a drop in demand for final products and services (Riksbank, 2017). Similarly, the House price index indicates the price level of one- and two-family dwellings for households (SCB, 2017). Rising property prices tend to promote household financial stability and minimize the chance of mortgage loan holders failing to satisfy their loan commitments. The unemployment rate reflects both the general status of the economy and the debt-to-income proportion of families. Rising unemployment rates have a direct impact on the payment ability of household borrowers, particularly mortgagees (Antonsson, 2018).

Therefore, finding what macroeconomic factors have a statistically significant relationship to the actual default frequency of a portfolio can aid banks and the authorities in estimating probability of default with reference to current and forecasted macroeconomic conditions. The macro-economic variables chosen in the study have been justified by the theoretical and empirical perspectives to be of significance and high contributory role towards mortgage financing. Majority of the studies reviewed have implied that rates of interest, inflation rates (CPI), collective market prices, demand, foreign investment, supply of money, GDP growth rate, Income per capita and investment explain the most of the outcome of mortgage financing (Keynes, 2018; Wanjiku et al., 2021; Shephard, 2016; Egbunike & Okerekeoti, 2018; Hlushchenko, 2021; Li, 2020). Theoretically, the study notes that from the monetary theory of inflation (Keynes, 1936), the loanable-funds theory (Robertson, 1934), and the classical growth theory (Ricardo, 1955; Smith, 1776) and the quantity theory of money (Friedman & Schwartz, 1963; Friedman & Schwartz, 2008), form the basis to argue that inflation rate, lending interest rate, GDP growth rate and money supply are significant contributors in the mortgage industry. Therefore, the current study found it worthwhile to use the same variable and provide a justification of their role in the mortgage financing in Kenya. That is, to investigate the macroeconomic factors that affect mortgage financing in Kenya.

1.1.2 Growth of Mortgage Financing

Kenya has a housing supply of approximately 50,000 units annually with only 2.0% percent of this incoming supply targeted for the low-income earners. With a housing deficit of 2.0 million units which continues to grow annually by 200,000 and the low supply rate, the government's plan of delivering 500,000 units by the end of 2022 is far out of reach. On the other hand, home ownership in Kenya has remained low at 21.3% in urban areas as at 2020, implying that 78.7% of the urban populations are renters (Centre for Affordable Housing, 2020). Availability of affordable housing finance continues to be the key challenge towards

home ownership in Kenya. This is why the government established the Kenya Mortgage Refinance Company to create efficiencies in participating financial institutions and, ultimately, a seamless experience for the borrower (KMRC, 2021).

However, the Kenyan Real Estate sector saw greater construction efforts in 2021, as well as an overall upswing in Real Estate trades, owing to the enhanced corporate setting. The Sector expanded by 5.2 per cent in Q3'2021, 0.3 per cent higher than the 4.9 percentage expansion reported in Q2'2021, as seen in Figure 1.1. Real estate prices show progress due to the high expenses of building and infrastructural improvements. Only 2% of professionally completed houses are aimed at low-income households (KNBS, 2021).



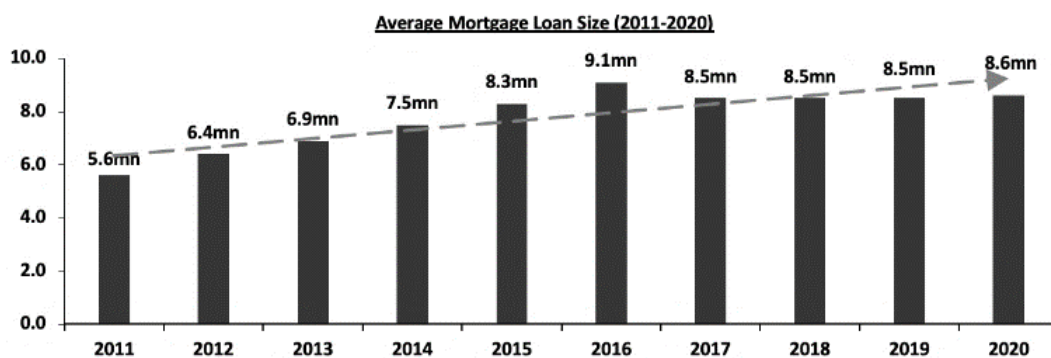
Source: KMRC (2021)

FIGURE 1.1: The performance of mortgage industry in Kenya from 2016 to 2021

Nonetheless, mortgage loans have remained a laggard as a home financing option. CBK also stated that the residential mortgage demand represented a 3.7 percent decline in the total count of residential mortgage accounts, to 26,971 in 2020 from 27,993 in 2019. The total value of active mortgage loans fell 2.1 percent, from Kshs 237.7 billion in 2019 to Kshs 232.7 billion in 2020. The mortgage market's performance drop was mostly due to the consequences of COVID-19, as well as a weak economy, which prompted a spike in

mortgage defaults. For comparisons of house ownership rates in other nations, the number of mortgage accounts, and mortgage-to-GDP ratios (CBK, 2020).

Despite a decrease in the number of mortgage accounts, the mean mortgage loan size expanded from Kshs 8.5 million in 2019 to Kshs 8.6 million in 2020, with the government attempting to provide reasonable priced home loans infrastructure through the KMRC as banking institutions toughen credit policies to the mortgage industry amid high mortgage default rates. The mean mortgage loan amount rose by 4.4 percent during a 10-year period as of 2020, while loan accounts rose by 5.3 percent, indicating a favorable trend. The rise in loan accounts over the last 10 years may be attributed to the joint efforts of the government and private sector entities to provide cheap mortgages with flexible terms. The figure below shows the average mortgage loan size from 2011 to 2020;



Source: CBK (2021)

FIGURE 1.2: The average mortgage loan size from 2011 to 2020

As a result, in the absence of appropriate economic instruments to increase loan size, households will continue to have a falling willingness to pay their housing and other mortgage payments, and their reserves would be drained, posing a challenge to their adaptability to other changes in the economy. There is a significant risk that many may go out of business, diminishing the housing supply and management industry just as it has been gradually increasing capacity. Thus, the KMRC has crafted strides in increasing mortgage liquidity for Primary Mortgage Lenders to increase mortgage absorption in the country, by

looking at new advancements by the organization and proposals it is undertaking to achieve its goals.

1.1.3 Mortgage Financing in Kenya

In Kenya, there are 38 commercial banks, 1 mortgage financing business (KMRC), 14 financial institutions, 9 international banks, 67 foreign exchange agencies, 17 money transfer operators, and 3 credit reference bureaus. On September 18, 2020, CBK announced the licensing of KMRC as Kenya's first refinance mortgage corporation to offer long-term funding to main lending institutions (financial institutions and Savings and Credit Co-operatives) to assist the State's Big Four Objective of offering cost-effective homes to a larger segment of Kenya's citizenry (Central Bank of Kenya, 2021).

KMRC in collaboration with several stakeholders is putting in place foundations for the eventual standardization of mortgage underwriting practices in Kenya to create efficiencies in participating financial institutions and, ultimately, a seamless experience for the borrower. Providing liquidity financing to Primary Mortgage Lenders entails supporting the development of the housing sector by bringing about a greater supply of housing finance and playing a significant role in increasing affordable housing finance.

Some of the leading Primary Mortgage Lenders in Kenya include Standard chartered bank with 12.2%, Citibank Kenya has 12.5% as the interest rate, Commercial Bank of Kenya at 12.9%, KCB Bank - 13.3%, NIC Bank Kenya - 13.4%, CFC Stanbic Bank Kenya -14.1%, Barclays Bank of Kenya - 14.4%, Co-operative Bank -14.9%, Consolidated bank - 15.1% and the Housing finance group -13% (which has been in this business for more than a decade) (CBK, 2021). KMRC is currently drawing down funds for lending from the credit lines facilitated by National Treasury to raise long term finance efficiently and sustainably. However, KMRC will need to ensure that it can continually raise long term funding at

attractive rates, and the issuance of corporate bonds will be one of the initiatives to meet this objective (KMRC, 2021).

In Kenya, the bankers have access to just 26,000 existing mortgages totaling KES 11 million. The 2016 interest rate cap, combined with falling asset quality (total NPL ratio of 12%), prompted lenders to restrict credit requirements and provide flexible rate mortgages. SACCOs were expected to supply about 90 per cent of overall home financing, but their ability to do so is severely limited by the relatively short timeframe of their demand deposits. Cooperatives' rates of interest are fairly modest at 12 per cent, but their loans are typically limited to 5 years. Consequently, the majority of urban residents rent or develop in stages using recurring loans (World Bank, 2019). Similarly, an approximately 61 per cent of urban families live in extreme poverty. This high prevalence is mostly attributable to overpopulation and a lack of essential housing services. In cities, 56 per cent of families have only 1 room, while only 19 per cent live in their home (KNBS, 2018).

Even though the standard price of a freshly built house by a private developer in 2015 was around US\$17,000, the mean result of a 3-bedroom residence might approach US\$140,000 as investors have concentrated on the strong valuation markets. The yearly average urban family earnings are approximately US\$6,000 (based on GDP consumption statistics), implying affordable housing pricing of approximately US\$18,000 (3 times higher than the standard prices). Property and infrastructure costs represent 30 per cent to 40 per cent of private construction costs. Due to the importation of steel and cement, as well as the accompanying levies, Kenya has one of the highest building expenses in Africa (Central Bank of Kenya, 2021).

1.1.4 Macro-economic Factors and Growth of Mortgage Financing

The term *macro-economic* defines the forces surrounding a firm that has the ability to influence its operations beyond the firm's capability (Davis & Powell, 2012; Sullivan &

Sheffrin, 2003; Taher et al., 2010). Thus, macroeconomic factors represent the exterior economic climate; that is the sum of external influences considered by a company in its strategic planning. These elements are heavily influenced by the external ecosystem's complexities and dynamism. It is a trend, trait, or situation that arises from (or is related to) a bigger component of an economy rather than an individual population (Egbunike & Okerekeoti, 2018).

Macro-economics is the study of how monetary and fiscal policies affect how much an economy generates considering the general level of prices and rate of unemployment (Abel et al. 2014, Kadochnikova et al., 2020; Keynes, 1937). Macro-economic parameters are therefore markers of economic patterns that have the potential to demonstrate a country's GDP development. They serve as guidance in determining investment choices for the state's spending or expenditure from both the local and global viewpoints. Rates of interest, commodity prices (inflation rates), collective market prices, demand, foreign investment, supply of money, informal employment, federal saving rate, GDP growth rate, Income per capita and investment are examples of these elements (Keynes, 2018; Wanjiku et al., 2021).

In the mortgage business, these elements have a variety of consequences on the performance of the real estate industry, including asset valuation and pricing. Considering macro-economic factors assists economies in understanding how to value/price the elements of production by affecting the pricing of each factor (Shephard, 2016). That is why, both scientifically and practically, favourable economic development leads to better incomes and more consumer expenditure, including mortgage loans for home purchases. A rise in overall housing demand, on the other hand, tends to raise mortgage rates. This is because lenders can only give out so much credit (mortgages) (Egbunike & Okerekeoti, 2018).

The aforementioned procedure is therefore governed by the central bank, with the pricing of banking goods being a crucial factor in defining the desired level of bank revenue.

Similarly, interest rates on bank loans (mortgages) frequently reflect the borrowing costs for the real economy – from the consumption side – as well as the number of mortgage loans granted – from the supplier side (Hlushchenko, 2021). As a result, mortgage rates are determined by the fundamental law of supply and demand - laissez-faire. Variables such as rising prices, economic expansion, monetary and fiscal policy, and the status of the bond and property prices all play a role in such an ecosystem. Given the mortgage industry's laissez-faire attitude, when fewer homes are developed or offered for resale, the fall in home purchases leads to a drop in mortgage uptake, pushing interest rates lower.

As the economy and wages grow, people in the country tend to have more than enough transactional, savings and investment capacity/power and as a result, they may spend more on homes (purchasing mortgages), improve implementations, and finally raise prices. Housing demand is frequently viewed as flexible in household financial income, resulting in a rise in household incomes. Loss of sales would also discourage individuals from purchasing during a depression, and individuals who lose their employment will fall behind on their mortgage payments and have their homes seized (Li, 2020). In summary, the price of mortgage loans is closely related to the health of an economy and fluctuates in tandem with economic output.

1.2 Statement of the Problem

The growth of mortgage financing in a perfectly sustained economy is expected to improve mortgage financing (Bulatova et al., 2019; Kadochnikova et al., 2020; Mwanemwa & Ndanshau, 2021). To that effect, the Kenyan government has launched a number of programs to offer inexpensive housing and expand house custody through mortgages, including the establishment of the KMRC to administer low-cost liquidity for mortgage loans (Central Bank of Kenya, 2021).

Notwithstanding various government initiatives to increase homeownership in Kenya, the mortgage industry has seen a case of urban housing being unaffordable. This stems from the high cost of mortgages/high cost of properties (World Bank, 2019). Evidence suggests that the residential mortgage demand represented a 3.7 percent decline in the total count of residential mortgage accounts, to 26,971 in 2020 from 27,993 in 2019. The total value of active mortgage loans fell 2.1 percent, from Kshs 237.7 billion in 2019 to Kshs 232.7 billion in 2020 (Central Bank of Kenya, 2021; KMRC, 2021). The foregoing has been combined with Kenya's lack of accessibility to cheap home finance, as indicated by fewer than 25,000 mortgage loans outstanding. Similarly, banks have restricted lengthy financing options, and few banks have used capital markets to finance mortgage loans. It is worth noting that mortgage loans account for less than 10 per cent of overall housing debt; the balance is provided through SACCOs and housing cooperative systems (KMRC, 2021; World Bank, 2017). This leaves a huge housing demand versus supply gap where the high cost of mortgages leaves the poor people stuck in unaffordable houses.

Despite the cited issues affecting growth of mortgage financing in Kenya, there is little evidence of empirical studies conducted in Kenya. Methodological gaps have been presented by Omondi (2017) studied mortgage financing between 2011 and 2015, with a sample size of 22 institutions, Wanjiku Bosire and Matanda (2021) looked at 13 Kenyan REITs businesses while Luyali et al. (2021) focused on 35 mortgage lending financial institutions between 1985 and 2019. The current study only focuses on a population of 1 mortgage financing business (KMRC). The above studies have presented methodological and contextual gaps since they have not presented findings up to the year 2022 on how mortgage financing has been performing. Contextual gaps were presented by La Cava (2016) and Sutton, Mihaljek, and Subelyte (2017) whose case were based in the United States. Shi et al. (2021) and Xu (2017) also investigated mortgage financing in China's financial institutions.

From the above studies, there is need to fill the presented gaps and look into the macroeconomic factors affecting growth of mortgage financing in Kenya. The current study sought to extrapolate the findings to shed light on the issues of growth of mortgage financing up to the year 2021.

1.3 Objectives of the Study

1.3.1 General Objective

To establish the effect of macro-economic factors on the growth of mortgage financing in Kenya.

1.3.2 Specific Objectives

1. To determine the effect of lending interest rate on the growth of mortgage financing in Kenya.
2. To determine the effect of the inflation rate on the growth of mortgage financing in Kenya.
3. To establish the effect of GDP growth rate on the growth of mortgage financing in Kenya.
4. To establish the effect of money supply on the growth of mortgage financing in Kenya.

1.4 Hypotheses of the Study

H₀₁: Lending interest rate does not have a significant effect on the growth of mortgage financing in Kenya.

H₀₂: The inflation rate does not have a significant effect on the growth of mortgage financing in Kenya.

H₀₃: GDP growth rate does not have a significant effect on the growth of mortgage financing in Kenya.

H₀₄: Money supply does not have a significant effect on the growth of mortgage financing in Kenya.

1.5 Significance of the Study

1.5.1 Management of Commercial Banks

The findings of this study will help strengthen the banking sector by providing information on the strategies of how banks can maintain their asset / capital base levels and reduce the non-performing loans given the prevailing interest rate levels to improve the supply of retail mortgages. That is how the macro-economic factors can be studied and monitored for mortgage financing. The findings will help the lenders and other mortgage financing institutions based on the policies by CBK and the KMRC to develop and issue market-friendly loans/mortgages to the public.

1.5.2 Policy Makers

The findings of this study will be of importance to the regulator KMRC in the housing and mortgage sector. In particular, this study will shed light on the urgent need for formulating guidelines to regulate and formulate policies regarding the uptake of the mortgage in Kenya. This study aligns itself with the Big Four Agenda of Kenya towards Vision 2030 which is towards achieving a greater supply of housing finance and playing a significant role in increasing affordable housing finance in Kenya by 2030.

1.5.3 Academicians

Furthermore, the findings of this study will be useful to academics and scholars since they will serve as a foundation for future research. This study will serve as the foundation for dialogues among students and academics and extrapolation of the findings with regard to the macro-economic factors that affect growth of mortgage financing in Kenya from the year until the year 2030. Specifically, in Kenya, the study will provide a reference point to the scholars who seek to improve on the wealth of knowledge in the related field.

1.6 Scope of the Study

The current study sought to investigate the macro-economic factors affecting growth of mortgage financing in Kenya. The study took a quantitative approach drawn from the positivism research philosophy. Therefore, the study was a time series research design which was used to track the growth of mortgage financing in Kenya for the last 20 years – from the year 2002 to 2021. The study targeted the time-series quarterly data from CBK for the last 20 years. Items to be collected included the following: quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate, Quarterly M3 (M2 plus large time deposits in banks) and quarterly growth of mortgage financing. The study used secondary data which was extracted from CBK quarterly data reports website for the period 2002 to 2021. The quantitative secondary data was analyzed by use of descriptive and inferential statistics. A 95% confidence interval was the statistical error variance used. Data was coded and analyzed using STATA 14 (or E Views 14.0). The findings were displayed in the form of spreadsheets, tables, graphs, and charts. The study was conducted in the year 2022.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature available regarding the research problem and objectives. It specifically reviews the relevant anchoring theories that inform the study variables, and empirical literature to show the hypothesized relationship and the conceptualization of the research variables.

2.2 Theoretical Review

A good study aligns its objectives to a theoretical background an approach that helps researchers to challenge and expound on existing forms of knowledge. The theoretical foundation is essential since it allows the researcher to translate the research problem and question into credible findings (Alavi et al., 2018; Nord et al., 2019). The current study was guided by the monetary theory of inflation (Keynes, 1936) to inform the variable inflation rate, the loanable-funds theory (Robertson, 1934) to inform the variable lending interest rate, and the classical growth theory (Ricardo, 1955; Smith, 1776) to inform the variable GDP growth rate and the quantity theory of money (Friedman & Schwartz, 1963; Friedman & Schwartz, 2008) to inform the variable money supply.

2.2.1 The Monetary Theory of Inflation

The theory was principally coned by Keynes (1936) and supported by Friedman (1970) in the pre-Friedman quantity theory of money, which was just a presumption identity known as the quantity theory of money (Keynes version as the price level equation):

$$M V / Y = P \dots\dots\dots (i)$$

Where: M = the money supply, V = the Velocity of money, P = the price level and Y = the real GDP.

The monetary theory of inflation provides a theory for each of the three factors on the right-hand side, resulting in a hypothesis of the level of prices (Keynes, 1936). According to the idea, the money supply is exogenously determined by the reserve bank, which can increase or reduce the supply of money and the rate of growth of the money supply (Wray, 2019). Money, in essence, influences the price of the goods but is not a true economic determinant (velocity). This is money's impartiality; the belief that money does not affect true economic factors (Keynes, 2018). The exchange rate levels equation generates the inflationary formula in the rate of growth form where:

$$\text{Growthrate (P)} = \text{Growth rate (M)} - \text{Growth rate (y)} + \text{Growth rate (v)} \dots n \dots \dots \dots \text{(ii)}$$

Inflation is hence the rate of rising in the pricing levels. The supply of money has no effect on the actual macroeconomic parameters y and v in the exchange rate equation I. As a result, a 1per cent rise in the supply of money boosts the price level by 1 per cent. Policymakers think that the short-term mobility/velocity (V) is constant since the central bank determines the pace at which money flows. Milton Friedman recognized that it may change somewhat but not much; hence it can be considered fixed (Friedman, 1971). As a result, increasing the Money Supply will cause inflation to rise (Vernengo & Pérez Caldentey, 2020).

In an essence, the economic concept of inflation holds that a rising supply of money is the root increase in the price level. Prices rise quickly when the supply of money expands more quickly. Specifically, a 1% increase in changes in the supply of money leads to a 1% increase in inflation. With all else being equal, the market price is proportionate to the supply of money. Increasing the supply of money would result in a doubling of prices. As a result, the hypothesis in the current study is utilized to elucidate the link between the Kenyan inflation rate and mortgage finance.

2.2.2 The Loanable Funds Theory

Robertson (1934) proposed the loanable funds principle, which states that the quantity of financial stability offered fluctuates at each particular rate of interest in reaction to a variation in a component besides the cost of borrowing. One of these factors is the threat to financial stability, which causes a change in the supply of money available for lending. Holding all other parameters equal, when financial safety threat decreases, it appears more desirable for fund suppliers, culminating in an increase in fund provision (Kohn, 1981).

Foreign borrowers, governments, consumers, and governments all need loanable money, according to the theory. According to the loanable funds hypothesis, the provision of loanable resources originates from foreign mortgages, financial sector currency holdings, and national reserves (Bertocco & Kalajzić, 2022). The above elements affect long-term interest rates, whereas market financial and monetary situations influence short-term borrowing costs. As per McGibany and Nourzad (2004), the parameters influencing loanable resources will reach a balance point when all of the factors listed are in balance. Consumers in nations with fluctuating mortgage prices are highly susceptible to interest rate fluctuations (Jakab & Kumhof, 2018).

In contrast, when the risk of financial security rises, it becomes less appealing to fund providers, resulting in a reduction in the supply of funds (Túñez Area, 2021). According to this theory, if a mortgage loan is deemed hazardous, the availability of loans would drop. According to Fereidouni (2010), lenders evaluate the rewards and risks involved with lending when providing money to the mortgage market. The main drivers of home prices are anticipated prices, income, and interest rates are all factors to consider. Since they are risk-averse, many financial institutions are slow to respond to changes in monetary policy. It is stated that increasing loan prices have caused many banking institutions to diversify their holdings to escape the risks of the financial markets (De Vries & Boelhouwer, 2005). As a

result, anticipated returns have decreased because individuals are being deterred from taking out home loans (Oakley, Zhang & Kidd, 2019).

As a result, the theory informs the current study by highlighting that the primary source of demand for loanable money is investment demand. Mortgage finance must guarantee that interest rates are established by the borrowers to achieve appropriate mortgage pricing. If interest rates are low, there will be a large demand for loanable money for investment reasons and vice versa. As a result, the theory supports the argument that interest rates influence mortgage demand and how they are priced. As a result, the theory has been useful in understanding the link between lending interest rates and mortgage finance in Kenya.

2.2.3 The Classical Growth Theory

The theory was coined by Ricardo in (1955) and supported by Smith (1776) describes the growth of the economy as the buildup of assets and the reinvesting of profit generated from expertise, division of labour, and the quest for competitiveness (Ricardo, 1955; Smith, 1776). The understanding of the dynamics driving the acquisition stage was viewed as the crux of the economic expansion challenge. Technological change, as manifested in the division of labour and modifications in output processes, is linked to aggregation. Smith, in particular, put a high value on the process of extending the division of labour; however, there is no structured discussion of the relationship between capitalist development and technological development in the work of the mainstream economists (Rangongo & Ngwakwe, 2018).

Thus, the market is free from government intervention and is thus controlled by the invisible hand. John Maynard Keynes also comes in as another developer with the General Theory of Employment, Interest, and Money in 1936 (Keynes, 1937; Keynes, 2018). And as such progressively, the theory came into economic sense in the late 1970s after being influenced by economists such as Margaret Thatcher in the United Kingdom and Ronald

Reagan in the United States. In addition, in 1980, the World Bank moved from its Basic Needs strategy to a classical methodology (Harris, 2007; Paun et al., 2019).

Keynes thought that industry would spontaneously adjust to produce full employment even when in equilibrium and that the unpredictable and uncontrollable nature of marketplaces would result in cyclical peaks and busts (Keynes, 1937). The primary argument of Keynes' theory is that the level of employment is determined by the rate of consumer spending rather than the cost of labour, as in neoclassical theory. Given that at full employment, total demand for products is less than total output, the economy will have to decrease until a level of equilibrium is attained (Keynes, 2018). Solow (1956) adds to the argument by claiming that because the economy can regulate itself to a natural real GDP, supply is thus the producer of value. Solow (1956) likewise, adds to the argument by stating that since the economy can regulate itself to a natural real GDP (grounded on Say's Law), the supply thus is the creator of its demand (Zhang, 2020).

The theory is very instrumental in the current study since it offers a ground upon which the policymakers and economists of the country can trace the economic development of the country. This enables them to appreciate the importance of creating an enabling environment for developmental opportunities in the country. Therefore, the classical growth theory has been found instrumental in the current study to inform the link between GDP growth rate and growth of mortgage financing in Kenya.

2.4.4 Quantity Theory of Money

The theory was conceived by Friedman (1956) and other monetarists, who articulate the quantity theory of money (QTM) in accordance with economic expansion rates, which indicates that they take the speed of circulatory money as a given and therefore, the growth rate supply of money influences the growth rate of the quantity of output defined with the nominal GDP (Friedman & Schwartz, 1963; Friedman & Schwartz, 2008). As a result, the

QTM believes that the amount of money in a system has a considerable effect on the degree of economic activity. As a result, fluctuations in the money supply affect either market prices or the availability of products and services/. Furthermore, the idea holds that fluctuations in the supply of money are the fundamental cause of changes in expenditure (Keynes, 1936).

The QTM is the thesis that variations in the amount of cash result in about equivalent variations in the level of price while all other parameters remain stable (Dimand, 2019). The QTM is often expressed as:

$$PY/V = M \dots\dots\dots (iii)$$

Where M=Money Supply, V=Velocity of circulation (the number of times money changes hands), P=Average Price Level and T=Volume of transactions of goods and services. As per Keynesian logic, the QOF can only have an indirect effect on the actual sector via changes in lending rates (Keynes, 1936). The principle is that the quantity/velocity of money is volatile; hence, fluctuations in the money supply (defined as narrow or wide money) may be accommodated by adjustments in the quantity/velocity of money with little impact on production or the price level. The velocity of money is determined by consumer and company expenditure inclinations, which are not constant. A similar viewpoint is held by neoclassical formulation, particularly when the sector is in a liquidity crisis, wherein variations in the quantity of money have no effect on the actual economy. Changes in money supply are assimilated by commensurate variations in money velocity (Walker, 1895).

The same dynamics that drive the market forces of any product also control the availability and need for money: a rise in money supply, in general, reduces the marginal real worth of cash, reducing the purchasing power of one currency unit. As a result, the overall price quantity supplied in a market is proportionate to the supply of money, providing that the level of real production is stable and the value of circulating money remains constant. The theory, therefore, centers its argument on how the money supply affects the prices of the

economy. Thus, in the current study, the theory lays the ground for the objective to establish the effect of money supply on growth of mortgage financing in Kenya.

2.3 Empirical Review

2.3.1 Lending Interest Rate and Growth of Mortgage Financing.

Ariso (2015) investigated the impact of mortgage interest rates on the increase of mortgage lending among Kenyan banking entities from 2012 to 2014. The 44 authorized financial institutions and home financing companies were the intended audience. Secondary sources were used to obtain data, and a descriptive research method was used. The research found a very modest positive association between mortgage interest rates and mortgage lending growth. Thus, it was noted that when interest rates fell by 9 per cent in 2013, existing loans grew by 13 per cent, a tiny shift relative to the 19 per cent growth in loans existing when rates of interest fell by 3.5 percent. This suggests that mortgage interest rates are a small influence driving mortgage growth.

Omondi (2017) investigated the effect of interest rates on mortgage adoption in Kenyan lenders. The descriptive research design was used in the investigation. The study was conducted between 2011 and 2015, with a sample size of 22 institutions that provided mortgage loans. CBK yearly reports were used to obtain secondary quarterly data. The study discovered that interest rates and inflation rates had a beneficial impact on mortgage funding in Kenyan lenders. In keeping with this conclusion, the investigation indicates that interest rates and inflation rates in Kenyan financial institutions have a direct link. Furthermore, the study found that mortgage risk had a negative impact on mortgage funding in Kenyan financial institutions. The survey indicated that mortgage volatility has a negative influence on mortgage financing, and that a significant degree of mortgage volatility decreases mortgage financing.

Owuor (2017) investigated the association between macro-economic variables and the economic expansion of the Kenyan mortgage industry. The descriptive study was used, which utilized quarterly secondary information from 2007 to 2016. The data was analyzed using descriptive and inferential statistics (that is by use of a multiple linear regression model). The research found a directly proportional and significant correlation between loan rates and lending revenue growth. The availability of loanable funds impacts mortgage growth of diverse ways.

Alper et al. (2020) examined the effect of interest rate restrictions in Kenya, which were implemented in September 2016 to lower borrowing costs, expand access to credit, and increase the saving rates. The study conducted an accounting decomposition exercise using bank balance sheets and income statements of the interest rates, loan loss provisions, operating costs and pretax profit margins on private sector lending. The study discovered that the interest rate control scheme has resulted in a breakdown of loans to SMEs, a dwindling of micro-financial institutions' loan books, and lower debt facilitation. Interest rate caps were also shown to decrease the sensing impact of monetary policy. These findings show that the negative consequences may be avoided particularly if the threshold (cap) was fixed higher enough to enable lending to somewhat high-risk depositors, and that substitute attempts to alleviate the high cost of borrowing could be desired.

La Cava (2016) took advantage of differences in factors that could explain residential investment income across nations, such as interest rates, real estate prices, and rising incomes. The study assessed the variation across US states in factors that could explain housing capital income, such as interest rates, housing prices and income growth. The data was collected on a annually from the early 1980s to at least 2012. According to the findings, the long-run increment in the accumulated percentage of residential investment income is primarily due to increased apportioned rental income received by owner-occupiers. Similarly,

the recent increase in the percentage of residential investment income represents a mixture of reduced interest rates, reduced inflation, and supply issues in some large United States urban centers. Consequently, the study found that the decline in lending rates during the 1980s and 1990s increased requirements for housing and drove the prices of houses and rents in supply-limited areas.

Guyo (2017) investigated the impact of interest rate caps on loan take-up among Kenyan commercial banks. The study targeted 42 commercial banks and used secondary data collected from the Central Bank of Kenya. The study underscored that the level of interest had a significant relationship with the uptake of loans. The relationship was negative thus showing that the capping on interest rates led to a major decline in the supply of loans by the commercial bank. Agao (2014) echoes these findings by showing that interest rates (lending rates) have the ability to influence such variables as GDP and the level of the money supply the most. The trend analysis indicated that a steady rise in macroeconomic variables such as money supply and interest rates steadily increase the uptake of mortgages in Kenya.

Gakuo (2018) agrees that interest rate surges could have an influence on financial predictability by affecting households' level' abilities to fulfil their liabilities. The population of this study includes 43 commercial banks that were operational in the study period. Monthly sources of data were utilized for 30 months from June, 2015 to December, 2017. Rising interest rates would significantly raise a mortgage and other loan repayments, potentially increasing the number of homes trying to cope to pay back their loans. Loan rates have an impact on lending quality because the higher the price of mortgages, the more expensive the loan affecting the uptake of mortgages.

Kigomo (2016) examined the implications of mortgage rates in Kenya for homeownership. The research sampled the components that contribute significantly to mortgage utilization, and the targeted population were the customers who had obtained or

were in the process of obtaining a home loan from one of Kenya's mortgage companies. Secondary data was gathered using snowballing, whereas primary data was gathered through a self-administered questionnaire. Income levels, followed by interest rates and other mortgage expenses, had the largest influence on mortgage uptake, according to the study's findings. A paucity of credit data and significant credit risks were the third most important factors impacting mortgage uptake.

Sutton, Mihaljek, and Subelyte (2017) assessed the reaction of property prices in 47 advanced and developing market nations to variations in short- and long-term lending rates. They used information from the finest house price datasets chosen by administrative agencies, spanning over 50 years of quarterly observational data in the U. S. and over 1,000 yearly measurements in the remainder of the population. They discovered that short-term interest rates play an unexpectedly substantial function as a determinant of property values, particularly outside the United States. Our opinion is that this shows the significance of the macroeconomic policy mechanism of mortgage lending in determining house price volatility, particularly in nations where privatization of mortgage loans is less common. Furthermore, we detect significant inertia in home prices and discover that fluctuations in lending rates and other variables affect property prices progressively rather than abruptly. This means that moderate policy rate reduction is unlikely to spark fast gains in housing prices. Finally, we discover that US interest rates appear to influence property values outside of the US.

2.3.2 Inflation Rate and Growth of Mortgage Financing.

Luyali and Gekara (2021) intended to explore the impact of inflationary pressures on housing finance development among Kenyan financial institutions. The research used a descriptive research approach and analyzed 35 residential mortgage issuing financial institutions between 1985 and 2019. Time-series data were analyzed using STATA version 13 software, regression analysis and model specification tests. The study examined secondary information

and discovered that the inflation and exchange rate had a substantial influence on the expansion of mortgage financing among Kenyan financial institutions.

Njoroge (2021) examined the Kenyan residential real estate market from 2005 to 2018 to determine the impact of market prices on the profitability of the Kenyan residential market. Causal research design was employed where 56-market quarterly observations were studied using secondary data techniques. Vector error correction model and autoregressive distributed lag model were used to analyze the data. The data revealed that commercial bank interest rates, consumer price index, currency rate, and stock market prices all had a substantial negative influence. Financial institution lending interest rate, consumer price index, and currency exchange had a long-run negative influence on residential real estate market efficiency to residential property market performance, whereas stock prices had a long-run beneficial impact on housing property market efficiency.

Wanjiku Bosire and Matanda (2021) tried to ascertain the macroeconomic impact on the profitability of Kenyan Registered Real Estate Investment Trusts (REITs). A causality study approach was employed to target 13 Kenyan REITs businesses. Secondary data were used to obtain the information needed to meet the research goals. Data analysis entailed done by use of SPSS. Inflation was observed to have a negative impact on REIT financial performance owing to decreasing aggregated pricing levels, which indicates that high inflation lowers the degree of the rate of exchange.

Musiaowski (2019) examined how the inflation rate (consumer price index) impacts the cost of an adjustable-rate mortgage from the standpoint of personal finances. The study consisted of two mortgage simulations: one for a mortgage taken out on 1 January 2001 for a 15-year-term and the second one taken out on 1 January 2006 for 10-year term. Mortgage models with adjustable rates were employed. The results reveal that as the consumer price index rises, so does the true cost of a loan. That is, there is a negative link between the rate of

inflation and mortgage cost-effectiveness. Inflation fell over the evaluation period, lowering both the actual and nominal costs of the loan. The WIBOR 3M rate, on the other hand, has a high positive association with the consumer price index. The link between the consumer price index and the real cost of borrowing was also significant, although unfavourable. Real mortgage rates climbed when the consumer price index fell, and vice versa.

2.3.3 GDP Growth Rate and Growth of Mortgage Financing

Shi et al. (2021) investigated the effectiveness of China's financial institutions, between 2012 and 2018. This is the effect of the GDP on the funding and capital effectiveness of China's financial institutions. The study adopted the dynamic slacks-based measure in combination with the Kernel density curve on state-owned commercial banks, joint-stock commercial banks, and urban commercial banks in China from 2012 to 2018. According to the findings, equity financial institutions have the best overall productivity. State-owned financial institutions and urban financial institutions have higher funding productivity gains than joint-stock financial institutions, showing that the latter phase reduces overall effectiveness. As a result, all financial institutions must prioritize the effectiveness of NPLs and profit margin. Ultimately, state-owned financial institutions must enhance internal procedures, minimize NPLs, and increase profit margins.

Xu (2017) investigated the link between Economic growth and Chinese housing prices. The study used 120 months of data from July 2005 to June 2015 to study the relationship between housing prices and the macro-economy in the first-, second- and third-tier cities: Beijing, Shanghai, Guangzhou and Shenzhen are well recognized as the first-tier cities. The vector auto-regression model (VAR) model was used to analyze the data. According to the study, China's elastic GDP ratio for credit facilities in 2017 was 1.048, and in the long run, when GDP expanded by 100 million RMB, bank loans climbed by 104.8 million RMB. Bank loans increase consumer expenditure and contribute to GDP. As a result,

GDP will have a beneficial influence on property prices, which represent housing prosperity. Property investment is a type of essential mortgaged property; as home prices rise, so does the value of the mortgaged property. That is, the expansion of the real estate business and GDP growth are inextricably linked; they interplay with one another.

2.3.4 Money Supply and Growth of Mortgage Financing.

Luyali et al. (2021) intended to look into the influence of interest rates and supply of money on the expansion of mortgage finance among Kenyan financial institutions. The study used a descriptive study approach, focusing on 35 mortgage lending financial institutions between 1985 and 2019. Time-series data were analyzed using STATA version 13 software, regression analysis and model specification tests. According to the findings, interest rates and the supply of money have a substantial impact on the expansion of mortgage financing. The results supported those of Karoki (2013), who found that asset prices, GDP, and supply of money all had a positive impact on real estate values.

Borio and Gambacorta (2017) investigated the impact of monetary policy on bank lending in the context of low-interest rates. The empirical research, based on a sample of 108 big worldwide banks, reveals that when short-term interest rates reach extremely low levels, decreases in rates are less helpful in encouraging bank lending growth. The sample covers 20 years from 1995 to 2014, a period spanning different economic cycles, a wave of consolidation and the Great Financial Crisis. After adjusting for business and financial cycle circumstances, as well as several bank-specific features such as liquidity, capitalization, financing costs, bank risk, and revenue diversification, this conclusion remains. Similarly, there was a differential influence of money market rates on lending when interest rates were low.

Murau (2017) investigated how money market shareholdings, overnight marketable securities, and investment bills of exchange have been impacted by short-term government

involvement and intermediate regulatory oversight in the United States all through and since the 2007-2009 economic meltdowns. The study demonstrates that the policies implemented between 2007 and 2014 included various types of shadow money in the public money supply. The originally private shadowing supply of money was either publicly bankrolled or demonetized within a year of the Lehman catastrophe because it had cracked par with bank loans. The public regulations took the shape of contingency resources provided by the Federal Reserve and Treasury assurances. Those safety nets suggest that during the recession, the governmental infrastructural structure designed to protect liquidity was stretched to some types of shadow money. This trend has persisted in post-crisis regulation. As a result of the political actions of US officials, the 2007-2009 financial meltdowns sparked a paradigm shift in the financial system.

Chepkemoi (2017) explored the determinants influencing demand for residential mortgages in Kenya using I&M Bank Limited as a case study. A descriptive technique was adopted, with structured questionnaires sent to 300 respondents. Data analysis involved descriptive statistical approach where descriptive arithmetical aspects assisted in illustrating the statistics obtained. The study discovered that income level influences one's capacity to obtain a home loan; lending rate and money supplies influence appetite for residential mortgages. Legal frameworks have had a detrimental influence on the uptake of housing loans and, as a result, house ownership.

Andele (2020) investigated the impact of public expenditure, mortgage financing, and per capita income on Kenyan property prices. The study focused on national income, input market variables such cost of construction and financial market variables such as inflation and interest rates. The study used a correlational research approach using a time series secondary data set from 2004 to 2017. The secondary data on government expenditure and mortgage credits were collected from Central bank of Kenya quarterly reports and data on

income was collected from Kenya National Bureau of Statistics quarterly reports. In the long term, public spending, government recurring spending, and mortgages have a positive influence on residential housing values in Kenya, according to this study. While government maintenance spending and personal income have a favourable and considerable influence in the near run.

2.4 Conceptual Framework

The framework links the independent variables (quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate and Quarterly M3 (M2 plus large time deposits in banks)) to the dependent variable which is growth of mortgage financing as shown in Fig. 2.1. The available data on the constructs are on annual basis. Therefore, to convert the annual data to quarterly data, the researcher divided the parameters by the number of periods.

Independent Variables

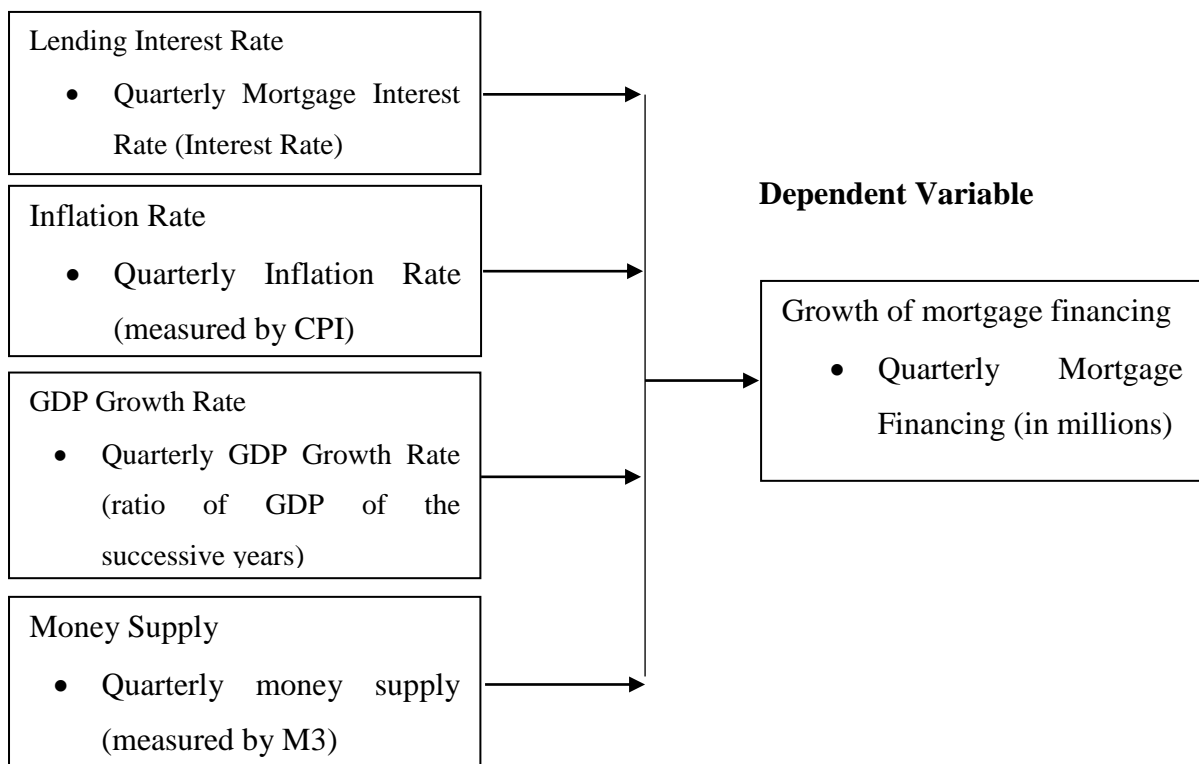


FIGURE 2.1: Conceptual Framework

2.5 Operationalization of Variables

The variables were operationalized as follows: quarterly mortgage financing, quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate and Quarterly M3 (M2 plus large time deposits in banks).

TABLE 2.1: Operationalization of Variables

Variable	Category	Measurement
Growth of mortgage financing	Dependent variable	Quarterly Mortgage Financing (in millions)
Lending interest rate	Independent variable	Quarterly Mortgage Interest Rate (Interest Rate)
Inflation rate	Independent variable	Quarterly Inflation Rate (measured by CPI)
GDP growth rate	Independent variable	Quarterly GDP Growth Rate (ratio of GDP of the successive years)
Money supply	Independent variable	Quarterly money supply (measured by M3)

Source: Author (2022)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter covers in detail the procedures the research undertakes to complete study in the area under study. This entails a set of processes such as the design of the research, how the sample is obtained and how the sampling is done, how to collect data, how data is analysed as well as the post estimation tests.

3.2 Research Design

A research design is a strategy used by a specific study in collecting, evaluating, and interpreting statistical information. This is a research layout that offers the overarching structure for data collection (Yanow & Schwartz-Shea, 2015; Meyers, Gamst & Guarino 2016; Saunders et al., 2019). The current study used a descriptive research method (Burlig et al., 2020; Cook & Ware, 1983) which was used to track the growth of mortgage financing in Kenya for the last 20 years – from the year 2002 to 2021.

3.3 Target Population

The study targeted the quarterly time-series data from CBK for the last 20 years (from the year 2002 to 2021). Items to be collected included the following: quarterly data on mortgage financing, quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate and Quarterly M3 (M2 plus large time deposits in banks).

3.4 Sampling and Sampling Procedure

Kenya was the unit of analysis of the study; therefore, no sampling was done. Thus, a census survey was adopted to assess all the data under observation.

3.5 Research Instruments

The research data was secondary data which was collected by the use of a secondary time series data template.

The secondary data was extracted from CBK quarterly data reports website for 20 years (from the year 2002 to 2021) (see Appendix I).

3.6 Data Collection Procedure

Secondary time series data were extracted from the Central Bank of Kenya for the last 20 years (from the year 2002 to 2021). Items to be collected included the following: the quarterly data on mortgage financing, quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate and Quarterly M3 (M2 plus large time deposits in banks)).

3.7 Data Processing and Analysis

The quantitative secondary data was analyzed by use of multiple time series data analysis. This captured the data on quarterly basis for the last 20 years (from the year 2002 to 2021) under study. This was aided by the use of STATA software version 14.0. The model used was as presented below:

$$Y = \alpha + \beta_{1t}X_{1t} + \beta_{2t}X_{2t} + \beta_{3t}X_{3t} + \beta_{4t}X_{4t} + \mu_t \dots \dots \dots (IV)$$

Where:

Y_t = Mortgage financing

β_n = beta coefficients

X_{1t} = Lending interest rate

X_{2t} = Inflation rate

X_{3t} = GDP growth rate

X_{4t} = Money Supply (M3)

μ_t = Error term in time series

t = periods under study (20 years)

3.7.1 Unit Root Test

Panel/time series data presupposes that the fundamental trend is stable, which means that its average, variation, and autocorrelation (at various lags) stay constant regardless of where they are sampled. The null hypothesis (H_0) states that: the series under examination is non-stationary or has a unit root. According to Baumohl and Lyocsa (2009), stationarity tests are performed to avoid changes in estimates over time in the research variables, which would result in false estimates. When the coefficient of determination (R²) value is larger than the Durbin Watson statistic, the findings are erroneous, and the model cannot be utilized for predicting (Palachy, 2019).

Single time-series stationarity verification is crucial since when time-series data is non-stationary, researchers can only investigate its behaviour for the timeframe under examination and cannot generalize it to subsequent periods. Furthermore, the model of a non-stationary data set on yet another non-stationary time-series data may result in erroneous extrapolation. To determine the root unit requirements of the time series in this study, a unit root test was performed using the Augmented Dickey-Fuller (ADF) approach, with the null hypothesis being that the series under examination is non-stationary or has a unit root.

3.7.2 Lag Length Selection

Furthermore, if the sequence is determined to be static, the Akaike Information Criterion was used to find an optimal time series quantity to prevent the mis-calculation/mis-specification of the error term. Notwithstanding, because the Granger causality test is very susceptible to the total count of time series used, the appropriate time series proposed is usually 2. This dictates how far a variation in one parameter can be determined in the other.

3.7.3 Co-integration Test

If a group of parameters is co-integrated, a legitimate error-correcting interpretation of the information persists, and vice versa. A co-integration test determines if the error

variance over time ($\hat{\sigma}_t$) is stationary. It indicates that the sequence is non-stationary. The Engle granger test and the Johansen maximum likelihood test were used to assessing this test (Brooks, 2008; Engle and Granger, 1987; Godfrey, 1978). The null hypothesis (H_0) states that: $\hat{\sigma}_t$ has a unit root (Godfrey, 1978).

3.7.4 Error Correction Model

Nevertheless, if there are several series that Granger causes, it is highly suggested that the sequence be reconciled through error correction modelling. ECM has a long-run balance and utilizes previous imbalance to explain the adaptable behaviour of existing parameters. ECM connects the long-run balance correlation inferred by co-integration between two lags with the short-run sophisticated modification pathway. A Vector Autoregressive (VAR) procedure was estimated using the Two-step Engle-Granger test (Granger causality Wald test) to determine whether or not long-run or balance interactions do exist between the possible factors (Godfrey, 1978). The null hypothesis (H_0) states that: there is no co-integration between y and any x.

3.7.5 Vector Error Correction Model

The null hypothesis (H_0) states that: there is no co-integration between y and any x. VAR formulations do not need to be co-integrated with a time series regression; however, if the variables are co-integrated, a vector error correction model is applied. As a result, a VECM is used to ascertain short relationships between co-integrated variables, limiting long interactions of factors via co-integrated connections, whereas a VAR model is used where there is no co-integration. The VEC model offers a systematic approach to representing the complexities that interconnect the factors under consideration. Presuming 4 variables in a time series model, the model was presented as shown (Brooks, 2008):

$$\Delta y_t = \Gamma (y_{1,2,3,4, t-1}) + \beta_1 \Delta X_{1t} + \beta_2 \Delta X_{2t} + \beta_3 \Delta X_{3t} + \beta_4 \Delta X_{4t} + \beta_4 (y_{1t-1} - y_1 X_{1t-1} - y_2 X_{2t-1} - y_3 X_{3t-1} - y_3 X_{4t-1}) + \mu_t \dots \dots \dots (V)$$

Where:

Y_t = Mortgage financing

$\beta_1, \beta_2, \beta_3$ are first difference coefficient matrices for w, x and z on y

Γ is the level matrix of the variable y_{t-1} and contains the long run equilibrium relationships and a rank equivalent to the co-integrating vectors.

Δ is the difference operator

$(y_{1t-1} - y_1 X_{1t-1} - y_2 X_{2t-1} - y_3 X_{3t-1} - y_4 X_{4t-1})$ is the lagged error correction term

β_4 is the speed of adjustment back to the equilibrium position

$t-1, t-2 \dots t-k$ are the number of lags

X_{1t} = Lending interest rate

X_{2t} = Inflation rate

X_{3t} = GDP growth rate

X_{4t} = Money Supply (M3)

μ_t = Error term in time series

t = periods under study (20 years)

3.8 Post Estimation Tests

3.8.1 Causality Test

Granger Causality tests whether a series can be utilized to predict the other (Granger, 1969).

The null hypothesis (H_0) states that: the lagged x -values do not granger cause the variation in y . The test was used to determine whether a time series quarterly growth of mortgage financing will granger cause quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate and Quarterly M3 (M2 plus large time deposits in banks) if its values give a statistically significant results in the future.

3.8.2 Impulse Response Function

This test describes the behaviour of the independent variables at the time of the distress for a given period. It is a dynamic multiplier that represents the present and any consequent influence on every parameter as a result of an unexpected transformation in one of the parameters. In Kenya, the impulse response function (IRF) was used to examine the relationship between lending interest rates, inflation rates, GDP growth rates, money supply, and growth of mortgage financing. The null hypothesis (H_0) states that: an impulse response function is $L(\tau)$, $\tau \in [0, A]$.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings from the field and which are presented in tables and figures. The chapter entails the descriptive statistics, diagnostic testing, correlation analysis and the regression analysis and the post estimation results.

4.2 Summary of the Descriptive Statistics

This section presents the summary and describes the features of the data collected with regard to the Growth of mortgage financing, Lending interest rate, Inflation rate, GDP growth rate and Money supply (M3). The findings are as presented in Table 4.1.

TABLE 4.1: Summary of the Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Growth of mortgage financing	80	5.729406	2.36876	2.408013	9.365625
Lending interest rate	80	14.75494	2.198961	11.94462	20.08653
Inflation rate	80	8.784206	5.270042	-2.30666	27.31907
GDP growth rate	80	4.448373	2.450218	-0.81073	13.30276
Money supply (M3)	80	38.17761	2.646694	31.59047	43.11895

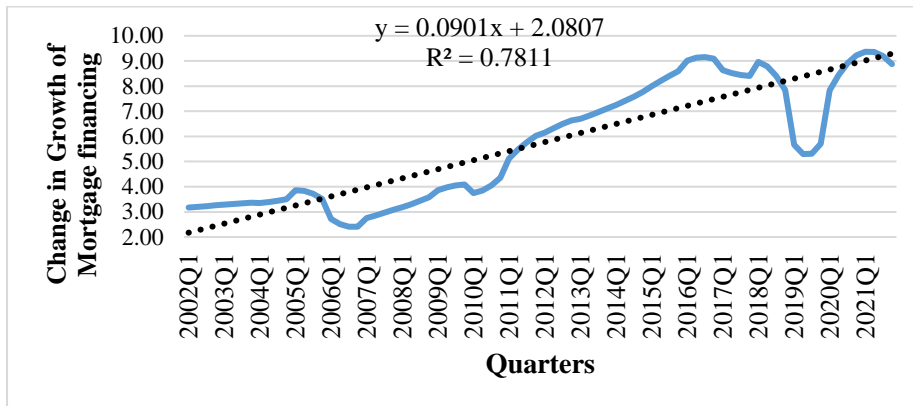
Source: Research Data (2022)

Table 4.1 revealed that the mean growth of mortgage financing in Kenya between the year 2002 and 2021 was 5.729 (S.D = 2.36876), the mean lending interest rate in the same period being 14.755 (S.D = 2.198961) the mean of inflation rate in the same period recorded at 8.784 (S.D = 5.270042), GDP growth rate in the same period was 4.448 (S.D = 2.450218) and the mean for money supply in the same period was 38.178 (S.D = 2.646694). Their respective trend values across the years are as shown in the next section.

4.3 Trend Analysis

The following section presents the trend patterns of the macroeconomic variables surveyed and the growth of mortgage financing.

4.3.1 Trend Analysis for Growth of Mortgage Financing

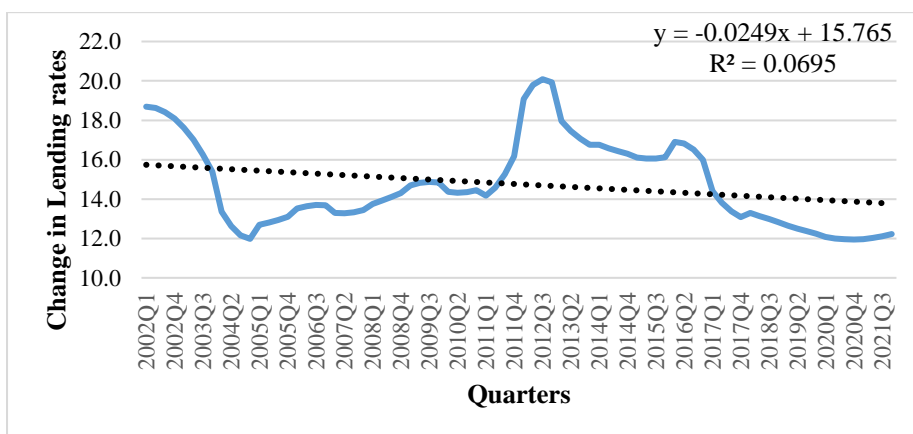


Source: Research Data (2022)

FIGURE 4.1: Trend Analysis for Growth of Mortgage Financing

Figure 4.1 above indicates an increasing trend in the growth of mortgage financing from the year 2002 to the year 2021 as evidenced by the positive beta coefficient of 0.0901.

4.3.2 Trend Analysis for Lending Interest Rate

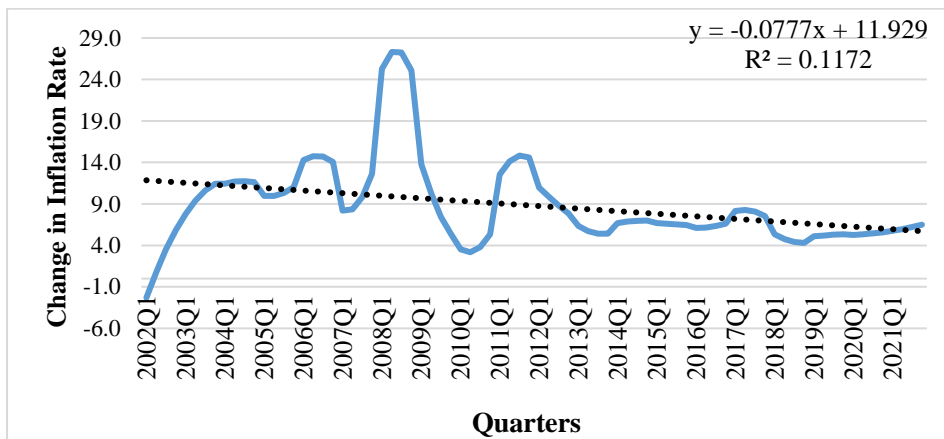


Source: Research Data (2022)

FIGURE 4.2: Trend Analysis for Lending Interest Rate

Figure 4.2 above indicates a decreasing trend in lending interest rate from the year 2002 to the year 2021 as evidenced by the negative beta coefficient of -0.0249.

4.3.3 Trend Analysis for Inflation Rates

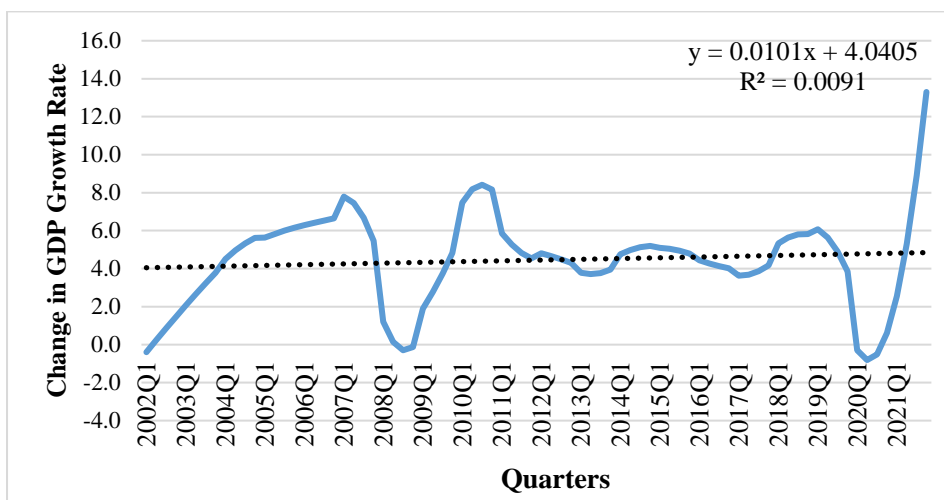


Source: Research Data (2022)

FIGURE 4.3: Trend Analysis for Inflation Rates

Figure 4.3 indicates a decreasing trend in inflation rates from the year 2002 to the year 2021 as evidenced by the negative beta coefficient of -0.0777.

4.3.4 Trend Analysis for GDP Growth Rate

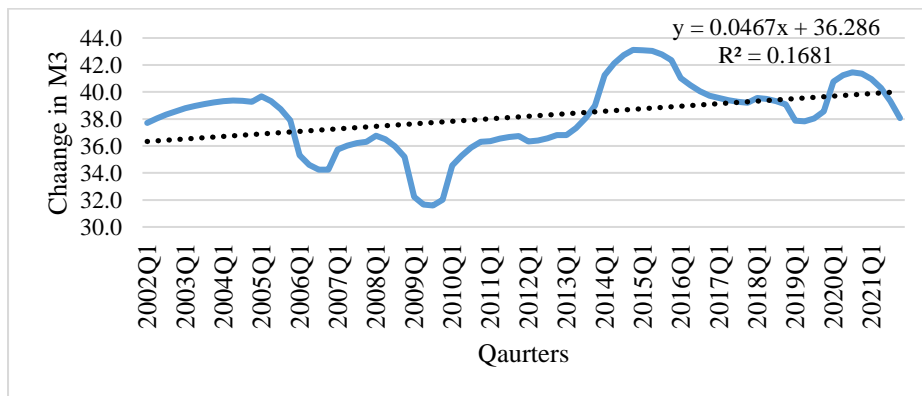


Source: Research Data (2022)

FIGURE 4.4: Trend Analysis for GDP Growth Rate

Figure 4.4 indicates an increasing trend in GDP growth rate from the year 2002 to the year 2021 as evidenced by the positive beta coefficient of 0.0101.

4.3.5 Trend Analysis for Money Supply (M3)



Source: Research Data (2022)

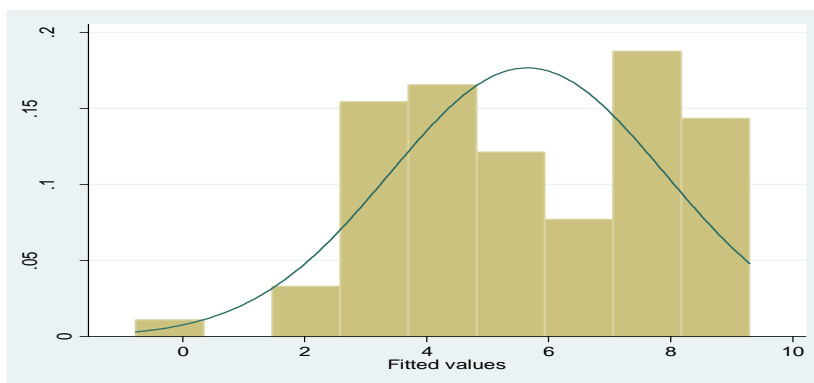
FIGURE 4.5: Trend Analysis for Money Supply (M3)

Figure 4.5 indicate an increasing trend in money supply (M3) from the year 2002 to the year 2021 as evidenced by the positive beta coefficient of 0.0467.

4.4 Diagnostic Testing

4.4.1 Testing for Normality of Residuals

In this study, normality was diagnosed using a histogram of regression standardized residuals as well as the Jarque-Bera test. Standardization is important to determine if the information given by the dependent variable is normally spread. The null hypothesis (**H₀**) states that the residuals are normally distributed. Where the probability value is greater than 0.05, the data is then considered to be normally distributed (Table 4.2 & Figure 4.6).



Source: Research Data (2022)

FIGURE 4.6: Normality Test for the Residuals**TABLE 4.2: Summary of the Details of the Residuals**

Thresholds	Percentiles	Smallest	Fitted values	Statistics
1%	-0.77345	-0.77345		
5%	2.665128	1.98346		
10%	2.801902	2.53022	Obs	81
25%	3.850593	2.53195	Sum of Wgt.	81
50%	5.595806		Mean	5.649124
		Largest	Std. Dev.	2.257953
75%	7.849475	8.589404	Variance	5.09835
90%	8.413531	8.616703	Skewness	-0.23453
95%	8.580446	8.701281	Kurtosis	2.074686
99%	9.296947	9.296947	Jarque-Bera test	3.632000
			P-value	0.162700

Source: Research Data (2022)

Table 4.2 shows the absence of abnormality as shown by the Jarque-Bera statistic of 3.632 and the probability value (0.1627) which was greater than 0.05. This has been complemented by the shape of the histogram in Figure 4.6. Therefore, the null hypothesis was upheld and therefore, the data is normally distributed.

4.4.2 Unit Root Test

To determine the root unit requirements of the time series in this study, a unit root test was performed using the Augmented Dickey-Fuller (ADF) approach, with the null hypothesis being that the series under examination is non-stationary or has a unit root. First running the normal regression model helps us to show the relationship between R squared and the Durbin Watson. Therefore, stationarity testing was conducted in Table 4.3 using the Augmented Dickey-Fuller (ADF) testing.

TABLE 4.3: Stationarity Test for the Variables at various differences

Differences (Lags)	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Growth of Mortgage Financing				
ADF at level	-2.936	-4.088	-3.472	-3.163
ADF at first difference	-4.258	-4.091	-3.47%	-3.164

Lending Interest Rate				
ADF at level	-4.114	-4.088	-3.472	-3.163
Inflation Rate				
ADF at level	-4.509	-4.088	-3.472	-3.163
GDP Growth Rate				
ADF at level	-3.063	-4.088	-3.472	-3.163
DF at first difference	-1.166	-4.091	-3.473	-3.164
DF at second difference	-7.060	-4.093	-3.474	-3.164
Money Supply (M3)				
ADF at level	-2.674	-4.088	-3.472	-3.163
ADF at first difference	-3.728	-4.091	-3.473	-3.164
DF at second difference	-7.161	-4.093	-3.474	-3.164

Note: The values are used as absolute and signs are ignored

Source: Research Data (2022)

Table 4.3, revealed that the lending interest rate and inflation rate were both stationary at level since the absolute test statistics of -4.114 and -4.509 were greater than the respective absolute critical values at 1%, 5% and 10%. However, growth of mortgage financing was found to be non-stationary at level but stationary after the first difference since the absolute test statistic (-4.258) was greater than the absolute critical values at 1%, 5% and 10%. GDP growth rate and money supply (M3) were found to be non-stationary at level and after the first difference but were stationary after the second difference since the absolute test statistics (-7.06 and -7.161) were greater than the respective absolute critical values at 1%, 5% and 10%.

Therefore, for the study to perform a regression that is stationarity, the study used the following stationary time series: growth of mortgage financing at 1st difference, the lending interest rate at level, inflation rate at level, GDP growth rate at 2nd difference and money supply (M3) at 2nd difference.

4.4.3 Lag Length Selection

Furthermore, if the sequence is determined to be static, the Akaike Information Criterion is used to find an optimal time series quantity to prevent the miscalculation/misspecification of the error term. Notwithstanding, because the Granger causality test is very susceptible to the total count of time series used, the appropriate time series proposed is usually 2. This dictates how far a variation in one parameter can be determined in the other. Table 4.4 presents the findings of each variable's optimum lag length selected.

TABLE 4.4: Lag Length Selection - Selection-order Criteria

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
Growth of mortgage financing								
0	-43.274				0.191	1.181	1.193	1.212
1	-34.321	17.905	1	0.000	0.154	0.969	0.993	1.030
2	-34.296	0.050	1	0.823	0.158	0.995	1.032	1.087
3	-33.294	2.005	1	0.157	0.158	0.994	1.044	1.118
4	-19.040	28.507	1	0.000	0.111	0.641	0.703	0.796
Lending Interest Rate								
0	-162.962				4.379	4.315	4.327	4.345
1	-104.947	116.03	1	0.000	0.977	2.814	2.839	2.876
2	-104.393	1.109	1	0.292	0.988	2.826	2.863	2.918
3	-104.165	0.455	1	0.500	1.009	2.846	2.895	2.969
4	-104.118	0.095	1	0.758	1.034	2.872	2.933	3.025
Inflation Rate								
0	-231.357				26.490	6.115	6.127	6.145
1	-172.891	116.93	1	0	5.839	4.602	4.627	4.664
2	-172.005	1.773	1	0.183	5.856	4.605	4.642	4.697
3	-171.277	1.455	1	0.228	5.899	4.613	4.662	4.735
4	-170.013	2.528	1	0.112	5.859	4.606	4.667	4.759
GDP Growth Rate								
0	-82.458				0.559	2.256	2.268	2.287
1	-79.523	5.869	1	0.015	0.530	2.203	2.228	2.266
2	-79.506	0.034	1	0.854	0.544	2.230	2.267	2.323
3	-78.864	1.286	1	0.257	0.550	2.240	2.289	2.364
4	-75.975	5.777	1	0.016	0.522	2.189	2.251	2.344
Money Supply (M3)								
0	-87.792				0.645	2.400	2.412	2.431
1	-84.855	5.875	1	0.015	0.612	2.347	2.372	2.410
2	-84.741	0.229	1	0.632	0.627	2.371	2.409	2.465
3	-83.547	2.386	1	0.122	0.624	2.366	2.416	2.491
4	-74.347	18.401	1	0.000	0.500	2.145	2.207	2.300

Source: Research Data (2022)

Table 4.4 indicates that from the test of lag length selection, the appropriate lags to be selected will be four for each of the variables/series under study.

4.4.4 Co-integration Test

The Engle granger test and the Johansen maximum likelihood test were used to assess this test (Brooks, 2008; Engle and Granger, 1987; Godfrey, 1978). The null hypothesis is that there is no co-integration (Godfrey, 1978). Once the trace values are higher than the critical values, the study rejects the null hypothesis and thus, there is co-integration. This was used to establish the long-run relationship between the variables as shown in Table 4.5 (using the 4 lags identified in Table 4.4).

TABLE 4.5: Co-integration Test

Maximum rank	Parms	LL	Eigenvalue	Trace statistic	5% critical value
0	80	-430.28808	.	109.3305	68.52
1	89	-408.44782	0.43715	65.65	47.21
2	96	-391.42793	0.36103	31.6102	29.68
3	101	-380.78709	0.24423	10.3285*	15.41
4	104	-375.73256	0.12455	0.2195	3.76
5	105	-375.62282	0.00288		

Source: Research Data (2022)

Table 4.5 above indicates that in the rank 0 – where there is no co-integration equation, the trace statistic (109.3305) is greater than the critical value (68.52). Likewise, in rank 1, the trace statistic (65.65) is greater than the critical value (47.21). In rank 2, the trace statistic (31.6102) is greater than the critical value (29.68). Therefore, the study rejects the null hypothesis and thus there is co-integration of the variables in the 2 null hypotheses/maximum ranks. However, there are 3 co-integrating equations in the model.

4.4.5 Vector Error Correction Model

Since the VAR variables were found to be co-integrated, a vector error correction model was applied (instead of error correction modelling). As a result, a VECM was used to ascertain

short relationships between co-integrated variables, limiting long interactions of factors via co-integrated connections, whereas a VAR model is used where there is no co-integration. The VEC model offers a systematic approach to representing the complexities that interconnect the factors under consideration.

TABLE 4.6: Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
_ce1						
Growth of mortgage financing	1	.	.	.	.	.
Lending interest rate	0.62195	0.09292	6.69	0.000	0.4398	0.8041
Inflation rate	0.16000	0.03364	4.76	0.000	0.0941	0.2259
GDP growth rate	-0.21403	0.08624	-2.48	0.013	-	-0.0450
Money supply (M3)	-0.23422	0.06714	-3.49	0.000	-	-0.1026
_cons	-6.24036	.	.	.	.	.

Note: when reporting the coefficients of the Johansen normalization report, the signs are reversed (Hamilton, Waggoner & Zha, 2007).

Source: Research Data (2022)

Table 4.6 indicates that, in the long run, lending interest rate ($\beta = 0.62195$, $p= 0.000$) and inflation rate ($\beta = 0.16000$, $p= 0.000$) have a long-run negative and significant effect on the growth of mortgage financing in Kenya. However, GDP growth rate ($\beta = -0.21403$, $p= 0.013$) and money supply (M3) ($\beta = -0.23422$, $p= 0.000$) have a long run positive and significant effect on the growth of mortgage financing in Kenya. Therefore, lending interest rate, inflation rate, GDP growth rate and money supply (M3) have asymmetric effects on the long-run growth of mortgage financing in Kenya; that is to predict changes/movements in the growth of mortgage financing. Therefore, the long-run error correction term (ECT) is as follows:

$$ECT_{t-1} = [1.000 Y_{t-1} + 0.62195X_{1t-1} + 0.16000X_{2t-1} - 0.21403X_{3t-1} - 0.23422X_{4t-1} - 6.24036] \dots \dots \dots (VI)$$

Where: Y_t = Mortgage financing
 X_{1t} = Lending interest rate
 X_{2t} = Inflation rate
 X_{3t} = GDP growth rate
 X_{4t} = Money Supply (M3)
 μ_t = Error term in time series
 t = periods under study (20 years)

4.5 Correlation Analysis between Macro-economic Factors and Growth of Mortgage Financing in Kenya

Given that all the variables were confirmed to be stationary, the study, therefore, conducted the Pearson correlation to establish the correlation between the dependent and the independent variables. The Pearson correlation coefficient was used to determine the association between the variables which is denoted by r . A correlation between 0.81 and 1.00 is considered very strong, between 0.61 and 0.8 is considered strong, between 0.41 to 0.6 moderate between 0.21 to 0.40 weak and between 0.00 - 0.20 no relationship (Gogtay, & Thatte, 2017).

TABLE 4.7: Correlation Matrix

Correlations	Growth of mortgage financing	Lending interest rate	Inflation rate	GDP growth rate	Money supply (M3)
Growth of mortgage financing	1				
Lending interest rate	-0.7495* 0.0000	1			
Inflation rate	-0.5505* 0.0000	0.2909* 0.0088	1		
GDP growth rate	0.4989* 0.0000	-0.3753* 0.0006	-0.2910* 0.0088	1	
Money supply (M3)	0.6320* 0.0000	-0.4576* 0.0000	-0.2021 0.0722	0.0185 0.8705	1

Source: Research Data (2022)

Table 4.7 showed that there is a significant negative link between lending interest rate and the growth of mortgage financing in Kenya ($r = -0.7495$, $p = 0.000$). This implies a strong collinearity between lending interest rate and the growth of mortgage financing in Kenya. These findings agree with Xu (2017) and Alper et al. (2020) that the interest rate control scheme has resulted in a breakdown of loans to SMEs, a dwindling of micro-financial institutions' loan books, and lower debt facilitation. They show that the negative consequences may be avoided particularly if the threshold (cap) was fixed higher enough to enable lending to somewhat high-risk depositors, and that substitute attempts to alleviate the high cost of borrowing could be desired. Omondi (2017) also found that mortgage risk had a negative impact on mortgage funding in Kenyan financial institutions. The survey indicated that mortgage volatility has a negative influence on mortgage financing, and that a significant degree of mortgage volatility decreases mortgage financing.

Likewise, the inflation rate and growth of mortgage financing in Kenya have a negative and significant relationship ($r = -0.5505$, $p = 0.000$). This implies a moderate collinearity between inflation rate and the growth of mortgage financing in Kenya. These findings are consistent with Luyali and Gekara (2021) who discovered that the inflation and exchange rate had a negative influence on the expansion of mortgage financing among Kenyan financial institutions. Njoroge (2021) also noted that inflation rates had a long-run negative influence on residential real estate market efficiency to residential property market performance, whereas stock prices had a long-run beneficial impact on housing property market efficiency

However, the GDP growth rate and growth of mortgage financing in Kenya have a positive and significant relationship ($r = 0.4989$, $p = 0.000$). This implies a moderate collinearity between GDP growth rate and the growth of mortgage financing in Kenya. These findings are consistent with Shi et al. (2021) who indicated that GDP growth rates higher

funding productivity gains than joint-stock financial institutions, showing that the latter phase reduces overall effectiveness. Xu (2017) also indicated that bank loans increase consumer expenditure and contribute to GDP. As a result, GDP will have a beneficial influence on property prices, which represent housing prosperity.

It was further shown that money supply (M3) and growth of mortgage financing in Kenya have a positive and significant relationship ($r= 0.6320$, $p=0.000$). This implies a strong collinearity between money supply and the growth of mortgage financing in Kenya. These findings are consistent with Luyali et al. (2021) who found that the supply of money has a substantial impact on the expansion of mortgage financing. Karoki (2013) also found that asset prices, GDP, and supply of money all had a positive impact on real estate values.

4.6 Regression Analysis between Macroeconomic Factors and Growth of Mortgage Financing in Kenya

This section presents the findings of the regression that sought to determine the extent and magnitude of the cause-effect of, lending interest rate, inflation rate, GDP growth rate and money supply (M3) on the growth of mortgage financing. The results are presented in Table 4.8.

TABLE 4.8: Relationship between Macroeconomic Factors and Growth of Mortgage Financing in Kenya

Source	SS	df	MS	Number of obs	79	
				F (4, 75)	82.79	
Model	371.174	5	74.235	Prob > F	0.000	
Residual	65.455	73	0.897	R-squared	0.8501	
				Adj R-squared	0.8398	
Total	436.630	78	5.598	Root MSE	0.94692	
Growth of mortgage financing	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ECT (β_4)	1.016	0.051	19.82	0.000	0.914	1.118
Lending interest rate	-0.265	0.111	-2.38	0.020	-0.486	-0.043
Inflation rate	-0.012	0.044	-0.27	0.787	-0.099	0.076

GDP growth rate	0.380	0.115	3.31	0.001	0.152	0.609
Money supply (M3)	0.172	0.140	1.23	0.224	-0.108	0.452
_cons	-0.102	0.312	-0.33	0.745	-0.724	0.520

Source: Research Data (2022)

In table 4.8 above the model R- squared was 0.8501, implying that the goodness of fit of the model explains 85.01% of the variation in the growth of mortgage financing in Kenya. This is further supported by a significant F statistic [F (4, 75) = 82.79] at 0.05 significance level where the Prob (F-statistic), Prob > F= 0.000. This implies the time series linear model is statistically significant.

The findings revealed that lending interest rate and growth of mortgage financing in Kenya are negatively and significantly related ($\beta = -0.265$, $p=0.020$). This implies that an increase in lending interest rate results in a decrease in the growth of mortgage financing by 0.419 units and vice versa. These findings are consistent with La Cava (2016) that the decline in lending rates during the 1980s and 1990s increased requirements for housing and drove the prices of houses and rents in supply-limited areas. Guyo (2017) also showed that the relationship was negative thus showing that the capping on interest rates led to a major decline in the supply of loans by the commercial bank. According to Gakuo (2018), loan rates have an impact on lending quality because the higher the price of mortgages, the more expensive the loan affecting the uptake of mortgages. Ariso (2015) also found a very modest positive association between mortgage interest rates and mortgage lending growth. Thus, it was noted that when interest rates fell by 9 per cent in 2013, existing loans grew by 13 per cent, a tiny shift relative to the 19 per cent growth in loans existing when rates of interest fell by 3.5 percent. This suggests that mortgage interest rates have a small influence driving mortgage growth.

The table further indicates that inflation rate and growth of mortgage financing in Kenya are negatively but insignificantly related ($\beta = -0.012$, $p=0.787$). This implies that an increase in inflation rate results in a decrease in the growth of mortgage financing by 0.126 units and vice versa. These findings are consistent with Wanjiku Bosire and Matanda (2021) who observed to have a negative impact on REIT financial performance owing to decreasing aggregated pricing levels, which indicates that high inflation lowers the degree of the rate of exchange. Likewise, Musiaowski (2019) reveal that as the consumer price index rises, so does the true cost of a loan. That is, there is a negative link between the rate of inflation and mortgage cost-effectiveness.

The findings revealed that GDP growth rate and growth of mortgage financing in Kenya are positively and significantly related ($\beta = 0.380$, $p=0.001$). This implies that an increase in GDP growth rate results in an improvement in the growth of mortgage financing by 0.255 units and vice versa. These findings are consistent with Shi et al. (2021) who indicated that GDP growth rates higher funding productivity gains than joint-stock financial institutions, showing that the latter phase reduces overall effectiveness. Xu (2017) also indicated that bank loans increase consumer expenditure and contribute to GDP. As a result, GDP will have a beneficial influence on property prices, which represent housing prosperity.

The table further indicates that money supply (M3) and growth of mortgage financing in Kenya are positively but insignificantly related ($\beta = 0.172$, $p=0.224$). This implies that an increase in money supply (M3) results in an improvement in the growth of mortgage financing by 0.351 units and vice versa. These findings are consistent with Borio and Gambacorta (2017) and Chepkemoi (2017) who indicated that money supplies influence the appetite for residential mortgages. Likewise, Andele (2020) notes that in the long term, public spending, government recurring spending, and mortgages have a positive influence on residential housing values in Kenya, according to this study.

Thus, the time series model can be stated as follows:

$$\Delta y_{t-1} = -0.102 - 0.265\Delta X_{1t-1} - 0.012\Delta X_{2t-1} + 0.380\Delta X_{3t-1} + 0.172\Delta X_{4t-1} + 1.016 + \mu_{t-1} \dots \dots \dots \text{(VII)}$$

Where:

Y_{t-1} = Growth of Mortgage Financing

X_{1t-1} = Lending Interest Rate

X_{2t-1} = Inflation Rate

X_{2t-1} = GDP Growth Rate

X_{2t-1} = Money Supply (M3)

Δ is the difference operator

μ_{t-1} = Error term in time series

t = periods under study (20 years)

4.7 Post Estimation Tests

4.7.1 Causality Test

The test was used to determine whether a time series quarterly growth of mortgage financing will granger cause quarterly average mortgage interest rate, quarterly Inflation rate, quarterly GDP growth rate and Quarterly M3 (M2 plus large time deposits in banks) if its values give statistically significant results in the future. A Vector Autoregressive (VAR) procedure was estimated using the Two-step Engle-Granger test (Granger causality Wald test) to determine whether or not long-run or balance interactions do exist between the possible factors (Godfrey, 1978).

TABLE 4.9: Granger causality Wald tests for the variables

Equation	Excluded	chi2	d f	Prob > chi2
Growth of Mortgage Financing				
Growth of mortgage financing	Lending interest rate	10.075	2	0.006
Growth of mortgage financing	Inflation rate	4.9242	2	0.085
Growth of mortgage financing	GDP growth rate	0.34198	2	0.843
Growth of mortgage financing	Money supply (M3)	0.79292	2	0.673

Growth of mortgage financing	ALL	15.914	8	0.044
Lending Interest Rate				
Lending interest rate	Growth of mortgage financing	13.097	2	0.001
Lending interest rate	Inflation rate	5.0045	2	0.082
Lending interest rate	GDP growth rate	2.344	2	0.310
Lending interest rate	Money supply (M3)	3.8971	2	0.142
Lending interest rate	ALL	14.968	8	0.060
Inflation Rate				
Inflation rate	Growth of mortgage financing	0.9486	2	0.622
Inflation rate	Lending interest rate	1.9188	2	0.383
Inflation rate	GDP growth rate	6.0393	2	0.049
Inflation rate	Money supply (M3)	1.0806	2	0.583
Inflation rate	ALL	20.905	8	0.007
GDP Growth Rate				
GDP growth rate	Growth of mortgage financing	9.6133	2	0.008
GDP growth rate	Lending interest rate	0.6832	2	0.711
GDP growth rate	Inflation rate	4.7035	2	0.095
GDP growth rate	Money supply (M3)	4.0382	2	0.133
GDP growth rate	ALL	18.407	8	0.018
Money Supply (M3)				
Money supply (M3)	Growth of mortgage financing	1.5284	2	0.466
Money supply (M3)	Lending interest rate	4.7043	2	0.095
Money supply (M3)	Inflation rate	1.2913	2	0.524
Money supply (M3)	GDP growth rate	1.0113	2	0.603
Money supply (M3)	ALL	9.1548	8	0.329

Source: Research Data (2022)

Table 4.9 indicates that lending interest rate granger causes growth of mortgage financing thus, the null hypothesis was rejected since ($p\text{-value} = 0.006 < 0.05$). Likewise, all the variables (lending interest rate, inflation rate, GDP growth rate and money supply (M3)) granger cause the growth of mortgage financing thus, the null hypothesis was rejected since ($p\text{-value} = 0.044 < 0.05$).

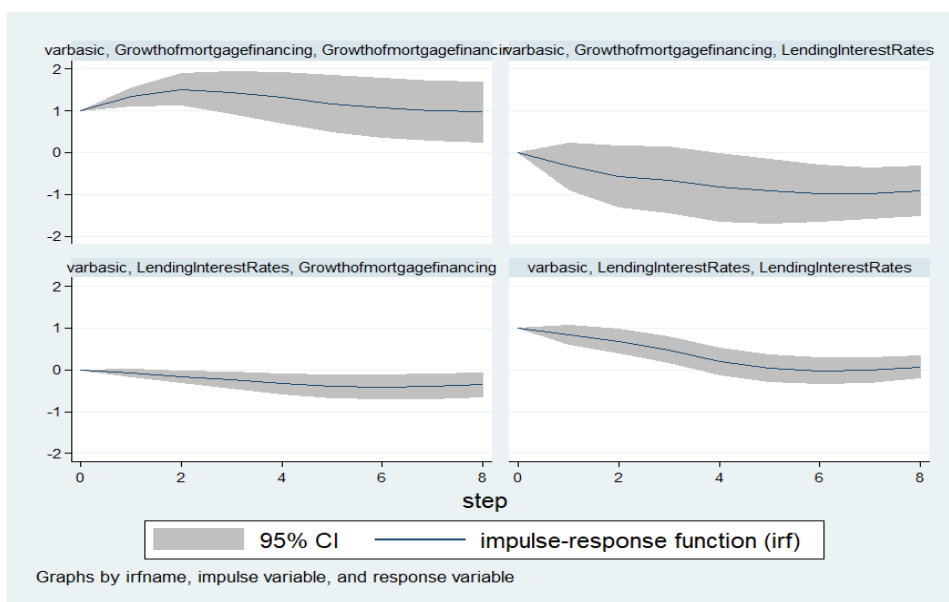
Furthermore, the growth of mortgage financing granger causes lending interest rates thus, the null hypothesis was rejected since ($p\text{-value} = 0.044 < 0.05$). Given the lending interest rate, it was found that GDP growth rate was found to granger cause lending interest

rate thus, the null hypothesis was rejected since (p-value = 0.001 < 0.05). Likewise, all the variables (growth of mortgage financing, lending interest rate, GDP growth rate and money supply (M3)) granger cause inflation rate thus, the null hypothesis was rejected since (p-value = 0.007 < 0.05).

Growth of mortgage financing was found to granger causes GDP growth rate thus; the null hypothesis was rejected since (p-value = 0.008 < 0.05). Likewise, all the variables (growth of mortgage financing, lending interest rate and money supply (M3)) granger cause GDP growth rate thus, the null hypothesis was rejected since (p-value = 0.018 < 0.05). However, none of the variables were found to granger cause money supply (M3).

4.7.2 Impulse Response Function

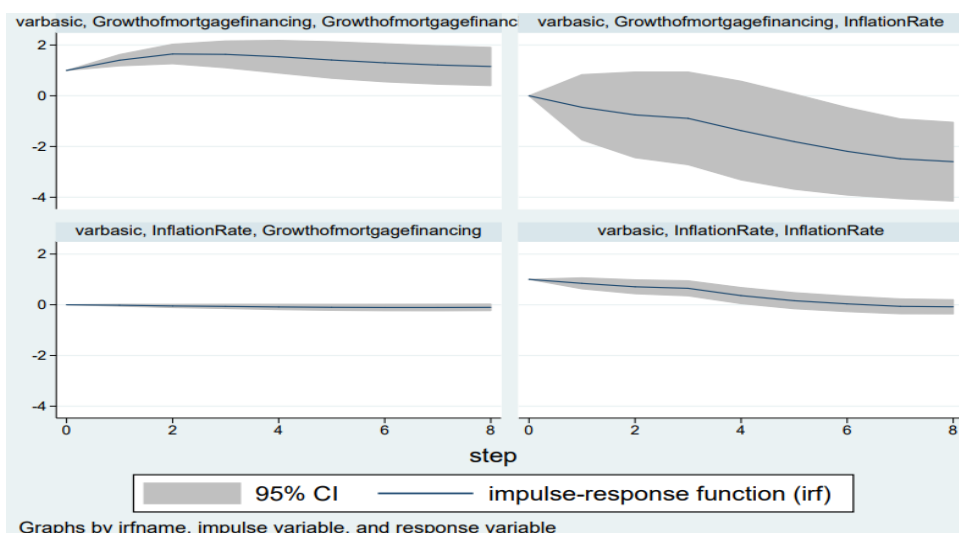
This test describes the behaviour of the independent variables at the time of the distress for a given period. It is a dynamic multiplier that represents the present and any consequent influence on every parameter as a result of an unexpected transformation in one of the parameters. In the study, the impulse response function (IRF) was used to examine the relationship between lending interest rates, inflation rates, GDP growth rates, money supply, and mortgage financing. The following are the results as shown in the Figures below.



Source: Research Data (2022)

FIGURE 4.7: Impulse Response of Growth of Mortgage Financing to Lending Interest Rate

Figure 4.7 (graph 2) indicates a decreasing trend in the slope where the growth of mortgage financing responds to standard deviation shock to lending interest rate. It can, therefore, be concluded that the response of growth of mortgage financing responds to standard deviation shock to lending interest rate is a decrease in the short run and a slight increase in the long run (0-2 = short run; 7-8 = long run).



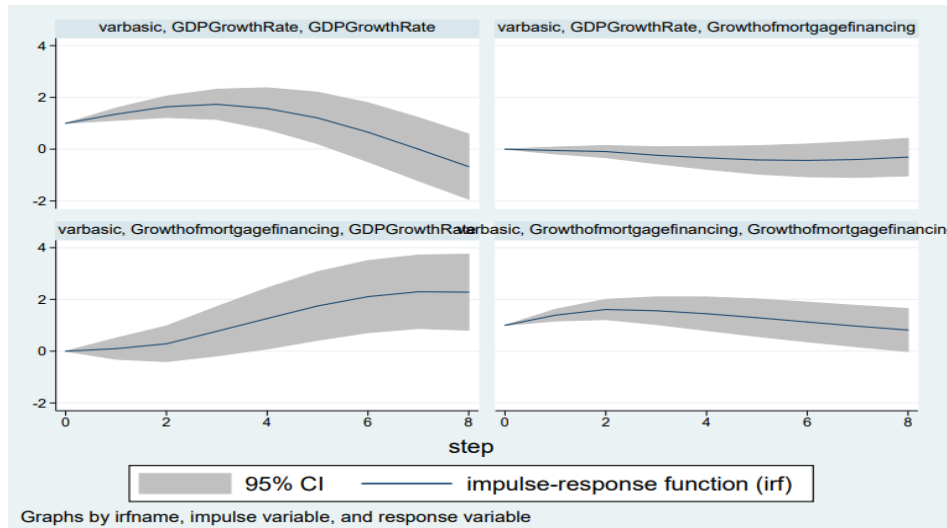
Source: Research Data (2022)

FIGURE 4.8: Impulse Response of Growth of Mortgage Financing to Inflation Rate

Figure 4.8 (graph 2) indicates a decreasing trend in the slope where the growth of mortgage financing responds to standard deviation shock to inflation rate. It can, therefore, be concluded that the response of growth of mortgage financing responds to standard deviation shock to inflation rate is a decrease both in the short run and in the long run (0-2 = short run; 6-8 = long run).

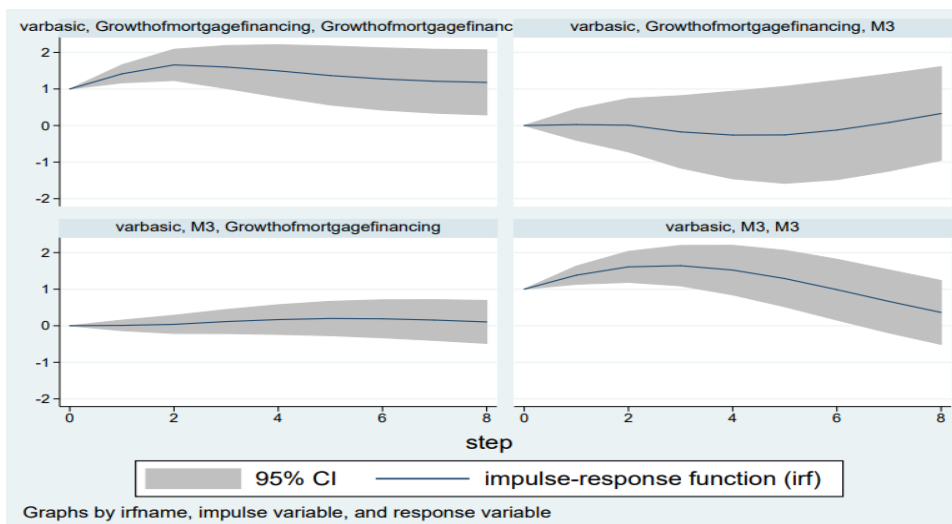
Figure 4.9 below (graph 3) indicates a decreasing trend in the slope where the growth of mortgage financing responds to standard deviation shock to GDP growth rate. It can,

therefore, be concluded that the response of growth of mortgage financing responds to standard deviation shock to GDP growth rate is an increase in the short run but is constant in the long run (0-4 = short run; 7-8 = long run).



Source: Research Data (2022)

FIGURE 4.9: Impulse Response of Growth of Mortgage Financing to GDP Growth Rate



Source: Research Data (2022)

**FIGURE 4.10: Impulse Response of Growth of Mortgage Financing to Money
Supply (M3)**

Figure 4.10 above (graph 2) indicates a decreasing trend in the slope where the growth of mortgage financing responds to standard deviation shock to money supply (M3). It can, therefore, be concluded that the response of growth of mortgage financing responds to standard deviation shock to money supply (M3) is constant in the short run but increases in the long run (0-2 = short run; 6-8 = long run).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter contains the summary of the study, conclusions and policy implications. In addition, the chapter contains areas for further research.

5.2 Summary of Major Findings

The summary of the major findings enumerates what was discovered or proved in each variable that was given as collaborated in the statistical analysis of the study. The summary was guided by the specific objective of this study as follows.

5.2.1 Lending Interest Rate and Growth of Mortgage Financing.

The study finds that there is a significant negative link between lending interest rate and the growth of mortgage financing in Kenya. Regression findings also acknowledge that lending interest rate and growth of mortgage financing in Kenya are negatively and significantly related. This implies that an increase in lending interest rate results in a decrease in the growth of mortgage financing. These findings are consistent with La Cava (2016) that the decline in lending rates during the 1980s and 1990s increased requirements for housing and drove the prices of houses and rents in supply-limited areas. Guyo (2017) also showed that the relationship was negative thus showing that the capping on interest rates led to a major decline in the supply of loans by the commercial bank. According to Gakuo (2018), loan rates have an impact on lending quality because the higher the price of mortgages, the more expensive the loan affecting the uptake of mortgages.

5.2.2 Inflation Rate and Growth of Mortgage Financing.

The correlation findings indicate that inflation rate and growth of mortgage financing in Kenya have a negative and significant relationship. From the regression results, inflation rate and growth of mortgage financing in Kenya are negatively but insignificantly related. This

implies that an increase in inflation rate results in a decrease in the growth of mortgage financing by 0.126 units and vice versa. These findings are consistent with Wanjiku Bosire and Matanda (2021) who observed to have a negative impact on REIT financial performance owing to decreasing aggregated pricing levels, which indicates that high inflation lowers the degree of the rate of exchange. Likewise, Musiaowski (2019) reveal that as the consumer price index rises, so does the true cost of a loan. That is, there is a negative link between the rate of inflation and mortgage cost-effectiveness.

5.2.3 GDP Growth Rate and Growth of Mortgage Financing

The correlation findings indicate that GDP growth rate and growth of mortgage financing in Kenya have a positive and significant relationship. GDP growth rate and growth of mortgage financing in Kenya from the regression findings are positively and significantly related. This implies that an increase in GDP growth rate results in an improvement in the growth of mortgage financing. These findings are consistent with Shi et al. (2021) who indicated that GDP growth rates higher funding productivity gains than joint-stock financial institutions, showing that the latter phase reduces overall effectiveness. Xu (2017) also indicated that bank loans increase consumer expenditure and contribute to GDP. As a result, GDP will have a beneficial influence on property prices, which represent housing prosperity.

5.2.4 Money Supply and Growth of Mortgage Financing

The study finds that money supply (M3) and the growth of mortgage financing in Kenya have a positive and significant relationship. The regression findings show that money supply (M3) and growth of mortgage financing in Kenya are positively but insignificantly related. This implies that an increase in money supply (M3) results in an improvement in the growth of mortgage financing. These findings are consistent with Borio and Gambacorta (2017) and Chepkemai (2017) who indicated that money supplies influence the appetite for residential mortgages. Likewise, Andele (2020) notes that in the long term, public spending, government

recurring spending, and mortgages have a positive influence on residential housing values in Kenya, according to this study.

5.3 Conclusion of the Study

The study concludes an increasing trend in the growth of mortgage financing, a decreasing trend in lending interest, a decreasing trend in inflation rates, an increasing trend in GDP growth rate and an increasing trend in money supply (M3) from the year 2002 to the year 2021.

Therefore, the study concludes that lending interest rates and inflation rates are negatively and significantly related to the growth of mortgage financing in Kenya. However, lending interest rate was statistically significant while inflation rate was not statistically significant. On the other hand, GDP growth rate and money supply (M3) are positively and significantly related to the growth of mortgage financing in Kenya. However, lending interest rate was statistically significant while inflation rate was not statistically significant.

Therefore, in the long run, lending interest rates and inflation rates have a long-run negative effect on the growth of mortgage financing in Kenya. However, GDP growth rate and money supply (M3) have a long-run positive effect on the growth of mortgage financing in Kenya. Lending interest rate, inflation rate, GDP growth rate and money supply (M3) have asymmetric effects on the long-run growth of mortgage financing in Kenya; that is to predict changes/movements of the growth of mortgage financing in Kenya.

5.4 Recommendations of the Study

The findings of this study are of importance to KMRC in the housing and mortgage sector since they shed light on the urgent need for formulating guidelines to regulate and formulate policies regarding the uptake of the mortgage in Kenya. This study aligns itself with the Big Four Agenda of Kenya towards Vision 2030 which is towards achieving a greater supply of

housing finance and playing a significant role in increasing affordable housing finance in Kenya by 2030.

Given the long-run negative impacts as evidenced by lending interest rate and inflation rate on the growth of mortgage financing in Kenya, the study recommends policy frameworks from CBK to be focused on ways to minimize the levels of inflation rates. A constant increase in inflation rates reduces the economic power of the citizens and the cost of borrowing money thus resulting in low uptake of mortgages. Likewise, an increase in lending rates increases the cost of mortgages and that results in low uptake of mortgages.

Likewise, CBK should implement the appropriate monetary policy instruments to ensure improvement in the GDP growth rate. This is because its relationship to the growth of mortgage financing in Kenya has been found to be positive and significant. Thus, the growth of GDP ought to be closely monitored for effective generation of wealth for the financing of mortgages in Kenya.

Likewise, given the long-run positive impact of money supply on the growth of mortgage financing, the government should encourage the forces of supply and demand to avoid the impact of inflation when there is too much supply of money in the market. This will ensure, appropriate enough money to fund the mortgages.

5.5 Limitations of the Study

This study had some limitations; first the data collection exercise took longer period than was anticipated thus affecting timely completion of the study. Proper time management can be of great importance in overcoming the challenge. The study also experienced the problem of accessing all of the data from the secondary sources as well as converting the annual data to quarterly data since some of the variable data were missing. This would affect the sample size which might be a problem of generalizability.

5.6 Areas of Further Study

The current study on macroeconomic factors (lending interest rate, inflation rate, GDP growth rate and money supply) that affects the growth of mortgage financing in Kenya. The factors showed a significant explanatory power of 85.01% of the variation in the growth of mortgage financing in Kenya. Therefore, it has been indicated that more factors can affect the growth of mortgage financing in Kenya which were not included in the model being captured in the 14.99%. This forms a basis for further studies to include more factors (such as unemployment rates) and extrapolate their effect on the growth of mortgage financing.

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APPENDICES

Appendix I: Secondary Data Template

Years	Quarters	Growth of mortgage financing	Lending Interest Rates	Inflation Rate	GDP Growth Rate	M3	LN Growth of mortgage financing	LN Lending Interest Rates	LN Inflation Rate	LN GDP Growth Rate	LN Money Supply
2002	Q1	8.519	13.102	5.338	6.679	39.382	2.142	2.573	1.675	1.899	3.673
2002	Q2	8.444	13.083	5.330	7.459	39.261	2.133	2.571	1.673	2.009	3.670
2002	Q3	8.406	12.985	5.292	7.478	39.201	2.129	2.564	1.666	2.012	3.669
2002	Q4	8.969	12.939	5.203	7.802	39.560	2.194	2.560	1.649	2.054	3.678
2003	Q1	8.781	12.830	5.090	8.158	39.480	2.173	2.552	1.627	2.099	3.676
2003	Q2	8.406	12.801	4.742	8.185	39.320	2.129	2.550	1.557	2.102	3.672
2003	Q3	7.844	12.688	4.396	8.412	39.079	2.060	2.541	1.481	2.130	3.666
2003	Q4	5.672	12.646	4.291	6.069	37.864	1.736	2.537	1.457	1.803	3.634
2004	Q1	5.303	12.502	3.781	5.634	37.817	1.668	2.526	1.330	1.729	3.633
2004	Q2	5.316	12.369	3.543	4.896	38.047	1.671	2.515	1.265	1.589	3.639
2004	Q3	5.709	12.247	3.183	3.857	38.553	1.742	2.505	1.158	1.350	3.652
2004	Q4	7.828	12.080	5.258	-0.290	40.755	2.058	2.492	1.660	.	3.708
2005	Q1	8.447	12.002	5.333	-0.811	41.245	2.134	2.485	1.674	.	3.720
2005	Q2	8.909	11.966	5.443	-0.510	41.444	2.187	2.482	1.694	.	3.724
2005	Q3	9.216	11.957	5.586	0.611	41.351	2.221	2.481	1.720	-0.493	3.722
2005	Q4	9.366	11.945	5.762	2.553	40.967	2.237	2.480	1.751	0.937	3.713
2006	Q1	9.359	12.020	5.972	5.315	40.291	2.236	2.487	1.787	1.671	3.696
2006	Q2	9.197	12.107	6.216	8.899	39.324	2.219	2.494	1.827	2.186	3.672
2006	Q3	8.878	12.227	6.493	13.303	38.065	2.184	2.504	1.871	2.588	3.639
2006	Q4	8.519	13.102	5.338	6.679	39.382	2.142	2.573	1.675	1.899	3.673
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2008	Q1	8.406	12.801	4.742	8.185	39.320	2.129	2.550	1.557	2.102	3.672
2008	Q2	7.844	12.688	4.396	8.412	39.079	2.060	2.541	1.481	2.130	3.666
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Source: (CBK, 2021; World Bank, 2021).