

**EFFECTS OF CENTRAL BANK RATE PASS THROUGH ON KENYA'S
SELECTED MACROECONOMIC VARIABLES**

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DECLARATION

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DEDICATION

This is devoted to my wife and our three wonderful children.

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TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES.....	viii
LIST OF FIGURES.....	x
ACRONYMS AND ABBREVIATIONS	xi
OPERATIONAL DEFINITION OF TERMS	xii
ABSTRACT	xvii
CHAPTER ONE.....	1
INTRODUCTION	1
1.0 Background.....	1
1.1 Mechanism of Monetary Policy and Interest Rate Pass-Through.....	2
1.1.1 The Central Bank Rate	4
1.1.2 Lending rates	6
1.1.3 Economic Growth.....	8
1.1.4 Stock Market capitalization in Kenya	10
1.2 Statement of the Problem	15
1.3 Research Questions	17
1.3.1 General Objective	18
1.3.2 The Specific Objectives.....	18
1.4 Significance of the Study.....	18
1.5 Scope and limitation of the Study	19
1.6 Study Organization.....	19
CHAPTER TWO.....	20
LITERATURE REVIEW	20
2.1 Introduction	20
2.2 Theoretical literature	20
2.2.1 Theory of Adverse Customer Reactions and Collusive Pricing Arrangements.....	20
2.2.2 Loanable Fund Theory	20

2.2.3 Keynesian Theory.....	21
2.2.4 The Interest Rate Pass-Through Theory.....	22
2.2.5 The Hicks IS-LM Hypothesis.....	23
2.2.6 The marginal cost pricing theory.....	26
2.3 Empirical Literature.....	28
2.4 Overview of Literature	32
CHAPTER THREE.....	35
METHODOLOGY	35
3.1 Introduction	35
3.2 Research Design	35
3.3 Study Theoretical Framework	35
3.3.1 Theoretical Framework for Bank Rate Pass through effects on Lending Rates in Kenya	35
3.3.2 Pass through Effect of Bank Rate on Economic Growth	36
3.3.3 Pass through Effect of Bank Rate on Stock Market Capitalization.....	36
3.4 Model Specification.....	39
3.5 Variables Definition and Measurement.....	45
3.6 Data Type and Source	46
3.7 Data Analysis.....	46
CHAPTER FOUR	47
EMPIRICAL FINDINGS	47
4.1 Introduction	47
4.2 Descriptive Statistics	47
4.3 Diagnostic tests.....	49
4.3.1 Stationarity Test.....	49
4.3.2 Lag Length Selection.....	56
4.3.3 Co-integration Results	57
4.3.4 Correlation Matrix Analysis	59
4.3.5 Diagnostic Tests	61
4.3.5.1 Heteroscedasticity Test.....	61
4.3.5.2 Normality Test.....	62
4.3.5.3 Serial correlation Test.....	64
4.4 Regression Results.....	64

4.4.1 Central Bank rate changes Pass-through effect on lending rate	65
4.4.2 Impulse Response Functions and Variance Decompositions for Pass-through effect of central bank rate changes on lending rate	68
4.4.3 Pass through Effect of Central Bank Rate Changes on Kenya’s Real Gross Domestic	69
4.4.4 Pass-through Effect of Central Bank Rate Changes on Stock Market Capitalization	75
4.4.5 Testing for Structural Break	76
4.4.6 Pre-estimation Tests Results for the Central Bank Rate Pass through Effect to Stock Market Capitalization.....	78
4.4.6.1 The unit Root Test	78
4.4.6.2 The Johansen Co-integration Test	78
4.4.6.3 Empirical Findings	80
4.4.6.4 Impulse Response Functions and Variance Decompositions	83
CHAPTER FIVE	85
SUMMARY, CONCLUSION AND POLICY IMPLICATIONS	85
5.1 Introduction	85
5.2 Summary of the study.....	85
5.3 Conclusion.....	89
5.4 Policy implications	91
5.5 Areas for Further Research.....	93
REFERENCES	83
APPENDICES.....	89
Appendix A.1: Visual Examination of Variables.....	89
Appendix A.2: CUSUM of Squares Parameter Stability of Lending Rate Function Model	90
Appendix A.3: Approval of Research Proposal	91
Appendix A.4: Research Authorization	92
Appendix A.5: Research Permit	93

LIST OF TABLES

Table 3.1: Definition and Measurement	45
Table 4.1: Descriptive Statistics Results	47
Table 4.2: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Unit Root Tests	49
Table 4.3: Zivot-Andrews Unit Root Test Results	50
Table 4.4: Multiple Structural Breaks Unit root test	53
Table 4.5: Kwiatkowski-Phillips-Schmidt-Shin Test.....	55
Table 4.6: Lending Rate Lag Selection	56
Table 4.7: Real Gross Domestic Product Lag Selection	56
Table 4.8: Stock Market Capitalization Lag Selection.....	57
Table 4.9: ARDL Bounds Test (Co-integration Test).....	57
Table 4.10: Gregory-Hansen Co-integration Test	58
Table 4.11: Correlation Matrix.....	59
Table 4.12: VIF Results.....	61
Table 4.13: Heteroscedasticity test result-equation 3.9.....	62
Table 4.14: Heteroscedasticity test result-equation 3.10.....	62
Table 4.15: Breusch-Godfrey Serial Correlation LM Test-Model 3.9	64
Table 4.16: Breusch-Godfrey Serial Correlation LM Test-model 3.10	64
Table 4.17: Central Bank rate changes Pass-through effect on lending rate.....	65
Table 4.18: IRF Tracing the Effect of Shocks on CBR on Lending Rate	68
Table 4.19: Results for Variance Decomposition: How Much Does CBR explain?.	69
Table 4.20: Central Bank Rate Changes and Real Gross Domestic Product Lag Selection	70
Table 4.21: Central Bank Rate Changes and Real Gross Domestic Product Johansen Tests	71
Table 4.22: Central Bank Rate Changes and Real Gross Domestic Product Pass- Through Effect	72
Table 4.23: IRF Tracing the Effect of Shocks on CBR on Real GDP	74
Table 4.24: Results for Variance Decomposition: How Much Does CBR explain?.	75
Table 4.25: The Supremum Wald Test of Study Variables on the CBR pass through Effect to Stock Market Capitalization in Kenya	77

Table 4.26: Central Bank Rate Changes and Stock Market Capitalization Lag	
Selection	79
Table 4.27: Estimating the Central Bank Rate Pass through to Stock Market	
Capitalization in Kenya	81
Table 4.28: IRF Tracing the Effect of Shocks on CBR on Stock Market	
Capitalization	83

LIST OF FIGURES

Figure 1.1: Central Bank Rate and Lending rate	8
Figure 1.2: Central Bank Rates and GDP Growth Rates in Kenya	9
Figure 1.3: Stock Market Capitalization and Central Bank Rate Trend.....	13
Figure 4.1: Histogram-Normality Test- model 3.9.....	63
Figure 4.2: Histogram-Normality test- model 3.10	63

ACRONYMS AND ABBREVIATIONS

APT	-	Arbitrage Pricing Theory
CAPM	-	Capital Asset Pricing Model
CBK	-	Central Bank of Kenya
CBR	-	Central Bank Rate
CGT	-	Capital Gain Tax
GDP	-	Gross Domestic Product
INTR	-	Interest Rate
IRPT	-	Interest Rate Pass Through
KBRR	-	Kenya Banks Reference Rate
KLSE	-	Kuala Lumpur Stock Exchange
MPC	-	Monetary Policy Committee
MPTM	-	Monetary Policy Transition Mechanism
NASI	-	Nairobi Securities Exchange All- Share Index
NBFIs	-	Non Banking Financial Institutions
NSE	-	Nairobi Securities Exchange
TAD	-	Term Auction Deposits
TB	-	Treasury Bill

OPERATIONAL DEFINITION OF TERMS

- A Reverse Repo:** is the practice of buying assets with the expectation of reselling them at a higher price at a later date.
- Central Bank Rate:** rates that a nation's central bank uses to encourage banks inside the country to borrow funds.
- Broad Money:** monetary value in any form, including deposits made at banks or other institutions, as well as coins and notes.
- Central bank mechanism:** The commercial banks get money from the central bank, which also charges interest on those funds. Due to its monopoly status, it has complete control over the money supply, interest rates, and other macroeconomic variables.
- Economic Growth:** Increases in Gross Domestic Product during a given time period.
- Financial innovation:** refers to the process through which new financial instruments, technologies, institutions, and markets are developed and adopted.
- Gross Domestic Product:** The entire worth of all the commodities and services that a nation produces in a given year is totaled up to form the gross domestic product of that nation.
- Horizontal Repos:** Collateralized repurchase agreements (repos) are transactions between commercial banks in which one

party transfers custody of collateral to another party in exchange for payment, but neither party transfers legal ownership of the collateral.

Interbank Market: On this market, financial institutions lend money to one another for a predetermined amount of time. Overnight loans make up the great majority of loans, and the median loan term duration is less than one week.

Interbank Offer Rate: Interest rate on loans between banks; serves as standard for the vast, overnight unsecured money market (one week to one year) that has developed since 1999.

Interest Rate: Lenders charge borrowers an interest rate, which is a percentage of the principle amount borrowed.

Lending rate: Rate of interest charged on loans to businesses and the private sector as a whole

Kenya Banks' Reference Rate: Every commercial bank lends money at the KBRR as their starting point which is the outcome of adding the Central Bank Rate to a weighted moving average of 91-day Treasury Bill Rates that is calculated over two months.

M0	The entire quantity of a currency that is either in use and owned by the general population or that which is kept in the reserves of a central bank in the form of deposits from commercial banks.
M1	consists of cash, demand deposits, and other liquid deposits; it is a specific measure of the money supply of the country.
M2	Includes M1 in addition to deposits held for a short period of time in banks and money market funds that are available 24 hours a day.
M3	Includes M2 in addition to deposits held for extended periods of time and money market funds with maturities of more than 24 hours.
Pass-through effect:	Refers to the level with which changes that are made to the central bank rate are passed on to other macroeconomic variables
Repo rate:	Repo loans allow banks to borrow short-term amounts of money from the central bank in return for collateral, with the interest rate being often referred to as the repo rate.

Repurchase Agreement (REPO): This is an agreement in which the vendor of a security agrees to repurchase it from the buyer at an agreed price and happens to dealers in government securities.

Ripple Effect The ongoing and widespread effects of an alteration in the CBR set by the central bank.

Stock market capitalization The market value of all common shares currently outstanding in a publicly listed corporation

Stock Market Returns: Are the profits that investors make as a result of their participation in the stock market. The potential distribution might manifest as either profits or dividends disbursed to shareholders and investors of the NSE.

Treasury bills: are a safe kind of investment that may be held for a short period of time and provide returns after just a little outlay of capital. Treasury notes are offered by the government to the public at a discount, and there are now three different maturities of TBs: 91 days, 180 days, and 365 days.

The interbank rate: Is the rate of interest that is applied to loans for brief periods of time that are made between banks.

- Term Auction Deposit :** The Central Bank Kenya uses the Term Auction Deposit when its stockpile of securities for the Repo program has been exhausted or when it determines that offering longer tenor options would be beneficial.
- Vertical repo:** Is a kind of financial instrument that is used by the commercial banks and the central banks of a country in which whenever the central bank wishes to withdraw liquidity the central bank rate will be the highest (ceiling) rate that it will pay on any bid received.
- Volatility:** The proportional magnitude of changes in price experienced by securities during a certain time period.

ABSTRACT

The study focused on the effects of central bank rate pass through on Kenya's selected macroeconomic variables. Up until now, most research concentrated on other, shorter-term interest rates such as the repo and interbank rates, which are almost entirely endogenous to the bank rate. After controlling for other variables, there is a significant negative correlation of five percent between the central bank's interest rate and the overall market capitalization. There is a 0.7513 connection between them. According to the study, real GDP growth in Kenya increases by 0.29 percentage points whenever the central bank rate is changed. The interest rate pass through loans as the CBR changes was found to be 0.9666 percent in the short run, while it was 1.29 percent in the long run. Stock or asset values rise by 2.957 percentage points for every percentage point increase in the central bank rate. This study made use of time series data collected between 2010 first quarter and 2021 fourth quarter. The Blanchard model (based on the Exponential Generalized Autoregressive Conditional Heteroscedastic estimating technique), the co-integration approach (based on the co-integration strategy and the Johansen and Juselius (1980) approach), and the co-integration approach (based on the Engle and Granger (1987) approach) were the methods employed in the study to estimate the Autoregressive Distributive Lag model. The study concluded that the real gross domestic product, stock market capitalization, and lending rates were not fully impacted by changes in the central bank's bank rates. For policy implication, Kenya needs a comprehensive review of its current monetary policy framework. This should be done in tandem with ongoing efforts to modernize the nation's banking and financial sector. The Monetary Policy Committee should be aware of the character and structure of commercial banks. Timing is of utmost importance when it comes to altering the Central Bank Rate. The research discovered an unsatisfactory pass-through effect when analyzing the impact of CBK on real GDP, lending rates, and stock market capitalization.

CHAPTER ONE

INTRODUCTION

1.0 Background

The Central Bank of Kenya (CBK) was first founded in March 1966 and commenced operations in September of the same year according to an act of Parliament. According to Section 36 (4) of the CBK Act, the bank is required to publicly disclose the minimum interest rate it applies to loans given to other commercial banks (Republic of Kenya, 1966). Section 36(4) of the CBK Act established the Central Bank Rate (CBR) in June 2006 to gauge the attitude of monetary policy. Commercial banks will be subject to the CBR as a minimum interest rate on loans given to them by the CBK, which is a lender of last resort. Before the CBR was established, there was a 3% difference between the rates of bank loans and Treasury bills. The year 2000 marked the beginning of this disparity. Following economic liberalization in the 1990s, the central bank established a consistent framework for monetary policy (Maturu et al., 2011).

As a matter of policy, the MPC announces the new Central Bank Rate every two months. The stance of monetary policy is shown by the magnitude and pattern of interest rate fluctuations. All monetary policy efforts are built around the CBR, which aims to make monetary policy implementation more accurate and transparent. The CBR is the minimum allowable interest rate that the Central Bank establishes when injecting money into the financial system via a reverse repurchase arrangement. In the event that the bank chooses to withdraw liquidity via a Vertical Repo, the CBR is the maximum interest rate that the CBK will provide for any

accepted bid. The monetary policy stance of the Bank is reflected in the revisions made to the CBR.

The pass-through effect of a change in the CBK rate refers to the extent to which macroeconomic variables respond, both statistically and qualitatively, to changes in the CBK rate and other economic factors. The "pass through," often known as the speed at which a change in interest rates may affect the economy, is a vital measure of a central bank's effectiveness. This might also serve as a reliable gauge of the potential speed at which these effects may manifest (Becker et al., 2012). The transmission of interest rate adjustments from the central bank to commercial banks might potentially achieve the goals of monetary policy, hence influencing domestic demand, investments, and production (Xu & Chen, 2012). According to academic articles such as Aydin (2007) and Sims (1992), there remains a lack of general agreement regarding the characteristics, approach, and methods by which monetary policy accomplishes its objectives. On "the quantity and type of effects of monetary policy rate upon aggregate economic activity," to use Sims's (1992) phrase, experts cannot agree. Experts concur that the institutional and economic features of a nation greatly influence the framework utilized for governing (Mishkin, 2007). An approach to evaluate the efficacy of monetary policy is examining its influence on specific country economies, such as that of Kenya.

1.1 Mechanism of Monetary Policy and Interest Rate Pass-Through

To properly understand the Interest Rate Pass through (IPRT) impact of central banks, it is necessary to consider it in the context of the Monetary Pass Transmission Mechanism (MPTM). To get a more profound comprehension of IRPT, it is vital to examine the occurrence and impact of MPTM on different macroeconomic facets

(Mishkin, 1996). As part of the first phase of the MPTM in the economy, a monetary authority, usually a central bank, would publicly announce a policy move to modify interest rates. In the context of Kenya, the Central Bank Rate would be applicable. The Central Bank of Kenya (CBK) not only releases the CBR, but also executes monetary policy in accordance with it via the use of open market operations (OMO) to exert influence on currency rates in the world's most significant financial markets (Mishkin, 1996). Policy changes have a wide-ranging effect via several channels, such as those that influence interest rates, lending, currency rates, and other asset values (Faure, 2006). Rates set by the central bank for short-term loans may have an effect on consumer spending and business investment since commercial banks can respond to these changes by changing the interest rates they offer their clients. This is where interest rates come in; whereupon, they are used as a policy instrument for the central bank (Wang & Lee, 2009). An efficient MPTM interest charges transmission channel allows commercial banks to advise borrowers of interest rate changes in the banking system via retail bank interest charges. However, when interest rates are enforced inflexibly, the channel via which they are disseminated is criticized as ineffective. It is very important how commercial banks react to currency shocks caused by the central bank since it is predicted that the consequences will be strong enough to have an influence on the overall demand, consumption, and investment levels of the economy (Aziakpono & Wilson, 2010). An efficient and competitive financial system would be indicated by a complete (of one) IRPT. Developing nations like Kenya are likely to have a lot of incomplete IRPTs (Misati *et al.*, 2011; John & Pokhariyal, 2013). This suggests that their financial system is not completely developed, therefore not competitive, and not efficient.

1.1.1 The Central Bank Rate

The fees imposed by a country's central bank on loans and other financial transactions conducted by commercial banks and other financial institutions under its authority are known as Central Bank Charges (Andrle et al., 2013). The Committee on Monetary Policy of the Central Bank usually starts its discussions on monetary policy by voting to modify the CBR. When the economy is thrown off balance, the central bank may make corrections by adjusting interest rates, among other tools at its disposal.

Many countries' central banks, monetary policy committees are the ones who get to set the commercial banks' interest rates charge on loans in the short-term. Those objectives are a means by which the central bank carries out its policy. Central banks routinely adjust the benchmark interest rate upwards or downwards to demonstrate their power. This change in the interest rates that commercial banks give to their borrowers may have repercussions for investment as well as for the spending habits of consumers.

Aydin (2007) provides a definition for "pass-through" as the process by which a change in the interest rate set by a central bank is transmitted to the interest rates of commercial banks and other economic factors. This is a vital part of the MPTM for keeping the economy's banking system stable by keeping interest rates steady.

One of the financial tools used by economies to address financial sector development and, by extension, implications on economic growth, is the CBR (Aydin,2007). Commercial banks are essential to the economy because the central bank supplies them with money, either directly or via the interbank market. The

interbank market is a key tool for central banks in enforcing monetary policy and limiting the free flow of currency. Central banks signal monetary policy to the interbank market via interest rates and lending. Kenya's central bank rate (CBR) is meant to reflect underlying market conditions and respond similarly to changes in other nations' CBRs. Federal funds rate changes are widely reported to the public via two channels: the interbank market and the receptiveness of consumer interest rates (Apostoaie, 2007).

A major factor influencing the cost of borrowing money in the near term is the prime lending rate, which is determined by the central bank. Immediate changes to this rate will significantly impact future borrowing costs (CBK, 2019). Following its signal of more monetary policy flexibility, the central bank may decide to cut its own interest rate if market rates keep falling (Mwega, 2014). Decreasing interest rates stimulates economic growth. The CBK keeps an eye on the Over-The-Counter (OTC) money market but has no direct impact on it (Muchiri, 2012). Rates set by central banks have an indirect effect on market interest rates.

Since June 2006, Kenya's central bank rate has been utilized to influence economic activity. Prior to this, a monetary policy indicator was the TB rate plus 3 percent (TBR + 3%) rule. Concerns over Kenya's monetary policy's efficiency culminated in the implementation of a Central Bank Rate (CBR), which serves to reinforce that policy's framework as well as its message. CBR aims to influence lending, deposit, and interbank rates. As a result, the CBR is a crucial tool for monetary policy. Compared to monetary goals, it is far more valued.

Potential effects of interest rate hikes determined by central banks on the stock and commodities markets are explored in (Mwega, 2014). Modifications to the bank rate may boost stock prices as a knock-on effect. Prices on the stock market go up when bank rates go down, but they go down when the central bank raises their rates. Hence, influencing economic activity that is accomplished by the Central Bank via the process of managing the bank rate.

1.1.2 Lending rates

As IRPT is important to the success of monetary policy, economists and policymakers are increasingly interested in the time lapse between policy interest rate changes and increases at commercial banks. Loans to business customers like merchants and wholesalers are a necessary aspect of a commercial bank's mission to foster the growth of economic activity (Gershenberg, 2011). The Kenya Vision 2030 program comprises activities that must be undertaken and target the banking system in order to raise savings rates from 17% of GDP to at least 30% of GDP. The adoption of these measures is planned to bring about these expansions. This would need lowering borrowing costs and raising bank deposits from the current level of 44% to almost 80%. Lending rates should be kept very low in order to provide the financial services outlined in Kenya's vision 2030 project.

The policy rate is crucial to a country's economy because it sets the benchmark for how much banks charge to borrow money. There is an argument here for the assumption that if monetary policy were tightened, consumers and businesses would have to pay more in interest and principal on their variable rate loans. Lending rate refers to the interest rate charged by financial institutions to borrowers (Maina, 2015). Either BFIs or NBFIs may be the institutions. Kithinji & Waweru (2007)

suggest that the loan charges might be viewed as "Rent for money," which is a tiny deviation. Lending rates take into account market data on the erratic nature of the value of the dollar and the chance that inflation will fluctuate in the future (Ngugi, 2001). This is on the assumption that borrowers, some of whom may be just money lovers, are more likely to take out loans when interest rates are low, which might contribute to inflation, while borrowers facing higher interest rates may be forced to forego borrowing, which would lead to deflation (Were & Wambua, 2014).

High borrowing rates are an indicator of banking industry inefficiency. Compared to other African nations, Kenya's average loan rates are somewhat higher, suggesting inefficiency in the country's banking sector (Hassan & Khan, 2010). There has been a lot of focus and interest from academics, consultancies, and non-profits in studying Kenya's bank lending rates (Hafer, 2010). Many people believe that commercial banks' interest rates are abnormally high compared to their cost of funding.

With inflation expectations firmly anchored within the Government goal range, enhanced certainty for economic growth prospects, and economic production below its potential level, the MPC decided to lower the CBR from 10% in September 2016 to 9.50% in March 2018 to boost economic activity. When compared to June 2019, when the average commercial bank loan rate was 12.47 percent, it was 11.89 percent in June 2020. The diagram shows the comparison in movements between the CBR and the lending rates in Kenya.

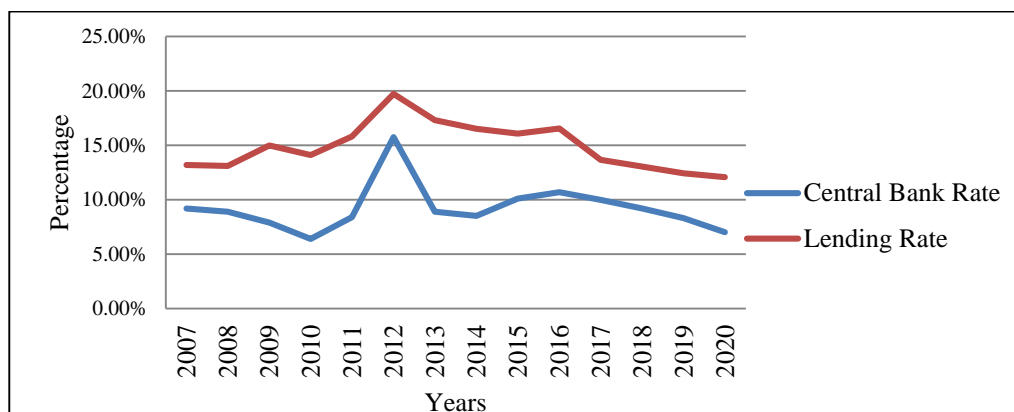


Figure 1.1: Central Bank Rate and Lending rate

A closer look at Figure 1.1 reveals a scenario where changes in the central bank rate do not reflect a one to one mapping in terms of changes expected to signal response to lending rates reflecting stickiness. For the years 2010 to 2020, interest rates from commercial lenders and the central bank indicate a range of likely outcomes. Lending rates were generally modest and stable under the interest cap regime, with narrow interest rate spreads. But in November 2019, the interest rate cap was lifted with the passage of the Finance Bill 2019. Loan rates dropped from 12.47 percent in February 2019 to 12.19 percent in February 2020 as a result of the monetary policy relaxation.

1.1.3 Economic Growth

Commercial banks modify the interest rates they impose on their retail customers in reaction to changes in the central bank's short-term policy interest rate. This is referred to as the monetary transmission policy's rate of interest channel. According to this view, Central Bank communicates their monetary policies to the economy through interest rates. This has led to the recognition of the immediate policy rate of interest as a useful operational tool of monetary policy, particularly in nations

seeking to control inflation. Particularly in the EU, this is accurate. The basis for this argument is derived from the contemporary trend in macroeconomics, according to economic theory. This trend emphasizes the importance of short-term interest rates in achieving price stability. Modifications to the interest rate at which commercial banks in Kenya get loans from the KCB have the capacity to have significant consequences for the country's economy. The cost of borrowing money goes up as a side effect of high interest rates on deposits at the central bank (Ng'etich & Wanjau, 2011). As a result, less money is being put into the economy and less money is being spent, both of which slow the growth of the national economy.

The MPC kept the CBR at 7 percent in its meetings in May and June 2020, noting that the package of policy changes taken since March were having the desired impact on the economy and that the fiscal changes for FY 2020/21 will supplement these changes (CBK, 2020). Figure 1.2 depicts the pattern of growth rates of central banks and GDP over the study period.

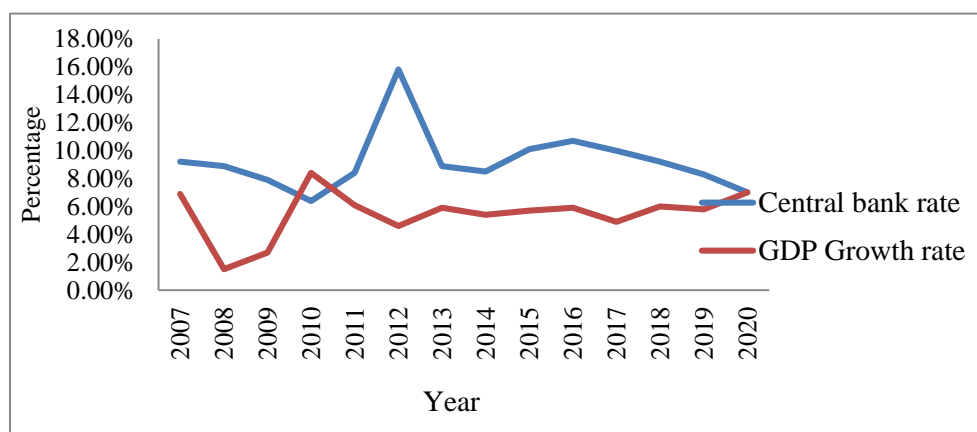


Figure 1.2: Central Bank Rates and GDP Growth Rates in Kenya

Source: Central Bank Annual Report, 2020

Contrary to what economic theory predicts, changes in central bank rates and GDP growth rates do not follow a predictable pattern. Economic theory postulates a situation where lower CBR should be accompanied by higher GDP growth rates. However, from the Figure 1.2 above, central bank rates adjustments are not showing a predictable pattern in the way GDP growth rates are evolving.

The turmoil that followed the 2007 election caused the economy of the nation to expand at its slowest rate ever in 2008, expanding by less than 2 percent. According to Figure 1.2, the economy expanded at its quickest rate in 2010—a year in which the bank rate was only 6.4%—and at its slowest rate—a year in which it expanded by 4.6%. The bank rate was 15.8% in both years. The main question of the study is how interest rates impact the rate of economic growth in a country. The CBK lowered the benchmark rate by 300 basis points between 2015 and 2016 as part of a loosening of its monetary policy stance. From 11.5% in July 2015 to 10% in January 2018, then to 9.5% in March 2018, and finally to 9.0% in May 2018, the CBR experienced a rise. In July 2018, the proportion was reduced to 9.0%, and it stayed there until November 2019. The rate was further brought down to 8.50 percent in November 2019 and subsequently by 25 basis points to 8.25 percent in January 2020 in an effort to increase market liquidity. The COVID-19 pandemic caused the CBR to drop to 7.25 percent in March 2020 and 7.0% in April 2020, respectively (CBK, 2020).

1.1.4 Stock Market capitalization in Kenya

Central banks throughout the world utilize the CBR to control the money supply and the economy generally (Hsing, 2004). Through the manipulation of this financial instrument, the governments' fiscal and monetary objectives are met. Furthermore,

stock price indices may be an indicator of a country's economic health because of how well the market performs there. Therefore, a weighted price index of chosen companies, such as the NSE 20 Share Index, is often calculated and used as a suitable representation of the market as a whole.

The Kenyan government's approach to business “The Kenya Vision 2030” plan calls for a globally competitive financial system that promotes high savings rates and meets the country's investment needs. To secure the USD 6.5 billion in funding and investments required to carry out the Flagship Projects, which will be supported by the Kenyan government and local and international private investors, financial services are anticipated to play a crucial role. The vision's objective is to boost stock market capitalization from 50% of GDP to 90% of GDP and to increase savings and investment from 14% of GDP to between 25% and 30% of GDP, giving corporations/companies and the government a means of raising money for project creation and company expansion (CMA, 2020). Extensive research on endogenous growth has been conducted, focusing on the relationship between economic growth and stock market liquidity or development in developed countries.

The rising stock market has been linked to economic growth in many scholarly research. Several researches have shown mixed or even contradictory results in their attempts to prove that a rising stock market supports economic development. This concept has had a lot of research behind it, but that doesn't prove it is right. Coşkun et al. (2017) uses quarterly data from Turkey between 2006 and 2016 to examine the connections between the maturity of individual segments of the capital market and GDP growth. In their research, they apply the ARDL technique, as well as Markov Switching Regression and Kalman Filter models. Long-term co-integration and a

unidirectional causal connection between capital market expansion and economic expansion are shown. These two connections are heading in the same general direction.

Levine and Zervos (1998) draw this conclusion from their examination of 42 countries' economic data collected between 1976 and 1993: strong stock market liquidity and bank credit are directly and significantly related to economic growth. Long-term economic development is helped by stock market liquidity, according to several studies, such as those conducted by Holmstrom and Tirole (1993) and Bencivenga et al. (1995).

Beck and Levine (2004) employed the most up-to-date generalized approach of moments dynamic panel techniques to isolate the impact of the stock market and banking institutions on economic development across a range of nations from 1976 to 1998. For 146 economies between 1991 and 2011, Seven and Yetkiner (2016) utilized principal component analysis to create a reliable financial development indicator to analyze the correlation between the two. Stock market expansion is shown to have a favorable effect on economic development in both high- and low-income nations.

Levine and Zervos' global growth regressions show a high correlation between long-term economic growth and the desired element of stock market development (Levine and Zervos, 1996). Using an Autoregressive Distributed Lag (ARDL) limits test on seven sub-Saharan African countries, Enisan and Olufisayo (2009) discovered that the establishment of stock markets greatly facilitated economic growth. From what has been said, it appears that research into developing economies

is scarce, and that the research that does exist often yields contradictory results. There is a dearth of material on the connection between central bank rate and security market capitalization in an emerging market economy like Kenya.

Figure 1.3 shows a correlation between the rate set by CBK and the value of securities traded on the country's stock exchange relative to GDP. Stock market performance and interest rate fluctuations are connected, at least in theory (Ferrer, Bolos & Benitez, 2014). The stock market reflects investor sentiments in a timely manner because, as the efficient market theory asserts, it responds instantly to any new information (Kitatia, Evusa & Maithya, 2015). As a result, capital market prices rapidly reflect changes in interest rates on money markets (Chovancova, 2001). According to the wealth effect idea, share prices may be able to forecast the direction of the real economy (Pasrun, 2015). Figure 1.3 below shows Central Bank rate and Stock Market Capitalization as percentage of GDP.

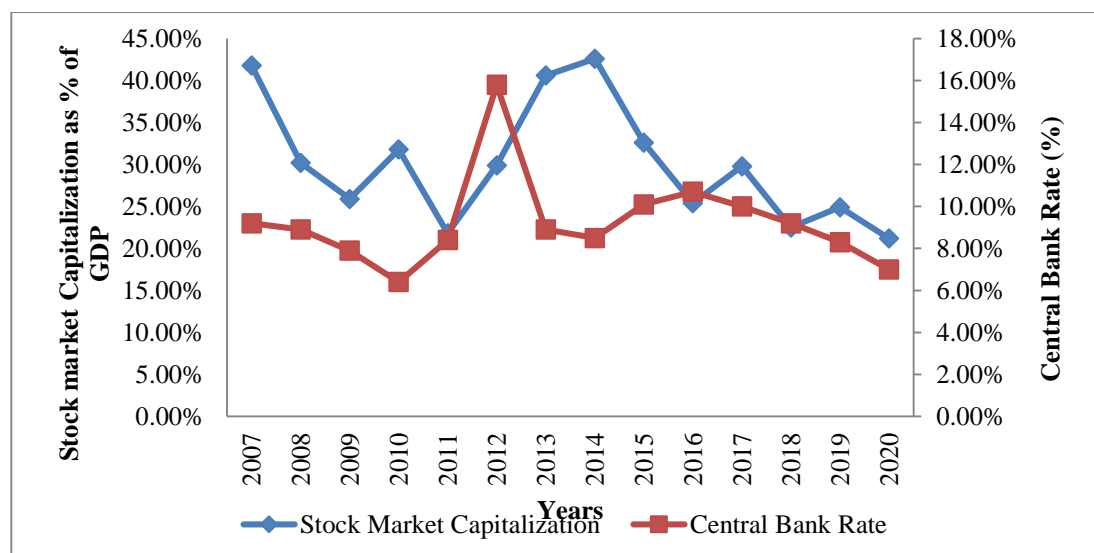


Figure 1.3: Stock Market Capitalization and Central Bank Rate Trend

Source: CBK Yearly Report, 2020

Figure 1.3 shows that CBR modifications will affect stock market capitalization. These effects include a lower CBR increasing stock market capitalization and vice versa. However, this does not come out well in the figure 1.3.

The Nairobi Securities Exchange report shows that both market capitalization and NASI have increased in 2020 quarter four relative to quarter three, by 8.74 and 8.80 percent, respectively. Comparing the fourth quarters of 2020 and 2019 reveals that there was a 38.88% fall in equity turnover in the fourth quarter of 2020, which confirms a decline in investor involvement at the stock exchange. Equity turnover for the fourth quarter of 2020 was KShs. 27.51 billion. The end-of-month market capitalization has also decreased by 8.00%, from KShs. 2,539.98 billion in the fourth quarter of 2019 to KShs. 2,336.70 billion in the fourth quarter of 2020. Moreover, there was a significant decrease of 24.85% in the number of shares traded, from 1,290.12 million shares in the fourth quarter of 2019 to 969.57 million shares in the corresponding quarter of the following year. This research investigated the actual correlation between the stock market value and bank rates in Kenya. The rate declined between 7.5 per cent and 11.5 per cent in the a five year period that followed the September 2016 implementation of the interest rate limitation law before dropping below 10%. The average inflation rate from 2013 to 2017 was 6.7 per cent (it reached 5.7% in September 2018), which was within the government's target range of $5 \pm 2.5\%$. Furthermore, there has been no change in the exchange rate. The CBK softened its stance on monetary policy to encourage economic expansion. In July 2018, the policy rate was 9.5 per cent; however, in March 2018, it was lowered to 9 per cent. Lower core inflation, a dedication to fiscal consolidation, a closing current account deficit, and improved external positions all backed this

conciliatory approach. Nevertheless, the interest rate cap regulation persisted in impeding the financial and monetary systems' ability to function efficiently. An outcome of the interest rate limitation legislation was a 5 percent reduction in the growth of credit in the private sector. The reallocation of credit occurred from more risky private sector investments to safer public sector Treasury Bonds and Bills, resulting in this outcome (Republic of Kenya, 2020).

1.2 Statement of the Problem

The Kenyan central bank introduced the CBR as an effective means of conveying monetary policy to the market, leading to swift adjustments in interest rates by financial markets. These changes will have a broad influence on the whole economy, including the stock market, real GDP, and other macroeconomic parameters.

Changing the bank rate is theoretically associated with slower economic expansion. As the bank rate rises, borrowing rates rise, money supply falls, and the cost of credit rises for businesses, all of which slows economic development since fewer people and fewer companies are willing to spend. Stock market values often react rapidly to changes in interest rates. Customers are impacted by changes in bank rates since prime personal loan interest rates are affected. When borrowing costs are lower, the economy can grow; conversely, when inflation is higher than intended, the economy can be restrained by raising bank rates (Mwega, 2014).

From 1998 to 2012, Kenya's CBR affected short-term interbank rates but had no impact on the lending rate at which commercial banks lent money. It's not clear whether the loan interest rate increased or not. As literature suggests monetary policy may not have had as much of an impact on private investor financing and, hence, economic growth, as was previously believed (Kaman, 2014). No clear

pattern emerged in real GDP growth rates in response to alterations in interest rates from central banks throughout the studied time period. A modification in the CBR by the CBK is expected to be reflected in adjustments to interbank, deposit, and lending rates. Yet, there has recently been criticism in Kenya that interest rates on loans, in particular, and associated charges, do not move fully and as quickly as the rates for monetary policy. As a result, the banking system has come to be viewed as a barrier to realizing the goals of Vision 2030 since it makes it difficult to finance important economic activity and effectively implement monetary policy. Because of doubts about the efficacy of Kenya's monetary policy, the CBR was established to provide more certain signals about the bank's monetary stance than the monetary targeting framework. The deregulation of Kenya's interest rates occurred in 1991 in the month of July, and currency rates were liberalized in October 1994, both of which are regarded to be congruent with the introduction of CBR in the country (Mwega, 2003). The implementation of the changes has been hampered by the quick uptake of cutting-edge financial products, information and communication technology (ICT), and globalization.

The NSE 20 index has shown declining performance as an indicator of the Kenyan stock market. There was a reduction of 4,840.52 points each year on average, from a high of 5499.64 points in 2015 to a low of 2636.47 points in March 2019. Stock prices are impacted by the decline in the traded share volume as a percentage of GDP since 2017. Stock values are often weighed down by rising interest rates. This conclusion, however, is disputed. That is not only the case for certain stocks, but for the whole banking industry. The success of the Nairobi Stock Exchange may be related to the central bank's capacity to control interest rates.

Some researchers, including Chirchir (2014); Were and Wambua (2013); and Adede (2015), have pointed to the Central Bank Rate as a crucial factor in realizing desired rates of economic development. Other studies have concentrated on other intermediate short-run rates of interest that are essentially endogenous to the bank rate, including repo rates and the interbank charges (Cheng 2007; Adam *et al.*, 2011). During the study period, there is no discernible pattern in how GDP growth rates, lending rates, or security market capitalization change as a result of central bank rates pass through effects. In the last two decades, several African nations, including Kenya, have seen substantial transformations in their financial systems and monetary policy frameworks. The Central Bank transitioned from using direct ways to influence lending and interest rates at financial institutions to utilizing indirect and market-based approaches to execute monetary policy with the aim of managing and stabilizing the economy. The correlation between IRPT and real GDP, lending rates, and stock market capitalization has been largely overlooked, despite the anticipation that changing financial circumstances would greatly impact the efficacy of monetary policy. This objective was achieved by analyzing the impact of the bank rate and the TBR+3% policy on real GDP, lending rates, and stock market capitalization.

1.3 Research Questions

- i) To what extent does lending rate react to a shift in CBR in Kenya?
- ii) To what degree does real Gross Domestic Product react to a shift in CBR?
- iii) To what extent does stock market capitalization react to a shift in CBR?

1.3.1 General Objective

The present study focused to analyze the effects of the CBR pass-through on Kenya's, Real GDP, lending rates and stock market capitalization.

1.3.2 The Specific Objectives

- i) To establish to what extent lending rates react to a shift in CBR in Kenya.
- ii) To determine to what degree does real GDP reacts to a shift in CBR
- iii) To establish to what extent does stock market capitalization react to a shift in CBR

1.4 Significance of the Study

Understanding the dynamics between the countries official rate, loan interest rates, real GDP, and market capitalization is greatly aided by the findings of this study. Since there is controversy over this topic, the study's findings also provide light on whether or not a connection exists between central bank rates and stock market capitalization, real GDP, and lending rates. This had made it easier for the government to make the proper policy decisions, especially for the central bank to determine when to make adjustments to the CBR. This research aims to expand the existing information on the transmission of monetary policy in the Kenyan economy, specifically targeting academics and scholars. To facilitate the continuation of study in these areas, it is advisable to suggest other areas for examination. Banks in Kenya can benefit greatly from this study because it improves their capacity to forecast interest rates in the market and helps the Central Bank and other non-bank financial institutions estimate the possible impact of monetary policy committee actions on market rates. The research would provide useful insights to the government, namely the Ministry of Finance, in devising

effective strategies to execute policies that seek to regulate monetary policy and influence economic activity levels. Additionally, it would aid in improving the CBK's ability to transmit monetary policy. This study gives the Central Bank policy committee information and techniques to ensure that their decisions are implemented effectively, which will serve as a monitoring tool for the committee. Lastly, with a deeper comprehension of the interest rate market, bond investors would be able to forecast the trajectory of interest rates going forward.

1.5 Scope and limitation of the Study

The study is confined to the central bank rate pass through effects on selected macroeconomic variables. A time frame during which data on the study's variables are both available and in use. Finally, the ten-year window (2010–2020) should potentially improve the accuracy of econometric results.

1.6 Study Organization

There were five chapters to this research. The first chapter of the thesis explains the context of the investigation. The theoretical and empirical literatures are the primary topics of the second chapter. The study methodology is dissected in great depth in Chapter 3. In Chapter 4, the study provides the data and debates them. Chapter 5 summarizes the study's findings and suggests additional research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides a survey of the empirical and theoretical literature that is related to the current subject of discussion. It also reveals knowledge gaps in the evaluated literature that this research seeks to fill.

2.2 Theoretical literature

2.2.1 Theory of Adverse Customer Reactions and Collusive Pricing

Arrangements

The two primary contributors to adverse customer reactions are unfavorable responses from customers, which are often collusive pricing rises, and rigidity in adjustments to deposit and lending interest rates. Every deviation from the collusive pricing structure reflects the presence of an extra expense. Price fixing proves this. The rigidity of the system is shown by the fact that both deposit fees and lending interest rates rise and fall in reaction to changes in official rates (Aziakpono & Wilson, 2010).

In accordance with the concept of unfavorable customer response, lending rates are rigorously increased while deposit interest rates are rigidly dropped. As a result, if the official rate is raised, the deposit rate will be strictly higher, and whenever it is decreased, the deposit rate will be strictly lower (Aziakpono & Wilson, 2010).

2.2.2 Loanable Fund Theory

The foundation of this study is the loanable fund concept, which was developed in the 1930s by Dennis Robertson and Bertil Ohlin. Ohlin claims that even though

there is a strong correlation between the supply and demand curves for loans and savings and investments, these two sets of curves do not coincide. Ohlin responds to this assertion by pointing out that, first, savers have the option to build wealth instead of automatically converting their choices into investments. Acknowledging the truth of this circumstance forces us to conclude that savers' decision to reduce their money stock may cause credit supply to increase independently of their saving decisions. Secondly, Ohlin agrees with This is what Wicksell means when he says that banks may print money to expand credit. The idea of a loanable fund, first proposed by economists Bertil Ohlin and Dennis Robertson in the 1930s, serves as the basis for this investigation. Ohlin argues that the demand and supply curves for savings and investments and loans do not meet, despite the fact that they are highly correlated. Ohlin responds to this assertion by pointing out that, first, savers have the option to build wealth instead of automatically converting their choices into investments. Acknowledging the truth of this circumstance forces us to conclude that savers' decision to reduce their money stock may cause credit supply to increase independently of their saving decisions. Secondly, Ohlin agrees with Wicksell when he notes that banks have the ability to create credit by printing money.

2.2.3 Keynesian Theory

Changes in monetary policy have an influence on major macroeconomic indicators via MPTM. The IS-LM-based interest rate (or cost-of-credit) channel of this mechanism has been interpreted in various ways in the literature, usually as part of conventional or monetarist rebuttals to the Keynesian approach, which is the foundation of modern economics. This direction was initially proposed by Keynes (1969) in 1936, and it was officially described by Tobin in 1940. The four key

routes are money supply, credit, exchange rate, and housing and asset values. A restricted monetary policy is seen here, along with an expansive one.

2.2.4 The Interest Rate Pass-Through Theory

De Bondt (2002) proposes the use of the cost of funds technique, a modified version of the conventional marginal cost pricing model employed in financial markets, to conceive the market-to-retailer IRPT. Markup pricing model described below may formalize the purportedly positive link between market rates, retail lending rates, and deposit rates:

$$i^R = \alpha + \beta \cdot i^M \dots\dots\dots 2.0$$

In cases of markup, β is a long-term IRPT coefficient, i^R and i^M are the wholesale and retail prices, respectively. When there are no hidden costs and plenty of lenders to choose from, the interest rate elasticity of demand for deposits and loans is 1 (Coricelli, Egert & McDonald, 2006). Equation describes the long-term equilibrium connection (2.4). When time delays and other variables are included into the aforementioned equation, Nikoloz (2011) suggests expressing the out-of-equilibrium adjustment as follows:

$$\Delta i_t^R = \mu + \rho(i_{t-1}^R - \alpha - \beta i_{t-1}^M) + \gamma \Delta i_t^M + \varepsilon \dots\dots\dots 2.1$$

Where: γ is a short-run IRPT coefficient and ρ is a measurement of the speed at which the modification is made.

The monetary transmission channel of interest rates defines the link between shifts in interest rates and the variables that are intended to be modified as a result of activities carried out by monetary policy. Market rates (money market and TBs) are

hypothesized to shift in response to variations in central bank procedure rates, first with shorter maturities and progressing down the yield curve to longer maturities. This estimate assumes market rates will quickly react to alterations in the federal funds rate. Commercial banks would almost definitely modify their lending and deposit rates to suit market interest rate changes. Demand and prices as a whole would be affected by the shift in consumers' inclination to save, invest, and spend. Money market rates are often assumed to be sensitive to policy shifts since central banks operate at the lower end of the yield curve.

Market rates may be more affected in the long run by the yield curve's slope and stability than they are in the short run. Potentially, this will affect market prices over extended periods of time. Long-term returns should be comparable to short-term returns if investors are risk-averse and markets are efficient. A steeper yield curve is indicative of a more risk-averse investing community that places a greater premium on shorter-term investments. Consequently, the yield curve's inclination would rise. Last but not least, a difference between short- and long-term interest rates might cause the transmission mechanism to fail in fragmented markets (Nikoloz, 2011).

2.2.5 The Hicks IS-LM Hypothesis

Hicks (1937) developed the IS-LM theory as a means of communication between the real and monetary spheres of an economy. This was exactly how Hicks envisioned his concept being used. Hicks' IS-LM is expanded upon in the Blanchard model by accounting for the fact that, unlike in the real business series model, asset values and actual activity are subject to cross-effects. Consumption and investment functions often combine observable activity with stock prices to generate aggregate

output in an economy. This leads Semmler (2003) to offer the following econometric justification of the model:

$$\dot{y} = k_y(aq - by + g) \dots\dots\dots 2.2$$

The equation demonstrates that Tobin's average q causes investment demand, allowing share dynamics to filter into the real sector.

In this equation, x represents the expected stock market return, q the security price index, g the government spending index, y the output index, and d the overall cost.

Making q the subject of the formulae and incorporating more variables gives:

$$\dot{q} = k_q f \left(\frac{x + \alpha_0 + \alpha_1 y}{q} - cy + h(m - p) \right) \dots\dots\dots 2.3$$

Also making x the subject of the formulae gives the equation below

$$\dot{x} = k_x \left(k_x f \left(\frac{x + \alpha_0 + \alpha_1 y}{q} - cy + h(m - p) \right) - x \right) \dots\dots\dots 2.4$$

Where; \bar{e} represents the equity discount rate, we have:

$$\dot{y} = k_y(aq - by + g)$$

$$\dot{q} = k_q f \left(\frac{x + \alpha_0 + \alpha_1 y}{q} - cy + h(m - p) - \bar{e} \right) \dots\dots\dots 2.5$$

$$\dot{x} = k_x \left(k_x f \left(\frac{x + \alpha_0 + \alpha_1 y}{q} - cy + h(m - p) - \bar{e} \right) - x \right) \dots\dots\dots 2.6$$

The system is at equilibrium when;

$$\dot{y} = 0, \dot{q} = 0, \dot{x} = 0$$

Values \bar{y} , and \bar{q} that solves the above equation 2.6

$$\frac{\alpha_0 + \alpha_1 y}{q} = cy + h(m - p)$$

$$aq - by + g = 0$$

$\frac{\alpha_0 + \alpha_1 y}{q} = cy + h(m - p) + \bar{\epsilon}$; m and p are the logarithms for both the cash balances and price, respectively. When these relate to the equity premium with time-varying real balances and $\delta = h(m - \mu)$ becomes $\delta_1 = h(m_1 - \mu_1)$. However, $\delta_1 = h(m_1 - \mu_1)$ - can be reinterpreted when there is an equity premium. The equations shown above indicate how to reconstruct the original Blanchard model. Assuming full foresight in the first instance, we let,

$k_x \rightarrow \infty$, thus we get: $q = x$

The dynamical scheme of the Blanchard models is predicated on the y and q differential equations. The model is adjusted so that the relationship between interest and stock market behavior can be studied, as proposed by Mazzucato and Semmler (2002):

$$d = aq + \beta + g \quad (\alpha > 0, 0 \leq \beta < 1) \dots\dots\dots 2.7$$

That is, aggregate expenditure(d) equals value of fiscal expenditure plus a fixed effect and a value of an index of stock capitalization. The LM equilibrium in the stock market assumption, on the other hand, is subject to critical analysis and reveals that:

$$i = cy - h(m - p) \quad (c > 0, h) \dots\dots\dots 2.8$$

Since i represents the short-term interest costs, we may find their logarithms in terms of money (m) and price (p). This equation provides a structure for how changes in the central bank's policies affect other parts of the economy, such the stock market, starting with short-term interest rates and moving on to lending rates.

The real output equation is derived in a way that:

$$\pi = \alpha_0 + \alpha_1 y$$

where; $(x + \alpha_0 + \alpha_1 y)/q$ reflect the predicted change in the stock market's value, and x represents the instantaneous real rate of return from owning shares.

The Blanchard model (Blanchard, 1981) that was mentioned earlier demonstrates the connections amid the central bank, stock market, interest rates as well as economic growth. The specific empirical model that will be utilized to determine how the study's variables interact will be based on co-integration techniques developed by Gregory and Hansen (1996) and Engle and Granger (1987).

Doornik and Hendry (1994) presented a recommendation that was accepted by Scholnick (1996), and that idea is used to calculate the adjustment mean lag in Section 3.4 of chapter three. Neumark and Sharpe's (1992) method is applied to the problem of asymmetric adjustment.

2.2.6 The marginal cost pricing theory

According to this hypothesis, when the monetary policy framework is put into place, there must be consistency between the policy interest rate and the retail interest rate that banks charge their customers for this system to function properly. Bondt's (2002) marginal cost pricing model might shed light on why money market

rates aren't directly proportional to consumer interest rates. The model relies heavily on the presumptions of perfect competition, pricing uniformity, and the absence of information asymmetry in the marketplace. In a perfect market with perfect information pricing, prices' derivative with marginal cost equals one (Tai, Sek, & Har, 2012; Rousseas, 1985). This is the model that results from using the theory to analyze how banks really establish pricing:

$$br = \gamma_0 + \gamma_1 mr + \varepsilon_t \dots\dots\dots 2.9$$

Where *mr* represents the marginal cost price roughly equivalent to the monetary policy rate, *br* represents the retail bank rate, γ_0 is a constant markup, and is the coefficient of IRPT rate. If =1, then the effect is transmitted unaltered; or otherwise, an incomplete IRPT effect is realized in the transmission mechanisms. When banks have some level of market dominance, γ_1 is less than one. High levels of market dominance are more probable given the presence of variables including high switching costs, incomplete information, and low barriers to entry in the banking industry (Niggle, 1987). Researching the effects of the federal funds rate on market value, lending rates, and GDP growth is a secondary objective. The long-term consequences of the transmission networks should be carefully considered.

$$lr = \alpha_0 + \alpha_1 mr + \varepsilon_{1t} \dots\dots\dots 2.10$$

$$dr = \beta_0 + \beta_1 mr + \varepsilon_{2t} \dots\dots\dots 2.11$$

Where; *lr* -lending rate, *dr* -deposit rate, *mr* -monetary policy, and ε_{1t} and ε_{2t} - stochastic random term.

2.3 Empirical Literature

By analyzing monthly data from 2001 to 2011, Mohsin (2011) determined how the pass-through effect affected the relationship between retail rates and the central bank's discount rate. The primary focus of the study was to compare the four categories of banks with their weighted average loan and deposit rates: private, foreign, nationalized, and specialized. Comparative investigation of retail pass-through rates and discount rates across several bank types was part of the analysis. The study's conclusions showed that banks typically only informed lenders of 20% of the effects of a change in the discount rate during the first month. This point to a short-term pass-through effect that is comparatively small. Furthermore, the research emphasized the significant differences in pass-through rates amongst various banks, underscoring the heterogeneity of financial institutions' reactions to shifts in the central bank discount rate. Additionally, a short-term review of the deposit rate showed a very low pass-through rate of 0.16. This suggests that Pakistan's ability to implement monetary policy effectively is limited, particularly when it comes to affecting deposit rates as indicated by shifts in the discount rate. This research sheds light on the transmission mechanism of monetary policy in the Pakistani banking sector over the specified time period by analyzing pass-through rates and focusing on different kinds of banks.

Based on their research on the impact of interest rates on stock prices, Ologunde, Elumilade, and Asaolu (2006) concluded that the present interest rate climate favors the acceleration of capitalization growth in the stock market. Market capitalization did not correlate positively with either the current interest rate or the government development stock rate. Parallel to this, Muchiri (2012) examined the interest rate

and CBK system in Kenya. It has been shown that the market interest rate increases by 0.322 percentage points for every percentage point that the central bank increases its interest rate. The study analyses how the interest rate set by Kenya's central bank has affected the country's stock market and economy.

A research carried out in Nigeria by Ogundipe et al. (2013) investigated the effects of interest charge pass-through on certain macroeconomic variables. Examining the short- and long-term effects of the Central Bank's monetary policy rate on commercial bank interest rates and other macroeconomic indicators is the goal of this study. To that purpose, we use the two-stage approach developed by Engle and Granger and the maximum probability technique proposed by Johansen and Juselius. From 1970 to 2011, we calculated the asymmetry IRPT using the Wald test and the mean adjustment lag. This research shows that the IRPT impact is sticky downward, since retail bank rates react slowly and limply to changes in policy rates. One method was substituted for another in order to ascertain whether or not this discovery holds up under scrutiny when compared to other methods of gauging how well financial information is transmitted. The results from the IRF and the Variance Decomposition (VD) supported the hypothesis that there was insufficient and slow transmission of wholesale rates to retail prices.

Using the NSE 20 share index as a proxy, Chirchir (2014) studied the relationship between stock prices and changes in interest rates in Kenya. The interest rates were calculated by calculating the weighted mean of the fees charged for loans made by the country's commercial financial institutions and were in place from 2002 to 2012. Applying the statistical methodologies proposed by Toda and Yamamoto (1995), the study found that interest rates and security prices are positively correlated. Weak

correlation between interest rates and security values was shown by the findings. There is strong negative causality in both directions with regard to the causal link's orientation.

Through the use of a multivariate Vector Autoregressive Model (VAR), Kelilume (2014) examined the effect of interest rates on the monetary policy rate in Nigeria. Studying how different short- and long-term interest rates were affected by the Nigerian monetary policy rate was the main goal. The study conducted an exhaustive analysis using monthly data from M1:2007 to M9:2012. A Vector Autoregressive Model was used by the researcher to examine the dynamics and causal linkages of the monetary policy rate with other interest rates. This approach shines when used to track the dynamic interplay and reactions of several variables across time. Consistently using the Monetary Policy Rate (MPR) as a yardstick to track shifts in other market interest rates and maintain economic stability is problematic, according to the study's findings. The word "dubious" denotes a degree of doubt or skepticism about the effectiveness of the present strategy. According to the paper, there may be good grounds to doubt the MPR's suitability as the only benchmark for determining and managing interest rates in the financial market of Nigeria. The request for a "immediate assessment" conveys a sense of urgency, implying that there might be problems that need the Central Bank of Nigeria to take immediate action and investigate them. The paper concludes that a reevaluation of the monetary policy framework, particularly the reliance on the MPR, is necessary to ensure the effectiveness of monetary policy tools and to promote overall economic stability in Nigeria.

Mwega (2014) used a structural VAR and data covering the years 2000–2012 to examine bank rates innovation and Kenya's MPTM. The study finds no connection between growth and an increase in bank rate innovations. Growth improves in the second and third months at a 10% level of significance, but this is offset by a decline in the eighth through eleventh months. In addition, the lending rate will increase by 5 to 6 percent in the upcoming one to six months. Instead of concentrating on the bank rate and monetary policy transmission, this research studied the IRPT effects of CBR on loan rates, Real GDP, and stock market capitalization. Therefore, whereas prior studies concentrated on monetary policy transmission and new approaches to bank rates, more recent studies have turned their emphasis to the possible effects of such changes on economic growth and stock prices.

A connection between interest rates and the long-term expansion of the stock market was discovered in a research by Cengiz and Basarir (2014). Using VAR estimating methodologies, this research looked at the interest rate, stock market, and RGDP of Turkey from 1998 to 2012 connection. Additional findings from the study suggested that interest rate regulation might help mitigate stock market shocks down the road. Researchers found that policymakers should think about how stock market volatility may affect their plans to address inflation, unemployment, and other macroeconomic imbalances. Charges levied by central banks affect the market capitalization of Turkish securities; nonetheless, this inquiry mostly concerns Kenya.

Adede (2015) examined how interest rates affect Kenya's overall economic growth. Using a quarterly secondary data for period 2000 to 2014, a causal study design was conducted. Results showed that a higher interest rate on interbank loans was associated with slower economic expansion. In contrast to a previous research that

looked at the broader impacts of interest rates on economic development, this one focuses on the IRPT effects of CBR on lending rates, Real Gross Domestic Product, and stock market capitalization in Kenya.

Rate of interest IRPT was studied by Chiumia and Palamuleni (2020) to ascertain its impact on the efficiency of Malawi's MPTM. In the research, models were computed for each of the nine banks by using the charge of funds approach. Also, the study employed the T-bill rate as a representation of the official policy position. The aggregate models were also estimated by the study. Many financial sector variables were used as conditions for the estimates. Based on the data, it seems that there is not enough of a IRPT to the loan and savings rate. Yet, the impact of IRPT on lending rates was substantially larger than the effect of IRPT on the savings rate. The last research was carried out in Malawi, while the one that is now being planned will be carried out in Kenya.

2.4 Overview of Literature

The traditional savings and investment explanation of interest rates is extended by the loanable-funds hypothesis. It blends financial concerns with the non-financial characteristics of saving and investing. Hicks (1937) developed the Hicks IS-LM theory to make sense of the data flow between an economy's financial and real parts. The primary channel of transmission identified by the McKinnon-Shaw technique is the fixed influence of the regulated interest rates. In evaluating the corpus of work on the connection between co-moving bank rates and commercial lending rates, this study points out areas of empirical literature weakness and suggests potential solutions. In other words, as Mwega (2014) indicates, commercial banks may be obliged to come up with novel ways to create revenue because high bank rates

dissuade them from borrowing from the Central Bank. They might lower loan rates with the money they hold to encourage borrowing by people and businesses, which would boost investment and growth.

Various ideas have been put out in an effort to shed light on the interest rate determination process. These theories include the following: the Hicks IS-LM Hypothesis, interest rate pass-through, marginal cost pricing, Keynesian liquidity preference, and loanable funds. The empirical literature review included a variety of subjects, including the effects of monetary policy on lending rates, deposit rates, and interest rate spreads. When looking at the empirical literature, it became clear that different research and nations came to different findings. Adede (2015) indicated that weaker economic growth was linked to higher interest rates on interbank loans, while Mwega (2014) found that an increase in bank rate innovations had little influence on growth.

The monetary policy rate had a favorable effect on prime lending and deposit rates, according to Kelilume (2014). Mohsin (2011) discovered that the loan rate and the rate were time-integrated, but he was unable to detect any among the deposit and central bank discount rates. Additionally, a variety of estimate models, including multiple regression, panel data regression, ECM, ARDL model, pooled generalized least square technique, and ECM, were employed in different investigations. The T-bill rate, CBR, and reserve requirement were the primary proxies for monetary policy in most studies, with other monetary measures remaining relatively understudied. A major knowledge gap has been exposed by the dearth of research on the pass-through impact of the Kenyan central bank rate. Additional study in this area is essential since the central bank rate affects several macroeconomic

indicators, including real GDP, lending rates, and stock market capitalization. The analysis was therefore based on the following theories: marginal cost pricing, the interest rate pass-through hypothesis, and the Hicks IS-LM hypothesis.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter details the study's methodology, theoretical foundation, model formulation, variable definitions and measurements. It also presents the data sources, tests for analysis, and methods for estimating results.

3.2 Research Design

The main aim of the study was to identify, clarify, and provide answers to research questions regarding the causal relationship between variables under examination. A non-experimental research methodology was employed to answer the research objectives. Instead of manipulating or changing the predictor variable or participants, non-experimental research approaches depend on interpretation, observation, or interactions to make findings.

3.3 Study Theoretical Framework

3.3.1 Theoretical Framework for Bank Rate Pass through effects on Lending Rates in Kenya

Both the cost of capital and the loanable funds theory provide theoretical backing for the primary goal of the research. To further understand how market prices are passed on to clients, one may look to the cost-of-funds method, which is based on the standard marginal cost pricing model for financial markets. According to the hypothesis, market interest rates and rates for retail lending and deposits have a positive correlation, a hypothesis that may be formalized using the markup pricing model that is shown below:

$$i^R = \alpha + \beta \cdot i^M \dots\dots\dots 3.1$$

Markup is determined by the long-run IRPT coefficient, and i^R and i^M are the retail and market rates, respectively. If banks are risk-neutral and markets are complete (full disclosure and perfect competition), then β would be equal 1, deposits and loans have an elasticity of demand of one for any given interest rate, demonstrating full IRPT. Loanable funds can be used to express lending rates such that $BLR = F(CBR, I, GDP, RISK)$

Where; CBR- the Central Bank rate, I- investment level and GDP - Gross Domestic Product.

3.3.2 Pass through Effect of Bank Rate on Economic Growth

The study's secondary objective was to look at how interest rate changes affect growth in the economy. This purpose is served by the Hicks IS-LM theory, which serves as the anchor theory by providing the framework through which macroeconomic instruments aid in explaining the association between interest rates and real GDP in the economy. Examination of the LM equilibrium in these frameworks from equation 2:17 shows that:

$$i = cy - h(m - p) \quad (c > 0, h) \dots\dots\dots 3.2$$

where i represents the short-term rate of interest, m and p are the logarithm of both the money and price, respectively; y is the gross domestic product or output.

3.3.3 Pass through Effect of Bank Rate on Stock Market Capitalization

The IS-LM model and the loanable funds theory were the theoretical underpinnings of the framework. Firstly, the IS model assumes that at equilibrium, investment is equal to savings. From the national income model, assuming zero taxation, the

output is composed of private spending and public spending. Households spend their income in either consumption (C) or investment (I). Aggregating private demand such that $D=C+I$. Then the output function can be represented as:

$$Y = D(Y^d, r^e, qK) + G + \varepsilon_d \dots \dots \dots 3.3$$

Where D refers to private demand, r^e refers to real interest rates, G represents private spending and ε_d represent over variables and shocks on output. Private demand is determined by household wealth which is derived from labour income (Y^d) and represent disposable income and financial wealth(qK). Note that q is the Tobin q ratio and financial wealth is derived from reparameterization of equation 3.3.

Therefore, returns for a unit of investment is defined as,

$$1 + r^e = (1 + i) \frac{P_t}{P_{t+1}} = \frac{1+i}{1+\pi_{t+1}^e} \approx i - \pi_{t+1}^e \dots \dots \dots 3.4$$

If Tobin q is assumed to be unity that is if the financial wealth is equal to gross fixed capital and K is treated as a constant, then equation 3.4 can be expressed as:

$$Y = D(Y, i - \pi_{t+1}^e, qK) + G + \varepsilon_d \dots \dots \dots 3.5$$

The total differential of equation 3.5 yields

$$\partial Y = D_Y \partial y + D_{r^e} \partial i + D_{qK} \partial q \Rightarrow \partial Y(1 - D_Y) - D_{qK} \partial q = D_{r^e} \partial i \dots \dots \dots 3.6$$

From 3.6 then

$$\frac{\partial i}{\partial Y} = \frac{1-D_Y}{D_{r^e}} < 0 \dots \dots \dots 3.7$$

$$\frac{\partial i}{\partial q} = \frac{-D_{qK}}{D_{r^e}} < 0 \dots \dots \dots 3.8$$

Real GDP is shown to be negatively related to investment in equations 3.7 and 3.8.

The IS curve slopes downward because rising aggregate demand and investment in the goods market are accompanied by falling interest rates. Therefore, equation 3.5 represent the IS component.

The LM component is based on the assumption that financial assets consist of money and interest-bearing short-term assets. While banks accept deposits and provide loans to households and firms, the assumption is that deposits attract zero interest and lending rates are equal to short term interest rate. Assuming that interest-bearing assets are perfect substitutes, demand for money is specified as:

$$\frac{M^d}{P} = L(Y, i) + \varepsilon_l \quad L_y > 0 \quad L_i < 0 \quad \dots\dots\dots 3.9$$

Where M^d refers to demand for broad money, P is the price level, $L(Y, i)$ denotes liquidity preference as defined by the Keynesian money demand for transaction and speculative motives and ε_l refers to other exogenous variables, policy changes and shocks that leads to a change in liquidity preference. Equation 3.8 shows that Real GDP and short-term interest rate are implicit functions of $\frac{M^d}{P}$, Y and ε_l . The total derivative of the LM curve yields

$$0 = L_y \partial y + L_i \partial i \quad \Rightarrow \quad \frac{\partial i}{\partial Y} = -\frac{L_y}{L_i} \quad \dots\dots\dots 3.10$$

It is important to keep in mind that the demand for money has a positive income-based partial derivative ($L_y > 0$), but a negative interest-based partial derivative ($L_i < 0$). The LM curve is upward sloping which means that higher volume of transaction is associated with higher interest rates. Equation 3.1 through 3.10 demonstrate that the equilibrium solutions of (Y, i) in the IS and LM curve are as follows:

$$i = f\left(Y, \pi_{t+1}^e, \frac{M^d}{P}, q, G, \varepsilon_d, \varepsilon_l\right) \quad \dots\dots\dots 3.11$$

$$Y = f\left(i, \pi_{t+1}^e, \frac{M^d}{P}, G, q, \varepsilon_d, \varepsilon_l\right) \quad \dots\dots\dots 3.12$$

Hicks (1937) developed the IS-LM hypothesis in 1937. Thus, objective three of the study is anchored on the theory as outlined by Hick (1937). The theory provides a

framework by which macroeconomic instruments can assist in illuminating the connection between rates of interest and real GDP in Kenyan economy. By noting that, in contrast to the actual business trend technique, there are cross-effects amid security prices and real activity, the Blanchard model extends Hicks IS-LM. Through the consumption and investment functions, actual activity and stock prices frequently work together to drive aggregate output in an economy. According to Mazzucato and Semmler (2002), short term interest rates affect the stock market indirectly through its effect on Tobin's q ratio. To this end, differentiating Equation 3.12 with respect to q yields

$$\partial Y = D(Y, i - \pi_{t+1}^e, qK)K \cdot \partial q \dots\dots\dots 3.13$$

The channel through which interest rates pass through maybe summarized as:

$$Y \rightarrow i \rightarrow q \rightarrow I \rightarrow Y$$

This shows that the stock market capitalization is a function of

$$SMC = f(Y, i, \pi_{t+1}^e, \frac{M^d}{P}, G, q, \varepsilon_d, \varepsilon_l) \dots\dots\dots 3.14$$

3.4 Model Specification

For the purpose of studying IRPT, this research makes use of the marginal cost pricing model, which is specified as follows:

$$Y_t = \alpha + \beta X_t + \delta W_t + \varepsilon_t \dots\dots\dots 3.15$$

Where; Y_t can be the lending rate, Real GDP or stock market capitalization, X_t represents the central bank rate and W_t is a vector of control variables for example expected exchange rate and broad money while β captures the extent of long-run IRPT for lending rates, Real GDP and stock market capitalization and δ - captures the effects of the control variables on a specified dependent variable. ε_t is

the residuals from the different lending rate, Real GDP and stock market capitalization equations.

$\beta < 1$ - incomplete Pass-through, $\beta = 1$ - complete pass-through and $\beta > 1$ denotes an over IRPT (Babatunde, 2019)

The cornerstone of rate of interest IRPT analysis is presented using an equation derived from equation 2.9 when calculating the error correction model and the long-run co-integration.

$$Y_t = \beta_0 + \beta_1 CBR_t + \beta_2 broadmoney_t + \beta_3 exchrates_t + \varepsilon_t \dots \dots \dots 3.16$$

Where the intercept and long run parameters are β_0 and β_1 , respectively, and t is the stochastic error term, Y_t - retail rates determined within the model (loan and deposit) and CBR_t - central bank rate determined by other factors which are not within the model.

The ARDL bound test was used to determine if the lending rate, stock market capitalization and the CBK rates, as well as the real GDP were co-integrated. Assuming the following specification, where z_t stands for the observed time series, accurately describes the data creation process, loan rate, and Real GDP for z_t . A weighted linear mixture of recent and previous white noise terms can be used to describe a generic linear process, or $\{Z_{t-1}\}$ as follows:

$$z_t = \mu + \sum_{j=1}^p \varphi_j z_{t-j} + \varepsilon_t \dots \dots \dots 3.17$$

Where $z_t = [y_t, x_t]'$, μ is the vector of constant terms terms $\mu_t = [y_t, x_t]'$ and φ_j is a matrix of VAR parameters for lag j . The two series y_t and x_t can either be $I(0)$ or I

(1). Integral order does not always correspond to the series in x_t . The error term ε_t is white noise.

After thinking about the potential for structural failure, the Gregory and Hansen (1996) residual-based method was chosen for the study. This strategy was selected because it accounts for the fact that the co-integration connection might sometimes experience structural failures. Engle and Granger's (1987) co-integration test has low power, therefore it under-rejects the null hypothesis of absence of co-integration if the connection has altered throughout the sample period. The technique biases towards rejecting the null of no co-integration, which causes this (Harris & Sollis, 2003). To explore co-integration with structural breaks, Gregory and Hansen (1996) developed four models. These models are capable of shifting in one of four distinct ways: at the level (GH-1), at the level with a trend (GH-2), at the intercept and slope (GH-3), and at the level, the slope, and the trend (GH-4). Contingent versions of the Gregory and Hansen equations as follows for each scenario:

$$Y_t = \alpha + \beta_1 D_t + \beta_2 x_t + \varepsilon_t \dots \dots \dots 3.18$$

$$Y_t = \alpha + \beta_1 D_t + \beta_2 t_t + \beta_3 x_t + \varepsilon_t \dots \dots \dots 3.19$$

$$Y_t = \alpha + \beta_1 D_t + \beta_2 x_t + \beta_3 D_t x_t + \varepsilon_t \dots \dots \dots 3.20$$

Where; y_{it} , x_t , y_u , y_p , and y_e are the previously declared variables. The time trend is represented by t , the intercept terms before and after the break are represented by the parameters α_{i1} and α_{i2} , the time trend coefficient is represented by φ , and the comparable interest rates on deposits held by commercial banks are represented by β_1 and β_2 in the IRPT coefficients before and after the structural break. It is

the empirical IRPT model of first difference. The first difference operator in the model above is denoted by the symbol (Δ).

The second goal, which is to determine the impact of the bank rate on real GDP, may be achieved by using the co-integration model outlined below:

$$\begin{aligned} \Delta GDP_t = \beta + \sum_{i=1}^q \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta CBR_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta EER_{t-i} \\ + \sum_{i=1}^q \alpha_{4i} \Delta MR_{t-i} + \sum_{i=1}^q \lambda ECT_{t-i} + u_t \dots \dots \dots 3.22 \end{aligned}$$

In this context, GDP stands for Real gross domestic product (GDP). The issue of spurious regression is avoided by estimating the aforementioned equation, but the information regarding the long-term association was lost. The long run IRPT can be determined using the specifications from Kwopil and Scharlar (2010), as follows:

$$\theta = \frac{(\sum_{i=0}^k \alpha_{1i})}{1 - \sum_{i=0}^k \alpha_{1i}} \dots \dots \dots 3.23$$

From the above discussions α_{1i} is the coefficient of the lag of GDP. If $\theta = 1$ the IRPT is said to be complete and where $\theta > 1$ there is incomplete pass-through.

. The third goal, which is to determine the pass through effect of the bank rate on stock market capitalization, may be achieved by using the co-integration model outlined below:

$$\begin{aligned} \Delta SMC_t = & \gamma_0 + \sum_{i=1}^q \gamma_{1i} \Delta SMC_{t-i} + \sum_{i=1}^q \gamma_{2i} \Delta CBR_{t-i} + \sum_{i=1}^q \gamma_{3i} \Delta EER_{t-i} \\ & + \sum_{i=1}^q \gamma_{4i} \Delta MR_{t-i} + \sum_{i=1}^q \lambda ECT_{t-i} + u_t \dots \dots \dots 3.24 \end{aligned}$$

In this context, SMC stands for Stock market capitalization. The issue of spurious regression is avoided by estimating the aforementioned equation, but the information regarding the long-term association was lost. The long run IRPT can be determined using the specifications from Kwapił and Scharlar (2010), as follows:

$$\theta = \frac{(\sum_{i=0}^k \gamma_{1i})}{1 - \sum_{i=0}^k \gamma_{1i}} \dots \dots \dots 3.25$$

From the above discussions γ_{1i} is the coefficient of the lag of Stock market capitalization. If $\theta = 1$ the IRPT is said to be complete and where $\theta > 1$ there is incomplete pass-through.

The following econometric model can be used to summarize all of the challenges the study outlined in equation 3.25.

$$y_t = f(x_t) + u_t \dots \dots \dots 3.26$$

where, y_t = logarithm of real gross domestic product, lending rates or stock market capitalization at period t . x_t = logarithm of real bank rate at period t . Using the Philip-Perron unit-root test, the study determined the order of integration for the variables, then computed the correlation between real GDP and bank rate, Central Bank rate and lending rates, and stock market capitalization and bank rate(PP-test). Levels of integration were used to choose an estimation method. The appropriate time series model was employed based on the results of the integration levels.

3.5 Variables Definition and Measurement

Table 3.1: Definition and Measurement

Variable	Variable Definition	Variable Measurement
Central Bank rate (CBR)	Rate at which the CBK, in its capacity as lender of last resort, lends money to commercial banks at the most minimal possible interest price.	Measured using the Central Bank Rate as of July 2006 and the TBR + 3% regulation as of July 2006, as reported annually by the CBK. CBK sets a minimum interest rate on loans to commercial banks.
Exchange Rate (ER).	The conclusion reached by the CBK on the worth of the nation's currency in comparison to the worldwide benchmark exemplified by the US Dollar.	Annual Average 1 US\$ to Kenya Shillings as published by the CBK for each year.
Money Supply (MS)	The total amount of currency, demand deposits, and notes and coins in circulation at any one period in a given economy.	M2 in Kenya Shillings as published by the CBK for each year.
Banks' Lending Rate (BLR).	A percentage of total charges levied by financial institutions on borrowed money	Measured as a percentage of total charges levied by commercial banks as published by the CBK for each year.
Pass through effect	speed and degree of adjustment of macroeconomic variables due to changes in central bank rate	Measured or quantified as a pass through rate a ratio given by the error correction term and the coefficient of policy rate in an ardl model expressible as a numerical of less than unit, unit or more than unit for the degree and for speed multiplied by the number of months
Real Gross Domestic Product (GDP)	When accounting for fluctuations in prices and taking into account a certain amount of time, often one year, the sum total of an economy's ultimate output value for the products and services it produces over the course of a specific length of time.	Measured in Ksh. as published by the KNBS for each year.
Stock market capitalization (SMC)	The aggregate value at which all of a corporation's shares may be purchased or sold on a national stock exchange at the specific point in time.	Measured in Kenya shillings. As released by the CMA/NSE.

Source: Author Computations from Literature

3.6 Data Type and Source

The CBK, the World Bank and the Nairobi Stock Exchange all contributed to the compilation of this data. All factors in the research were analyzed using quarterly time series datasets spanning from 2010 to 2020.

3.7 Data Analysis

Model predictions were developed accurately to test the association between study variables, including real gross domestic product, stock market capitalization, and the influence of bank interest rates on lending rates in Kenya. A boundaries test can be used to find out how the variables move together and whether or not they exhibit "long run forcing". These calculations and tests were performed using appropriate econometrics software. Time series tests were first determined to ensure stationary before employing the appropriate model and estimation technique to achieve the objectives. For all the objectives the ARDL model was used.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

The investigation's empirical results are presented in this chapter. Each research objective is addressed in this chapter by presenting descriptive data, diagnostic tests, and empirical results related to the study's objective.

4.2 Descriptive Statistics

The research provided the measurements of central tendency and dispersion metrics.

Table 4.1 presents comprehensive data for all research variables, including the mean, minimum, S.D, and maximum values.

Table 4.1: Descriptive Statistics Results

Variable	Mean	Standard Deviation	Minimum	Maximum
Broad Money	2065.05	686.95	959.13	3250
Central Bank Rate	9.46	2.84	5.9	18
Exchange Rate	94.85	9.16	80.68	109.49
Stock Market Capitalization	1975.96	322.88	1441	2817
Real GDP	5.45	2.76	-5.7	11.6
Lending Rate	9.84	4.87	1.11	22.07

Source: Computations based on Central Bank of Kenya for years 2010-2021

Table 4.1 presents information based on variables used in the study. Broad money supply averaged 2065.05 billion Kenya shillings with an S.D of 686.95, implying that the data is widely spread over the period of study. The Broad money supply ranged from Ksh. 959.13 billion to Ksh. 3250.20 billion. The real GDP had standard deviation of 2.76, the lowest among all the variables, indicating that the data for real

GDP revolves around the mean value of 5.45, the low value also implied that the observations were close to each other when compared to other variables indicating low mean deviation value. The exchange rate has the mean value of 94.85 Kenyan shilling per US dollars with the highest value being 100.49 Kenya shillings per US dollars and the minimum value being 80.68 Kenya shillings per US dollars.

The results also showed that real GDP had the minimum value of -5.7 and a maximum value of 11.6. The minimum real GDP -5.7 occurred during the second quarter of 2020. This is a deviation from the expected real growth of 5.5. This contraction in GDP can be attributed to COVID-19 that led to restriction of movement and closure of some businesses to check spread of the pandemic. The sectors that were hard hit by the containment measures included the hotel and tourism sectors which contribute immensely to Kenya's GDP. Bank lending rate ranged from 1.11 percent to 22.07 percent. The highest lending rate occurred in the fourth quarter of 2011. This is the period when commercial banks were allowed to fix the rates. Such action was seen to lock out some businesses especially in the informal sector thus leading to an interest rate capping law. The law which came into force in 2016 required commercial banks to charge an interest rate of not more than 4 percent of the central bank's rate. This led to reduced interest rate as observed at the later years of the study. Stock market capitalization averaged 1975.96 billion. The variable ranged from 1441 billion to 2817 billion for minimum and maximum values, respectively. It was observed that stock market capitalization contracted during the first quarter of 2020. This can be linked to containment measures put in place to control spread of COVID-19 that affected businesses in key sectors of the

economy negatively. Despite the structural breaks data was still found to be fit for use.

4.3 Diagnostic tests

4.3.1 Stationarity Test

The stationarity tests such as ADF, PP, and Z-A were employed to investigate for the chances of occurrence of a unit root. Tables 4.2 and 4.3 show the findings.

Table 4.2: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Unit Root Tests

Variables	Level	Augmented Dickey-Fuller			Phillips-Perron		
		Statistic	Critical value (5%)	Order of Integration	Statistic	Critical value (5%)	Integration Order
Lending Rate	Level	-2.640	-2.950	I (1)	-2.795	-2.950	I (1)
	1 st difference	-5.121	-2.952		-5.032	-2.952	
Broad Money	Level	-0.850	-2.950	I (1)	-3.692	-2.950	I (1)
	1 st difference	-6.793	-2.952		-6.879	-2.952	
Central Bank Rate	Level	-2.385	-2.950	I (1)	-2.686	-2.950	I (1)
	1 st Difference	-5.288	-2.952		-5.252	-2.952	
Stock Market Capitalization	Level	-1.850	-2.950	I (1)	-1.620	-2.950	I (1)
	1 st difference	-7.710	-2.952		-8.104	-2.952	
Exchange Rate	Level	-1.690	-2.950	I (1)	-1.594	-2.950	I (1)
	1 st difference	-6.620	-2.952		-6.804	-2.952	
Real domestic product	Level	-2.983	-2.952	I (1)	-2.989	-2.950	I (1)
	1 st difference	-8.895	-2.952		-9.691	-2.952	

Source of data: Computations

Results from unit root test showed that the true growth rate was constant. Broad money was integrated at order one under the ADF and order zero under the PP test, whereas interest rates, stock market capitalization, and exchange rates were all

integrated at order one. If a structural break occurs, the outcomes of these two-unit root tests inaccurately indicate the existence or non-existence of unit roots in the data. Therefore, the variables were put through a Zivot-Andrews (Z-A) unit root test, which, according to Lumsdaine and Papell (1997), is an improved version of the ADF and PP in terms of determining the proper integration sequence. When a series contains structural breaks, the PP and ADF tests become biased. This supports the application of the Z-A test, which permits a single structural break. Z-A analyzes whether an endogenous break exists by determining whether the break dates is related to the data (Hansen, 2001). Table 4.3 displays the results of the Z-A unit root test.

Table 4.3: Zivot-Andrews Unit Root Test Results

Trend and Intercept					
Variables	Structural break period	Level of Testing	t-statistic	5 percent critical value	Order of Integration
Lending Rate	2017q1	Level 1 st Difference	-4.080	-4.80	I (1)
	2012q2		-5.519	-4.80	
Broad Money	2013q2	Level 1 st difference	-1.513	-4.80	I (1)
	2015q3		-6.735	-4.80	
Central Bank Rate	2015q2	Level 1 st Difference	-4.059	-4.80	I (1)
	2012q3		-5.462	-4.80	
Stock Market Capitalization	2018q3	Level 1 st difference	-4.684	-4.80	I (1)
	2018q2		-8.146	-4.80	
Exchange Rate	2015q2	Level 1 st di	-4.618	-4.80	I (1)
			-7.465	-4.80	
Real Gross domestic product	2015q2	Level 1 st difference	-4.212	-4.80	I (1)
	2019q2		-6.810	-4.80	

Source: Author's Computations based on Central Bank of Kenya data

Table 4.3 displays the results of the Zivot-Andrews test used to integrate the variables of order 1. These findings provide credence to the ADF and PP tests with regard to the general structure of the research variables, but not in the case of a variables-on-variables analysis. The recognizable endogenous political shocks that occurred in 2012 and 2017 coexist with the structural breaks for lending rates identified by the Z-A test. The structural break that occurred in the other years coincided with periods of adverse weather and a locust invasion from Somalia, an external shock, in Kenya.

Then, a substantial amount of government funds was redirected to combat the locusts, hurting government development spending in key sectors of the economy. The locust invasion in financial year 2020/2021 had a negative impact on real GDP. This forced the CBK to lower its discount rate to boost the economy. A fundamental breach was seen in interest rates on loans in 2012. This is what has led to an economic upswing in Kenya, despite the fact that rising oil prices have dampened the country's terms of trade, delayed growth, and pushed up inflation. An external shock occurred here. In 2013 and 2015, there were two significant drops in exchange rates given by a p-value of less than 0.05 (0.000). The first gap in 2013 was related to the uncertainties brought on by the 2013 general election and the likelihood for regime changes.

The other significant break occurred in 2015 and was brought on by balance of payment factors that weakened and prolonged Kenyan currency rate instability (Kiprono, 2019). Kenya's GDP increased by 5.6% in 2015 due to the success of its mining and quarrying sector, as well as its tourism, financial services, real estate, and construction industries. The economic boom that started in the second quarter of

2015 was forecast to go on uninterrupted throughout the year. The first quarter of 2018 had a year-over-year increase in real GDP of 5.9%.

Sharp increases in inflation expectations were seen in the first half of 2015 as a result of currency devaluation, market pressures, and persistent volatility in international currency markets. After two years of maintaining inflation at 8.5 percent, the CBK raised its policy rate by 150 basis points in June 2015 to stem rising prices. To lock in the benefits of the tightening policy bias, the CBR was raised to 11.5% in July 2015, an increase of 150 basis points from its previous level. Interest rate spreads and lending/deposit rates were impacted by fluctuations in the interbank interest market and the TB market, which occurred simultaneously with the increase. Interest rates spiked in the fourth quarter of 2015 as a direct consequence of new policies introduced that year, then began to decline in the first quarter of 2016 (CBK, 2020).

However, in terms of stock market value, the greatest decline occurred in 2018, when market capitalization dropped by Ksh. 419 billion representing a loss. Market capitalization decreased from Ksh. 2,521 billion in 2017 to Ksh. 2,102 billion in 2018, a reduction of about Ksh. 400 billion (NSE, 2018). A large part of investor wealth was lost during this time when international investors withdrew their shares from the NSE in the wake of the protracted 2017–2018 general elections and the post-election violence. This pushed the stock market to its lowest point in more than ten years (NSE, 2018). Such a significant drop in value in a brief period increases market risk, making it unpredictable, thus undesirable to potential investors (Koskei, 2017).

Finally, the study assumed that the series could have multiple structural breaks. In this case, according to Clemente-Montañés-Reyes (1998) unit-root test is conducted. This test also establishes the presence of exogenous structural breaks. Table 4.4 shows the outcomes of this research study.

Table 4.4: Multiple Structural Breaks Unit root test

Variable	Breaks	Coefficient	t-Statistics	P-value	Breakpoint	Order of integration
M2	D1	967.27740	11.856	0.000	2014q3	I(1)
	D2	644.60201	6.434	0.000	2018q3	
CRB	D1	.72571	-5.099	0.000	2011q1	I(1)
	D2	-3.72540	-3.964	0.003	2012q4	
ER	D1	6.72800	3.733	0.001	2011q1	I(1)
	D2	14.73767	12.831	0.000	2014q4	
SMC	D1	371.31513	5.977	0.001	2013q2	I(1)
	D2	323.47059	5.101	0.002	2017q3	
LR	D1	7.46652	4.481	0.004	2011q2	I(1)
	D2	3.03932	2.557	0.043	2016q4	
RGDP	D1	0.23051	-0.400	0.002	2016q2	I(1)
	D2	-8.27333	-7.352	0.000	2020q1	

Source: Computation from Study Data

The structural breaks unit root was carried out using Clemente-Montañés-Reyes unit-root test. The findings show that all study variables are integrated at order one, despite the presence of two structural breaks. These results agree with those of the single structural break ADF, PP, and Z-A tests. It was considered that the variables

had a long-term link when it was discovered that certain variables stayed immobile at their level while others remained stationary after the initial difference between them. In this particular investigation, the co-integration ARDL bounds test was used in order to ascertain the long-term links that exist between the research variables. Before continuing on to the Autoregressive Distribution Lags limitations test, the research, however, identified the optimum number of lags to use. The conclusions of that research are presented in the part that comes after this one. This was necessary to ensure that the study adopts adequate lags in the analysis.

Even though the previous unit root tests indicated that some variables were integrated of order zero and others of order one, unit root analysis using the Kwiatkowski-Phillips-Schmidt-Shin technique (KPSS) was still required in this study. The KPSS test frequently selects fewer differences than the ADF unit root test and the PP unit root test, making it the optimal choice. While the ADF and PP tests presume the data are non-stationary ($I(1)$), the KPSS test assumes the data are stationary (H_0). The KPSS test only picks one or more differences if there is enough evidence to reject the stationarity assumption, whereas the other tests constantly do so until there is enough evidence to refute the non-stationarity assumption. Table 4.5 displays the results of a KPSS unit root test.

Table 4.5: Kwiatkowski-Phillips-Schmidt-Shin Test

Variables	Level	Statistic	Critical value (5 percent)	Order of Integration
Lending Rate	Level	0.311	0.463	I (1)
	1 st difference	0.111	0.463	
Broad Money	Level	0.0943	0.146	I (0)
	1 st difference	-	-	
Central Bank Rate	Level	0.0967	0.463	I (0)
	1 st Difference	-	-	
Stock Market Capitalization	Level	0.742	0.463	I (1)
	1 st difference	-	-	
Exchange Rate	Level	0.784	0.463	I (1)
	1 st difference	0.104	0.46	
Real Growth Rate	Level	0.359	0.463	I (1)
	1 st difference	0.167	0.463	

Source: Author's Computations

The foregoing findings clearly demonstrated a zero-order integration between the broad money and the central bank rate. The KPSS test also demonstrated that market capitalization, the exchange rate, and real growth rate are all integrated of order one. This aspect of the considered time series is what ultimately led to the ARDL model being chosen. However, the ARDL model couldn't be used until the right lag time was established. In the next part, the study talk's about how to decide on the best lag time.

4.3.2 Lag Length Selection

A sufficient lag length was found by applying the five lag length selection criteria to the analysis. FPE, HQIC, LR, AIC, and SBIC were taken into consideration. The test was conducted on specific factors including loan rate, real GDP, and stock market capitalization. The findings are shown in Tables 4.4, 4.5, and 4.6.

Table 4.6: Lending Rate Lag Selection

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-101.50				11.45	5.28	5.34	5.44
1	-97.36	8.298	1	0.004	9.79	5.12	5.19	5.33
2	-93.19	8.34*	1	0.004	8.36*	4.96*	5.05*	5.21*
3	-92.998	0.38401	1	0.535	8.72	4.99	5.11	5.30
4	-92.995	0.00655	1	0.936	9.18	5.05	5.17	5.39

Source: Author's Computations

From the lag selection results, it can be revealed that all the lag length criteria suggested 2 lags. As SBIC's proposed test is more stringent, the research followed its recommendation and used a lending rate function with two delays.

Table 4.7: Real Gross Domestic Product Lag Selection

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-93.69				7.75	4.88	4.95	5.05
1	-87.79	11.81*	1	0.001	6.07*	4.64*	4.72*	4.85*
2	-87.62	0.34	1	0.561	6.33	4.68	4.77	4.93
3	-87.58	0.083	1	0.773	6.65	4.73	4.835	5.02
4	-86.28	2.59	1	0.107	6.56	4.71	4.836	5.05

Source: Author's Computations

From the lag selection results, it can be seen that all the lag length criteria suggested 1 lag. SBIC advised 1 lag, a harsher test, thus the research used it.

Table 4.8: Stock Market Capitalization Lag Selection

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	44.97				0.0076	-2.048	-1.99	-1.88
1	49.77	9.61*	1	0.002	0.0063*	-2.238*	-2.16*	-2.03*
2	49.81	0.081	1	0.776	0.0066	-2.19	-2.10	-1.94
3	49.86	0.10	1	0.747	0.0069	-2.14	-2.04	-1.85
4	49.89	0.047	1	0.828	0.0073	-2.09	-1.97	-1.76

Source: Author's Computations

All of the lag length selection criteria suggested, according to the lag length selection results. Given that the process was more rigorous test, the study settled on lag one as recommended by SBIC. The study then moved on to the evaluation of the long run association after determining the lag time. The following section discusses the findings.

4.3.3 Co-integration Results

The findings are shown in table 4.9.

Table 4.9: ARDL Bounds Test (Co-integration Test)

Bounds Test	Lending Rate Function
F-statistic	5.6
I (0)	3.5
I (1)	4.9

Source: Computations from study data

Co-integration test results (ARDL limits test) suggest that long-term loan rates have been linked to central bank interest rates. Given that the F-test findings exceed the 1(1) limit critical values, it is feasible to draw the conclusion that the two variables

have a long-term association (Pesaran & Shin, 1999). Future forecasts were created using preliminary data for the ARDL and the error correction model.

The findings of the Z-A unit root test and the visual examination of the research variables are shown in Appendix A.1. There appears to be a structural break in the data, according to both studies. As a result, it was claimed that the co-integration test for ARDL boundaries was inappropriate because the results would be unpredictable. The Gregory-Hansen co-integration test was used to get around this problem. This is a structural breakdown-accounting co-integration test. The results are summarized in Table 4.10.

Table 4.10: Gregory-Hansen Co-integration Test

Model		Test Statistic	Break-point	Period	Critical Values (%)			Conclusion
					1	5	10	
Break in the constant	ADF	-5.92	30	2017q1	-5.77	-5.28	-5.02	Cannot reject the null of no co-integration for ADF, Z_t , Z_α .
	Z_t	-5.99	29	2017q1	-5.77	-5.28	-5.02	
	Z_α	-40.07	29	2017q1	-63.64	-53.58	-48.65	
Break in the constant and Trend	ADF	-6.06	29	2017q1	-6.05	-5.57	-5.33	Declined to reject the null of none co-integration for ADF, Z_t , Z_α .
	Z_t	-6.13	29	2017q1	-6.05	-5.57	-5.33	
	Z_α	-40.84	29	2017q1	-70.27	-59.76	-54.94	
Break in the constant and slope	ADF	-6.58	29	2017q1	-6.51	-6.00	-5.75	cannot reject the null of no co-integration for ADF, Z_t , Z_α .
	Z_t	-6.66	29	2017q1	-6.51	-6.00	-5.75	
	Z_α	-44.18	29	2017q1	-80.15	-68.94	-63.42	

Co-integration was supported, according to the results of the Gregory Hansen co-integration test. Given that the test for ADF and Z_t was more negative and supported the findings of the ARDL limits test (co-integration), there might be a long-term relationship between the central bank rate and the lending rate.

4.3.4 Correlation Matrix Analysis

The Pearson Equation The correlation matrix provides a graphic representation of the correlation between the regress and dependent variables. The results are shown in Table 4.11.

Table 4.11: Correlation Matrix

Variable	Broad money	Central Bank Rate	Exchange Rate	Stock market capitalization	Lending rate	Real GDP
Broad money	1.000					
Central Bank Rate	-0.104	1.000				
Exchange Rate	0.887	-0.068	1.000			
Stock Market Capitalization	0.821	-0.002	0.763	1.000		
Lending rate	0.395	0.661	0.373	0.433	1.000	
Real GDP	-0.431	-0.033	-0.345	-0.260	-0.459	1.000

Source: Computations Based on Central Bank of Kenya Data

The level of connection between two variables is shown by linear correlation. It shows how two variables might have a direct or indirect correlation. The results demonstrated that broad money (M2) mirrored the association between the stock of money and the central bank rate, revealing a weakly inverse link between the two. The P-value of 0.476 for this association is much lower than the threshold for

statistical significance. This means the relationship between these two variables is insignificant. This is in agreement with economic theory because if central bank increases its discount rate, commercial banks increase their interest rates thus discouraging the public from borrowing. The correlation between interest rates set by central banks and currency exchange rates was shown to be negative, but weak. No statistically significant relationship between these two factors was found ($P = 0.659$). Central bank rates and stock market capitalization were found to have a weak link (0.033), while lending rates were found to have a positive moderate association with the other variables. A statistically significant negative association was found between each component and real GDP. Commercial banks reduce their borrowing from the central bank in response to rising interest rates, as predicted and consistent with economic theory. This reduces the amount of money in circulation since banks have set high interest rates. In such a situation, the exchange rate falls because currency suppliers lower their rates in response to reduced demand. Nonetheless, there was a robust and positive correlation between the money supply and the exchange rate. There is a strong correlation between the two variables when the p-value is less than 0.000. This outcome is in line with economic theory as an increase in the money supply is linked to a larger money supply, which ultimately results in a higher exchange rate. People are able to pay a premium in their own currency for foreign currencies, which is why this is happening. Although this strong correlation may be a pointer to possibility of multi-collinearity, there was need to put to implement variance inflating factor (VIF). The literature indicates that pairwise correlation is necessary but is not sufficient. Therefore, a decision to drop a variable can only be informed by the VIF test. It is on this ground that the study implemented VIF test and Table 4.12 displays the outcomes.

Table 4.12: VIF Results

Variable	VIF	1/VIF
Expected Exchange Rate	4.90	0.2024
broad money	4.94	0.2039
Central Bank Rate	1.02	0.9834
Mean VIF	3.62	

The results in Table 4.12 indicated absence of multi-collinearity. This was evidenced by VIF of less than 10, a threshold for accepting multi-collinearity. Having determined that multi-collinearity did not exist, the research next looked at whether or not there was a unit root among the variables, eliminating that potential source of error in the regression estimation.

4.3.5 Diagnostic Tests

The diagnostic test on the estimates was carried out to guarantee that the findings are accurate, verifiable, valid, consistent, and impartial, and that they will withstand the test of time in the years to come. Several statistical tests, including the serial correlation LM test, heteroscedasticity test, and normality test, were performed.

4.3.5.1 Heteroscedasticity Test

Heteroscedasticity test was carried out ARCH test. Table 4.13 and 4.14 show the results.

Table 4.13: Heteroscedasticity test result-equation 3.9

F-statistic	0.042640	Probability of F(1,39)	0.8375
Observed R-squared	0.044778	Probability of Chi-Square	0.8324

The absence of heteroscedasticity was indicated by the results in Table 4.13, where the p-value for the Chi-square statistics was 0.8324. This implies that accurate inference testing can be carried out.

Table 4.14: Heteroscedasticity test result-equation 3.10

F-statistics	0.174032	Probability F(1,41)	0.6787
Observed R-squared	0.181750	Probability Chi-Square	0.6699

Table 4.14 shows that the Chi-squared test for model 3.10 has a p-value of 0.6699. Furthermore, the data did not allow for the rejection of the homoscedasticity null hypothesis at the 5% level of significance. This paves the way for surety in inference tests.

4.3.5.2 Normality Test

The Jarque-Bera (JB) test was used to conduct the test for normality. This test was performed to demonstrate the uniform dispersion of the residuals. The null hypothesis posits that the calculated residuals are expected to have a normal distribution. Figures 4.1 and 4.2 show the test findings.

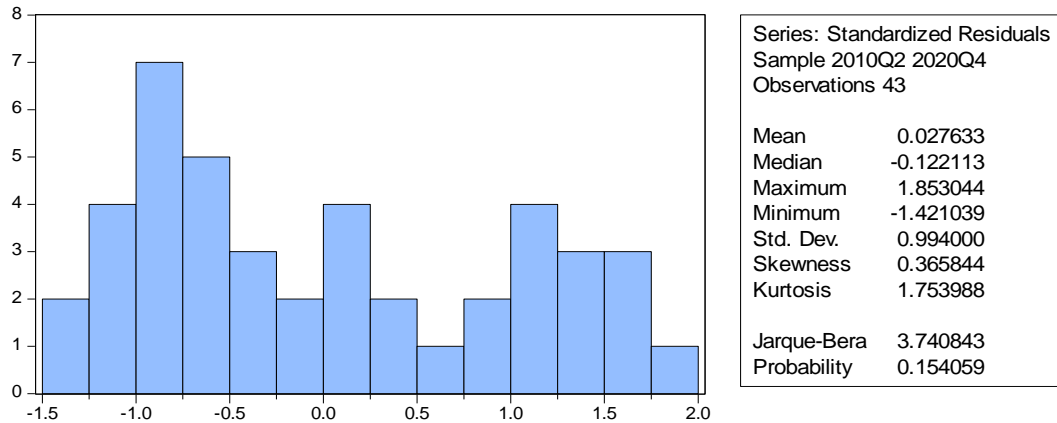


Figure 4.1: Histogram-Normality Test- model 3.9

Source: Computation from study data

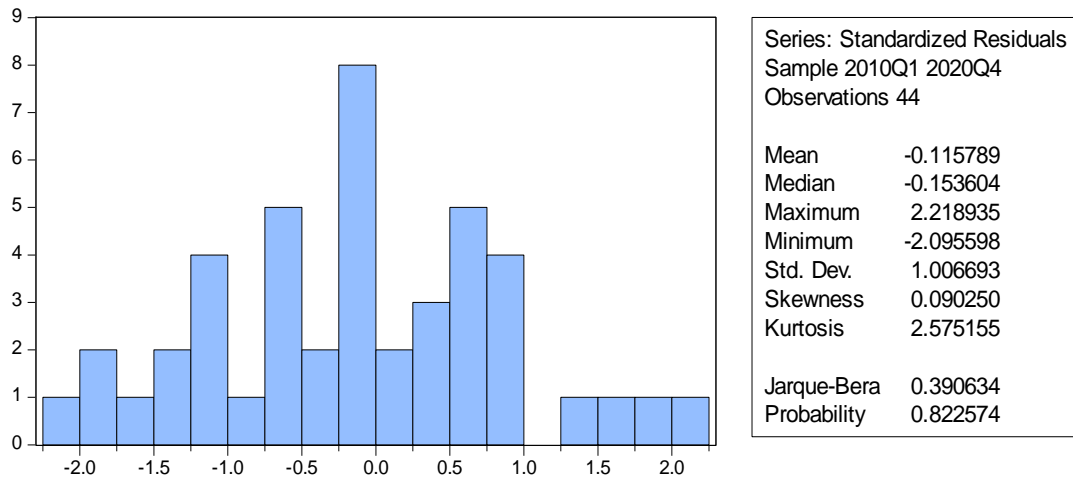


Figure 4.2: Histogram-Normality test- model 3.10

Source: Computation from study data

The findings indicate that for models 3.9 and 3.10, the p-values for Jarque-Bera statistics were 0.154059 and 0.82274, respectively. The residuals were not significantly different from normally distributed, since the p-values were larger than 0.05 at the 5% significance level. This suggests that data had normal distribution, and the P-values thus successfully tested the null hypothesis.

4.3.5.3 Serial correlation Test

The study's variables were tested for serial correlation using the Breusch-Godfrey LM test. The residuals did not show any signs of autocorrelation, thus we cannot rule out the null hypothesis with a 5% degree of confidence. Tables 4.15 and 4.16 display the collected information.

Table 4.15: Breusch-Godfrey Serial Correlation LM Test-Model 3.9

F-statistics	1.717210	Probability F(2,3)	0.3184
Observed R-squared	21.35030	Probability Chi-Square(2)	0.4529

Source: Computations from Study Data

Table 4.16: Breusch-Godfrey Serial Correlation LM Test-model 3.10

F-statistics	0.169938	Probability F(2,27)	0.8446
Observed R-squared	0.522123	Probability Chi-Square(2)	0.7702

Source: Computations from Study Data

The p-value of the Chi-square was statistically significant at five percent, indicating that there was no evidence of autocorrelation. Because the values at 0.4529 and 0.7702 were found to be greater than 0.05, showing that the estimation's results were accurate and dependable, the null hypothesis was therefore unable to be rejected at the 5 percent significance level.

4.4 Regression Results

The study attempted to address three objectives: firstly, to identify how variations in central bank rates affect lending rates; secondly, to determine how changes in CBR affect Kenya's Real Gross Domestic Product; and thirdly, to determine how changes

in CBR affect stock market capitalization. The three goals were accomplished as explained in the following sub-sections.

4.4.1 Central Bank rate changes Pass-through effect on lending rate

The effect of the CBR on Loan Rates will be analyzed in this research. Table 4.17 displays the outcomes of our analysis of 3.21 using the ARDL regression methodology.

Table 4.17: Central Bank rate changes Pass-through effect on lending rate

Dependent Variable: Lending Rate				
	Coefficient	Standard Error	T	P>t
Error Correction Term (ECT)	-0.6028	0.1713	-3.52	0.002
Central Bank Rate	1.299	0.287	4.53	0.000
Natural log of Broad Money	6.343	5.501	1.15	0.259
Exchange rate	-0.111	0.3162	-0.35	0.727
Dummy variable	-133.97	102.65	-1.31	0.203
Interaction between dummy variable and Central Bank Rate	-0.0836	1.216	-0.07	0.946
Dummy variable and Natural log of Broad Money interaction	18.29	14.31	1.28	0.212
Exchange Rate and Dummy Variable Interaction	-0.0796	0.4282	-0.19	0.854
Lag one of Lending Rate	0.2713	0.1724	1.57	0.128
Lag one of Central Bank Rate	0.9666	0.3306	2.93	0.007
Lag two of Central Bank Rate	-0.1502	0.3516	-0.43	0.673
Lag one of Natural log of Broad Money	-5.707	19.23	-0.30	0.769
Lag two of Natural log of Broad Money	3.954	16.14	0.24	0.808
Lag one of Exchange Rate	0.3796	0.1813	2.09	0.046
Lag two of Exchange Rate	0.06396	0.1752	0.36	0.718
Constant	-24.57	23.095	-1.06	0.297
Jarque Bera Test	0.3128			
Observations	42			
R-squared	0.871			

Source: Computations from study data (Quarter 1 of 2010- Quarter 4 of 2020)

Central Bank of Kenya policy changes and their effect on lending rates from Q1 2010 to Q4 2020 are shown in Table 4.17. The selected models' goodness-of-fit statistics are summarized in Table 4.17. This is because the normality null hypothesis could not be rejected using the Jarque-Bera, post estimation test since it yielded insignificant findings. Zivot-Andrews found structural faults in the unit root during their study. However, according to the results of the Gregory Hansen co-integration test, the existence of a link between structural breakdowns has no effect on the long-term changes. The research showed that central bank rates accounted for 87.1% of the variation in lending rates, with unmeasured factors accounting for the remaining 12.5%. The corrected R-squared value was 0.871. The ARDL regression's recursive residuals were used to evaluate the model's stability. The CUSUM, often known as the cumulative sum of squares, was created. The graphical plot of this CUSUM is shown in Figure A.2 in the appendix. The CUSUM should be within a 5% significance threshold in order to assure model stability. Since the CUSUM was found to be inside the 5 percent border, it was clear from the graph in the appendices (Figure A.2) that the model specified was stable.

The findings of Table 4.17, which demonstrate a long-term relationship between lending and the central bank's rate, are consistent with the co-integration results in Table 4.9. A substantial negative ECT estimate at the 5% level is required for a sustainable relationship. Long-term coefficient of CBR was found to be 1.29, while short-term coefficient of central bank rate was found to be 0.9666. These results are consistent with a low short-term impact of Kenya's central bank rate and a larger long-term effect.

According to the results of Dube and Zhou (2014), commercial banks in Kenya may have an incentive to avoid considerably raising lending rates as borrowers who accept higher rates are more likely to default on their loans. In general, substantial rises in loan rates might contribute to the moral hazard problem. When the anticipated value of a loan is low, borrowers are more likely to choose risky ventures and take out the loan. Aziakpono et al. (2007) and De Angelis et al. (2009), for example, both discovered the same thing when they investigated the impact of interest rates on IRPT. (2009). They found an IRPT between policy rates and lending rates of 0.93% to 1.040% over the long run. Consumers may feel an effect from the central bank's short-term borrowing rates ranging from 0.40 percentage points to 0.92 percentage points, according to the data.

The results demonstrated that at the 1% level, the lag one estimate of the predicted exchange rate was statistically significant, suggesting that prior fluctuations in the projected exchange rate significantly affected present day loan rates provided by commercial banks. It was calculated that a 1% rise in the exchange rate would lead to a 0.38 % increase in the loan rate in the absence of any other changes in the economic environment.

It was discovered that the logarithm of wide money had a little positive but statistically negligible impact on Kenya's lending rate over a period of time. Despite the insignificance of the coefficient, its sign was consistent with economic theory. This is a result of the augmented currency circulation throughout the economy caused by a rise in broad money. When the central bank raises interest rates to counter inflation, commercial banks react by increasing the interest rates they charge on loans to consumers.

4.4.2 Impulse Response Functions and Variance Decompositions for Pass-through effect of central bank rate changes on lending rate

This section presents the outcomes of the Impulse Response Function (IRF) and Variance Decomposition Functions for various time periods, illustrating the influence of changes in central bank rates on lending rates. The IRF quantifies the influence of a disturbance that arises from an internal variable on other variables in the VECM. Conversely, the variance decomposition function offers details on the precise influence and relative significance of each random innovation on the variables inside the VECM. The results are shown in Tables 4.18 and 4.19.

Table 4.18: IRF Tracing the Effect of Shocks on CBR on Lending Rate

	After		
	2 Quarters	4 Quarters	6 Quarters
Lending Rate	0.4340	0.8569	0.8134

Source: Author's Computation 2024

The results in Table 4.18 the study indicates that Kenya's Central Bank Pass-through (CBRPT) to lending rate is incomplete, with a 1% increase resulting in an 85.69% increase in lending rates four quarters ahead.

Table 4.19: Results for Variance Decomposition: How Much Does CBR explain?

	After		
	2 Quarters	4 Quarters	6 Quarters
Central Bank Rate	1.7	5.0	8.7
Exchange Rate	3.4	3.4	6.9
Broad Money	0.3	1	1.7
Lending Rate	94.6	90.6	82.2

Source: Author's Computation 2024

The variance decomposition analysis in Table 4.19 shows that the lending rate significantly influences the lending rate's variance, accounting for 82.2% of its variance after 6 quarters. The central bank rate's influence on the lending rate intensifies, particularly after 4 quarters, indicating a lagged effect. This highlights the intricate dynamics of monetary policy transmission in Kenya, with the central bank rate playing a key role in shaping lending rate dynamics. Understanding the lagged effects and interconnections within the financial system is crucial for a comprehensive understanding of monetary policy transmission mechanisms in Kenya.

4.4.3 Pass through Effect of Central Bank Rate Changes on Kenya's Real Gross Domestic

Non-stationarity was taken into account while analyzing the results of a study that investigated how shifts in the CBR affect the pace at which Kenya's economy grows. Because The Zivot Andrews demonstrated that every one of the variables under consideration was integrated of order one, the Johansen co-integration test was

carried out in order to look for signs of a lasting connection between the variables. After the optimum lag length test was finished, the Johansen co-integration test was run. The five criteria for the optimum lag duration were applied. FPE, HQIC, Likelihood Ratio (LR), AIC, and SBIC were all taken into account. Table 4.20 displays the outcomes for the best lag duration.

Table 4.20: Central Bank Rate Changes and Real Gross Domestic Product Lag Selection

Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-615.60				3.3e+08	30.98	31.04	31.15
1	-475.47	280.24	16	0.000	678381	24.77	25.08*	25.68*
2	-455.15	40.645	16	0.001	560967*	24.56	25.11	26.08
3	-441.31	27.681	16	0.035	667893	24.67	25.46	26.86
4	-421.41	39.796*	16	0.001	627437	24.47*	25.51	27.34

Source: Author's Computation 2024

From Table 4.20, it was observed that both HQIC and SBIC indicated use of one lag. The LR and AIC, indicated use of 4 lags while FPE, indicated use of two lags. Since SBIC is a more stringent exam, one lag was used in the research to reflect that. Once the optimal lag period was established, the study used the Johansen co-integration test to identify indications of a lasting relationship. Table 4.21 displays the outcomes.

Table 4.21: Central Bank Rate Changes and Real Gross Domestic Product

Johansen Tests

Number of observations = 43					
Trend: constant					
Sample: 2010q2 - 2020q4					
Lags = 1					
The maximum rank	The parms	Log Likelihood	The eigenvalue	The Trace Statistic	Critical value
0	4	-541.6	.	59.4	47.21
1	11	-524.04	0.558	24.27 *	29.68
2	19	-512.57	0.188	1.35	3.76
3	20	-511.898	0.0068	0.031	

Source: Computations from study data

The Johansen co-integration test identified a single co-integrating equation. This is due to the fact that the null hypothesis of a single co-integrating equation was not rejected when the rank threshold was set at 1.

Once a long-term association was established, the study moved on to estimate an error correction model (ECM). The results for the ECM are presented in Table 4.22.

Table 4.22: Central Bank Rate Changes and Real Gross Domestic Product**Pass-Through Effect**

Dependent Variable: Real GDP growth				
Explanatory Variables	Coefficient	Standard Error	T	P>t
Error Correction Term (ECT)	-0.2557	0.1221	- 2.09	0.036
Central Bank Rate	-0.6698	0.2047	3.27	0.001
Exchange Rate	0.6554	0.1482	- 4.42	0.000
Broad money	-0.009665	0.001956	4.94	0.000
Lag one of real GDP	-0.1627	0.1282	- 1.27	0.204
Lag one of Central Bank Rate	-0.3978	0.1835	- 2.17	0.030
Lag one of Exchange Rate	-0.3132	0.1276	- 2.46	0.014
Lag one of broad money	-0.0214	0.00528	- 4.06	0.000
Constant	2.882	0.8968	3.21	0.001
R-squared	0.52			
P>chi2	0.0000			
DW	2.2707			

Source: Computations from study data (Quarter 1 of 2010- Quarter 4 of 2020)

The adjusted R-squared value of 0.52 shows that about 52 per cent of the variation in real GDP growth can be explained by the model in consideration. This suggests that factors outside of the model account for 48% of the volatility. Despite this, the model's statistically significant F-statistic of 0.0000 indicates that it is thought to be

acceptable and sufficient for analyzing how changes in central bank rates affect Kenya's economic growth.

The calculated Durbin-Watson score, 2.2707, indicates that there is no evidence of serial auto-correlation among the variables under investigation. If the calculated value exceeds tabulated value 1.8 in absolute terms adds credence to the conclusion that there is no serial autocorrelation. Additionally, the statistically significant and negative Error Correction Term (ECT) in Table 4.22 shows a long-term association, providing insights into the pace of correction.

The CBR long-run coefficient is -0.6698, while the short-run coefficient is -0.3978, suggesting a poor short-term association between the real GDP growth and the rate set by the Kenyan central bank. The findings of Zhou (2014) suggest that changes to the central bank's interest rate policy may have a negative impact on real GDP. These results are consistent with economic theory.

Inflation caused by an excessive money supply may hurt economic growth, according to economic theory. Negative statistical significance for the broad money coefficient was established at the 5% level. Oluseyi *et al.*, (2017) study on Nigeria's economic performance in connection to money supply revealed similar results.

To the contrary, real GDP growth is positively and statistically significantly affected by an increase in the exchange rate, rising 0.6554 percentage points for every one percentage point increase. Theoretically, a higher exchange rate may encourage exports and bring in foreign currency that could be used to import capital goods from other nations. This would be in line with their predictions. Findings are in line

with those of a research on the impact of currency rates on Malaysia's economic growth conducted by Kogid et al. (2012).

In the short run, there were negative and statistically significant coefficients for both broad money and exchange rate. Under the condition that all other factors remained same, a 1% rise in the exchange rate was linked to a real GDP growth rate of 31.32%, whereas a 1% increase in broad money was related with a real GDP growth rate of 0.0214%. These results provide insight on the causal link between changes in the money supply and the economic growth of Kenya.

Tables 4.23 and 4.24 demonstrate the reaction of real GDP to a sudden change in the central bank rate at 2, 4, and 6 quarters.

Table 4.23: IRF Tracing the Effect of Shocks on CBR on Real GDP

Variable	After		
	2 Quarters	4 Quarters	6 Quarters
Real GDP	-0.1307	-0.4031	-0.5703

Source: Author,s Computation 2024

Table 4.23 shows that Kenya's Central Bank Pass-through (CBRPT) to real GDP is not fully implemented. For example, the CBRPT to lending rate four quarters ahead is -0.4031. This suggests that the amount of real GDP decreases by 40.31 percent for every 1% increase in central bank rates. This finding is plausible in general and in agreement with findings of other studies in the area for instance Zhou (2014).

Table 4.24 presents the variance decomposition results.

Table 4.24: Results for Variance Decomposition: How Much Does CBR

explain?

	After		
	2 Quarters	4 Quarters	6 Quarters
Central Bank Rate	2.1	7.0	7.9
Exchange Rate	1.3	1.2	1.0
Broad Money	14.8	10.5	10.4
Real GDP	81.8	81.3	80.7

Source: Author's Computation 2024

The variance decomposition analysis in Table 4.24 reveals that real GDP significantly influences Kenya's economic performance, accounting for a larger percentage of its variance. The analysis shows that the real GDP's variance contribution declines to 80.7 percent after 6 quarters, indicating a dynamic relationship between real GDP and its determinants over time. The central bank rate's increasing dominance in determining the variance of real GDP underscores Kenya's economic growth's dependence on central bank rate movements, providing valuable insights for policymakers and researchers.

4.4.4 Pass-through Effect of Central Bank Rate Changes on Stock Market

Capitalization

The study's third objective was to quantify the effect of central bank rate on stock market capitalization. Particularly in the data, the study suspected the existence of structural breakdowns. As a result, the likelihood of a structural breach was investigated, and the findings are described in the part that follows.

4.4.5 Testing for Structural Break

The Supremum Wald test was employed in the study to investigate the existence of a structural break, especially as the break's timing was neither predefined nor known ahead of time. A statistical method frequently used to determine if a structural break occurs in a particular dataset is the Supremum Wald test. In this case, the Supremum Wald test's null hypothesis asserts that there hasn't been a structural breach within the time frame under examination. Structural breaks are crucial points at which the fundamental features of the data significantly alter; they frequently indicate a change in the political or economic landscape. The Supremum Wald test looks for evidence of a fundamental shift in the relationships between variables by assessing the null hypothesis that there is no structural break.

The incorporation of the Supremum Wald test in the study adds a robust dimension to the analysis, as it gives a data-driven approach to finding potential structural fractures without relying on prior conceptions or assumptions about when such breaks may have occurred. By taking this approach, the study recognizes the value of evaluating relationships objectively throughout time in order to provide a more comprehensive picture of the dynamics at work. Moreover, the robustness and dependability of the results are enhanced by the Supremum Wald test's inclusion in the research approach. The study attempts to determine whether changes in the economic environment or other external factors have affected the relationships between variables, hence altering the overall conclusions reached from the analysis, by testing the null hypothesis that there is no structural break.

Last but not least, the Supremum Wald test's inclusion in the study's methodology demonstrates a thorough attempt to objectively identify potential structural breaks,

boosting the validity and credibility of the research findings pertaining to the relationships and dynamics under study within the economic context under

Table 4.25: The Supremum Wald Test of Study Variables on the CBR pass through Effect to Stock Market Capitalization in Kenya

Number of observation = 44	
Full sample:2010q1 - 2020q4	
Trimmed sample:2011q4 - 2019q2	
Estimated break date:2017q3	
Ho:No structural break	
Test Statistic	p-value
swald 38.37	0.0000

Source: Author's Computations

The data do not definitively show the exact site of the structural break; consequently, the research used the Supremum Wald test to search for it. Based on the null hypothesis, there was no evidence of a structural breach. The Supremum Wald Test yielded a p-value of 0.00 and a statistics value of 38.37. Consequently, the null hypothesis was disproven, suggesting a significant change in the model's structure. The test projected that the break date will occur during the third quarter of 2017. To account for this structural gap, the research used a dummy variable. This structural rupture occurred concurrently with a period characterized by public protests orchestrated by the opposition subsequent to the general elections held on August 8th, 2017. The demonstrations were intense and this may have discouraged investors thus leading to poor performance of the stock market.

4.4.6 Pre-estimation Tests Results for the Central Bank Rate Pass through Effect to Stock Market Capitalization

The following pre-estimation tests were performed

4.4.6.1 The unit Root Test

To determine whether the variables utilized in this investigation were stationary, the unit root test was used as a pre-estimation in the study. ADF, PP, Zivot-Andrews, Clemente-Montañés-Reyes (1998) unit-root test, and KPSS test were employed in the investigation. Tables 4.2, 4.3, 4.4, and 4.5 display the findings for these unit root tests, accordingly. The findings showed that all of the factors integrated of order one were utilized in the assessment of the CBR pass through effect to stock market capitalization. This implied that there might be a long-term link between the relevant variables. The Johansen Co-integration test, which is covered in the next part, was used by the study to perform the co-integration test.

4.4.6.2 The Johansen Co-integration Test

Prior to using the Johansen co-integration test, the research determined the most suitable lag duration utilizing. The lag length selection criteria include FPE, HQIC, Likelihood Ratio (LR), AIC, and SBIC. The results for the lag duration selection criterion are shown in Table 4.21.

Table 4.26: Central Bank Rate Changes and Stock Market Capitalization Lag Selection

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	8.30				9.5e-06	-0.22	-0.15	-0.05
1	164.23	311.85	16	0.000	8.7e-09*	-7.21	-6.91*	-6.37*
2	177.04	25.63	16	0.060	1.0e-08	-7.05	-6.50	-5.53
3	194.95	35.81	16	0.003	1.0e-08	-7.15	-6.35	-4.95
4	215.40	40.90*	16	0.001	9.3e-09	-7.37*	-6.33	-4.50

Source: Author's Computation 2024

From Table 4.26, it was observed that both LR and AIC suggested 4 optimal lag length. The remaining FPE, HQIC and SBIC suggested one lag as the optimal lag length. The study considered 4 lags as suggested by AIC. The decision optimal lags as suggested by AIC was because the criterion is the most widely used.

The Johansen co-integration test was used in the study to check for the existence of a long-term association after choosing the ideal lag length. Table 4.23 presents the findings.

Maximum Rank	Parms	LL	Eigenvalue	Trace Statistic	5 % Critical value
0	5	162.49	.	77.19	68.520
1	14	176.75	0.48	48.66	47.210
2	21	189.42	0.44	23.34*	29.680
3	26	195.86	0.26	10.45	15.410
4	29	199.45	0.16	3.27	3.760
5	30	201.08	0.07		

Source: Author's Computation 2024

Assuming the stated maximum rankings do in fact exist is the null hypothesis of this hypothesis test. No co-integrating equation with a maximum rank of zero (0) is asserted by the null hypothesis. The null hypothesis is rejected due to the trace statistic being higher than the crucial threshold of 5%. For the single co-integrating equation, the null hypothesis is disproved. For two co-integrating equations, the null hypothesis is not disproved, nevertheless. This therefore suggested the link between the stock market capitalization and the independent variables had two co-integrating equations. Therefore, these findings suggested that the central bank rate and stock market capitalization had a long-term link. After determining that a long-term association existed, the study estimated a VECM. The VECM results are shown in Table 4.24.

4.4.6.3 Empirical Findings

The empirical Findings in estimating the CBR pass through to stock market capitalization is shown in Table 4.27

Table 4.27: Estimating the Central Bank Rate Pass through to Stock Market**Capitalization in Kenya**

Variable	Coefficient.	Standard Error	Z	P>z
Error Correction Term	-0.058	0.03	-1.95	0.052
Lag 1 of Differenced Natural log of Stock Market Capitalization	-0.64	0.20	-3.13	0.002
Lag 2 of Differenced Natural log of Stock Market Capitalization	-0.45	0.24	-1.89	0.059
Lag 3 of Differenced Natural log of Stock Market Capitalization	-0.72	0.27	-2.64	0.008
Natural log of Central Bank Rate	-0.50	0.30	1.67	0.095
Lag 1 of Differenced Natural log of Central Bank Rate	0.03	0.13	0.20	0.839
Lag 2 of Differenced Natural log of Central Bank Rate	0.07	0.13	0.51	0.611
Lag 3 of Differenced Natural log of Central Bank Rate	0.03	0.10	0.29	0.775
Natural log of broad money	2.53	0.46	-5.51	0.000
Lag 1 of Differenced Natural log of broad money	-1.27	1.10	-1.15	0.250
Lag 2 of Differenced Natural log of broad money	0.41	0.84	0.49	0.622
Lag 3 of Differenced Natural log of broad money	-0.66	0.95	-0.69	0.488
Natural log of exchange rate	-15.15	1.98	7.66	0.00
Lag 1 of Differenced Natural log of exchange rate	0.80	0.56	1.43	0.152
Lag 2 of Differenced Natural log of exchange rate	0.70	0.61	1.13	0.256
Lag 3 of Differenced Natural log of exchange rate	0.49	0.54	0.90	0.366
Dummy Variable	-0.41	0.16	2.57	0.010
Constant	-0.04	0.04	-0.97	0.334
R-Squared : 0.5106				
P>chi2 : 0.1196				
Jarque-Bera test : 0.6995				

Source: Author's Computation 2024

The post diagnostic examinations indicated that the data followed a normal distribution, as shown in Table 4.24. In addition, the post estimation results showed absence of heteroscedasticity. This was evidenced by lack of a pattern shown in appendix A.3. The Figure in Appendix A.3 shows the relationship between variance of the error term and predicted value that capture all the independent variables.

At a significance threshold of 10 percent, the error correction coefficient of 0.058 was found to be statistically significant and had a negative value. This implies that if distortions develop, equilibrium will be achieved more quickly. The results therefore shown that there is a consistent and enduring correlation between the logarithms of the stock market capitalization, central bank rate, exchange rate, and broad money.

The modified R-squared value of 0.5106 is considered adequate as it suggests that the natural logarithms of the exchange rate, central bank rate, and broad money explain 51.06 percent of the variations in the natural logarithm of stock market capitalization. Ozili (2023) contends that a minimum adjusted R-square value of 0.1 (or 10 percent) is deemed acceptable, provided that a sufficient number of the predictors or explanatory variables are statistically significant.

The long-run coefficient estimates indicate that the natural logarithm of the central bank rate was significantly negative at the 10 percent level. The statistics clearly indicated that the coefficient of the natural logarithm for the central bank rate was -0.50. This suggests that a 1% rise in the central bank rate leads to a 0.50% decline in the stock market's capitalization, assuming all other factors remain constant. Upon closer analysis of the short-term data, it was discovered that there is a minimal negative association between the natural logarithms of the central bank rate and stock market capitalization. This study provides support for the conventional rule of

thumb that indicates a tangential correlation between stock market capitalization and central bank rate. Uddin and Alam (2010) found a negative association between the discount rate and the capitalization of the Bangladeshi stock market; the data corroborate their conclusions. A statistically significant negative association between loan rate and stock market capitalization was shown by Lopez et al. (2018) and Demiralp (2017), and the results of our study support their conclusions. Contrary to what was found in previous investigations by Ologunde et al. (2006), Muchiri (2012), and Chirchir (2014), this study found different outcomes.

4.4.6.4 Impulse Response Functions and Variance Decompositions

This section displays the outcomes of the Impulse Response Function (IRF) and Variance Decomposition Function (VDF) over different time periods. The VDF utilizes the IRF to observe the influence of a shock originating from an internal variable on other variables. Conversely, the VDF offers insights into the comparative significance of each stochastic innovation in influencing the variables inside the VECM. Table 4.28 and Figure A.4 (included in the appendix) provide the rate at which individuals or entities respond to a sudden change in the central bank rate after certain time intervals of 2, 4, 6, and 10 quarters.

Table 4.28: IRF Tracing the Effect of Shocks on CBR on Stock Market

Capitalization

	After			
	2nd Quarters	4th Quarters	6th Quarters	10th Quarters
Stock Market Capitalization	0.100 (0.286)	0.027 (0.303)	-0.0792 (0.274)	-0.118 (0.128)

Source: Author's Computation 2024

The results in Table 4.28 reveal that Central Bank Pass-through (CBRPT) is incomplete in Kenya. For instance, CBRPT to stock market capitalization six quarters ahead is -0.0792. This suggests that the level of stock market capitalization decreases by 7.92 percent for every one percent increase in central bank rates. Overall, this result seems reasonable and consistent with results from other research in the field.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This chapter presents an overview of the study, conclusion, the chapter's policy implications and ideas for future investigations. The presentations are done in four sections.

5.2 Summary of the study

There have been major changes in Kenya's monetary policy framework and the financial climate during the last two decades, as well as in many other nations throughout the African continent. Hence, the Central Bank has shifted its monetary policy operations toward more indirect and market-based mechanisms. Despite popular beliefs that the shifting financial environment would significantly affect the efficiency of monetary policy, no systematic study has been performed to examine the effects of interest rate IRPT on GDP growth, lending rates, and stock market capitalization. In light of this, the purpose of our research was to evaluate the potential that this might be the case.

The monetary policies implemented by the CBK were CBR, Open Market Operation, bank reserves and lending rates which are enshrined through various channels. These channels are interest channels, credit channels, exchange rate channels, amongst others. The rigidity of the interest rates channels renders the channel ineffective and inefficient to ensure IRPT mechanism in the banking sector. This indicates non-development of the financial sector in any economy hence remains non-competitive in the phase of changing technology. These critical

policies were found to emanate from the Central Bank monetary committee that stabilizes the economy from any shock.

Stock market prices indices is used as a measure of economic conditions in any economy and in order for the monetary authority to achieve robust economic growth, the authority manipulate the stock market prices quite often to realize this growth as envisioned in Vision 2030 blue print. Increasing investment and savings in the economy from 14% and 25% of GDP, respectively, is the primary objective of Vision 2030. If the objective is met, stock market capitalization is guaranteed to increase from 50% to 90% of GDP. The expansion gives the government, people, and businesses a way to raise money for project implementation and corporate expansion.

Bank rates has been found to affect most sectors of the economy including; financial market, commodity's market and international trade market. Changes in bank rates have a negative relationship with economic variables whereby increase in bank rates result to a decline in growth of the economy due to contraction of money supply in the economy which ultimately slows down economic activities hence affecting economic growth by a bigger margin. A lower bank rate expands economic activities by reducing the cost of borrowing funds, increasing circulation of money in the economy, this trigger economic activities stimulating growth through stock market capitalization. However, the stock market performance has also been declining over years to about 2636.47 points in March 2019 pointing to serious implications on the stock market prices. Despite this, there is no consensus on the association between CBR and security market capitalization even though the theory of interest rates points a negative relationship. While prior studies have

looked at how repo and interbank rates affect market cap, the current study aimed to see how CBR are passed through to the Kenyan stock market.

The research aims to accomplish three primary things. The major goal was to analyze the effect of CBK rate on commercial banks' interest rates in Kenya. The effect of interest rate adjustments by the central bank on the price of Kenyan equities was also analyzed. Furthermore, the study discovered that GDP growth in Kenya was considerably impacted by shifts in the country's CBR.

The study was based on six theoretical frameworks: hypothesis of negative consumer response and price fixing; the idea of borrowable money; the Keynesian economics theory; the interest rate IRPT theory; the Hicks IS-LM hypothesis; and the marginal cost pricing theory. The study's foundation, however, was laid in the rate of interest IRPT theory and the Hicks IS-LM hypothesis, which provide a rationale for how bank rates impact lending rates made by commercial banks. Relevant past studies were also reviewed that gave the great insights for references.

The three study questions were answered using a non-experimental research approach. Quarterly time series data for the study's variables, which covered the years 2010 to 2020, were obtained from the CBK, Nairobi Stock Exchange reports, and Kenya Bureau of National Statistics reports in order to address the research issues. Several estimation techniques were applied to evaluate the provided data. One model looked at the short-term impacts, while another employed vector error correction to determine the long-term effects of changes in bank rates on lending rates in Kenya. In order to determine how bank rates impact GDP growth, we used an autoregressive distributed lag model. We found more evidence in support of the model when we found that the variables were stable at different levels and co-

integrating on several orders. Lastly, the data was fed into the EGARCH model, which estimates the relationship between the stock market capitalization and Kenya's central bank rate. The model's ability to account for conditional variation in the lag residuals led to its adoption. For the purpose of avoiding the acquisition of misleading data, we performed both pre- and post-estimation tests.

The first objective of this research was motivated by the importance of the impact of IRPT on central bank rates and the fact that lending rates have remained stable or changed in different ways whenever the central bank changes its policy. Consequently, monetary policy may not have had the desired effect. The study used an autoregressive distribution lag regression framework for analysis in order to accomplish this purpose. The results show that Kenya has an incomplete CBR pass through effect, meaning that anytime the CBR changes by a certain percentage, lending rate rises would be less than proportionate. This is one reason why some banks have foreign ownership, are not dependent on the liquidity of the central bank, and may be sluggish to respond to signals from the bank to change lending rates.

The second objective of the study investigates the central bank rates IRPT effects on real GDP, which have not been showing a predictable pattern in the way GDP growth rates have been evolving especially during the period of study. It was decided to estimate the empirical model that is based on co-integration approaches. The study found that the error correction term, which quantifies the rate at which corrections are performed, is a considerable and unfavorable requirement over the long term. It seemed to indicate that if the central bank changed the interest rate, equilibrium would be restored in around 23 days. Overall, the results indicate a partial passage through, both immediately and in the future. This essentially

suggests that banking sector rigidities and other macroeconomic variables dampen the IRPT effects, suggesting that the expected consequences may take longer to materialize than first expected.

The third objective was to examine the CBR IRPT effects on stock market capitalization. Results showed that lowering the CBR increases stock market value via IRPT effects. The research did find a positive value, but the impact of the central bank's activities was determined to be rather small. Investment would be discouraged since stock and asset prices would rise for an increase in the CBR.

5.3 Conclusion

The study's key results are as follows. The CBR changes which are meant to affect lending rate, economic growth and even investments in the stock market capitalization have to take into account several considerations. One crucial part of the transmission systems are commercial banks. They need to do the same with the changes to the interest rates on loans. However, in certain instances this result happens and the desired outcome is never achieved.

The existence of structural breaks does not alter the short- and long-term empirical evidence of IRPT effects of CBR adjustments. In areas where the CBR has been altered, re-establishing stability typically takes about 54 days. The findings point to an imperfect transmission of the CBR's impact on the lending rate. Commercial bank do not adjust their lending in the same proportion with changes in the lending rates and especially when it comes to raising the lending rates because borrowers could easily shy off from borrowing or they could face off with riskier borrowers.

Long-run pass through did not completely reflect the impacts on real GDP, neither did short-run IRPT. Exchange rates that are positive and statistically significant are indicative of a little stimulative impact from a one percentage point increase in exchange rates. This is because high exchange rates may encourage exports, which could ultimately result in a country receiving foreign exchange. The capital items from other nations can then be purchased using the foreign currency.

The notion that a decrease in the central bank's fixed interest rate for a certain time period would lead to a decline in the stock market's market capitalization is supported by the data. This study shows that when lending rates at commercial banks climb, the stock market follows suit. A higher interest rate at which loans may be given to the public leads to a larger money supply, or more cash in people's hands. Because of this, more people will be able to invest in stocks, which will boost the stock market's total capitalization. The present study concludes that as the money supply grows, more individuals will be able to put their money to work in the stock market, leading to a rise in the value of stocks and other assets.

The study also found that in the stock market, negative perception on the investment is worse than good news on the stock price. Therefore, the investment in the assets is not lucrative due to losses being incurred in the sector due to changes in other stock prices across in the economy. This means that the stock causes loss in the assets return in the economy.

The current study (the "pass through" of the CBR) primarily examined the effects of the monetary policy rate on GDP, stock market capitalization, and interest rates. The CBR has a large and non-elastically impact on GDP and interest rates. This could be due in part to the virtually constant demand for loans from consumers.

5.4 Policy implications

The implications of these findings for monetary policymaking and framework choice are substantial. If interest rate IRPT is poor, an inflation targeting monetary framework may not be the best option. This might occur if a nation has a weak financial system or a low-income economy, both of which need more time to create and enhance transmission channels. A system using monetary aggregates, the exchange rate, or another nominal anchor as an intermediate objective may be more appropriate for this kind of nation.

The standard goal of monetary policy rate is to keep inflation rates low, often called price stability or an inflation target (a point or a range). Improved transmission is a must for every central bank that seeks to link the instruments of monetary policy with its objectives. The quicker and more powerful the transmission of a central bank's policy changes, the more straightforwardly it may achieve its aims.

It should nevertheless be underlined that the success of monetary policy can only be sustained by robust and transparent institutions such as the monetary authorities which is meant to be policy and instrument independent. Interbank rates and the money stock are two of the most important economic indicators, and the central bank's capacity to affect them relies on the health of secondary markets and the level of competition among financial institutions. Central banks that can be relied on to operate autonomously are essential for maximizing the transmission of monetary policy rates to the economy.

Banks that lack competition prevent changes in policy rates from being efficiently conveyed to client lending and deposit rates. In order to affect the arbitrage between domestic and foreign assets through the exchange rate channel, a higher level of

international integration is initially necessary. While deciding what needs to be done about lending rates in the nation, the MPC should be aware of the character and structure of commercial banks. It is crucial to change the CBR at the right time, and to adjust quickly enough to meet set goals. As a result of the lending rate's limited ability to fully transmit the policy interest rate's effects on production and inflation, this influence is necessarily limited. Nonetheless, it should be highlighted that the predicted error correction model's low degree of adjustment speed is a logical result of monetary policy's imperfect transmission impact. The high degree of concentration ratio in the Kenyan financial sector is another potential element that contributes to such a result. Another intriguing finding from this study's empirical data is that while the adjustment is statistically insignificant, the ARDL model's error correction component has the right negative sign. This may highlight the potential for a substantial adjustment cost in the banking industry.

The fact that the IRPT was discovered to be incomplete raises the possibility that monetary policy may need to be approached more actively in order to achieve the intended goals. These results could have been caused by a variety of factors, such as less developed and efficient financial markets, less competitive markets due to market imperfections, an oligopolistic system in the financial sector, and high switching costs to other sources of funds, fixed commodity prices, and asymmetric information. It's also possible that the results were distorted by the government's heavy influence over the lending and deposit markets in the banking industry.

It appears that factors other than the market influence interest rates in Kenya because the reported rates for some of the businesses rates is still low and inadequate to influence market operations. Given the lack of a co-integrating link between CBR

and lending rates, the efficacy of Kenya's monetary policy operations is open to doubt. As a result, this raises questions about the efficacy of Kenya's monetary policy. In conclusion, Kenya desperately needs a thorough examination of its current monetary policy framework, which should be followed by persistent efforts to revamp the country's banking and finance system. This examination can be undertaken by the ministry of finance and nation planning or treasury. Also the central bank monetary policy committee can help in reviewing the entire monetary policy framework.

5.5 Areas for Further Research

More attention is required for the incomplete IRPT impact and the persistence of lending rates to the central bank pass through among other banks. Lower speed and higher adjustment costs in this situation call for more consideration in future research. Also, it is necessary to determine the causes of the variations in banks' CBR IRPT rates. This would facilitate the discovery of potential explaining elements for the observed heterogeneity. A study of how common foreign currencies are used in relation to interest rates on foreign loans and deposits for various nations is also included. In order to compare effective monetary policies, this can help the local monetary authorities.

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APPENDICES

Appendix A.1: Visual Examination of Variables

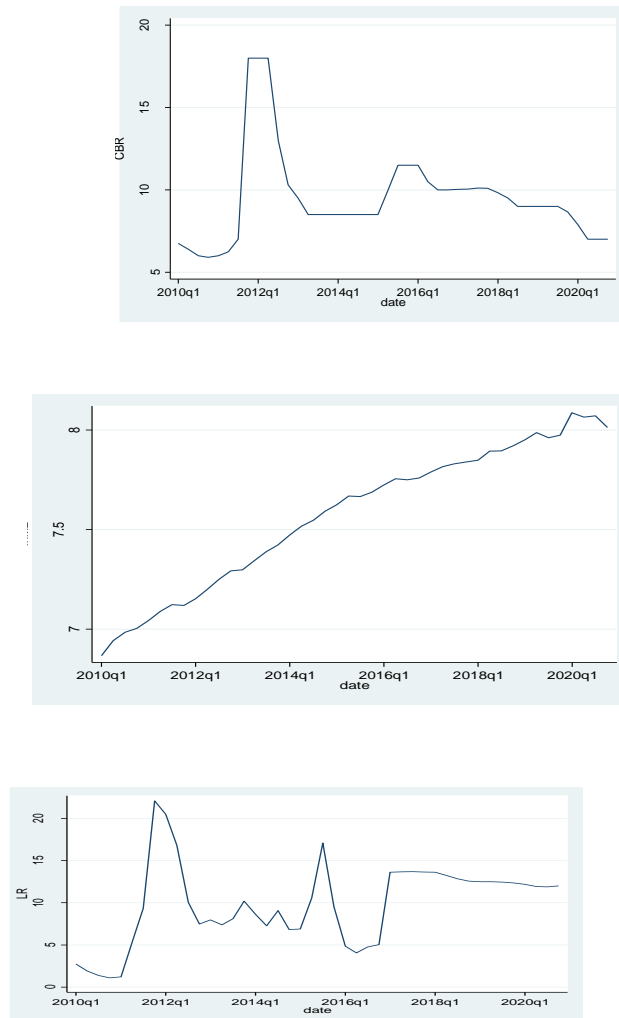


Figure A.1: Visual Examination of the Variables

Source: Author's Computations based on Study data

Appendix A.2: CUSUM of Squares Parameter Stability of Lending Rate

Function Model

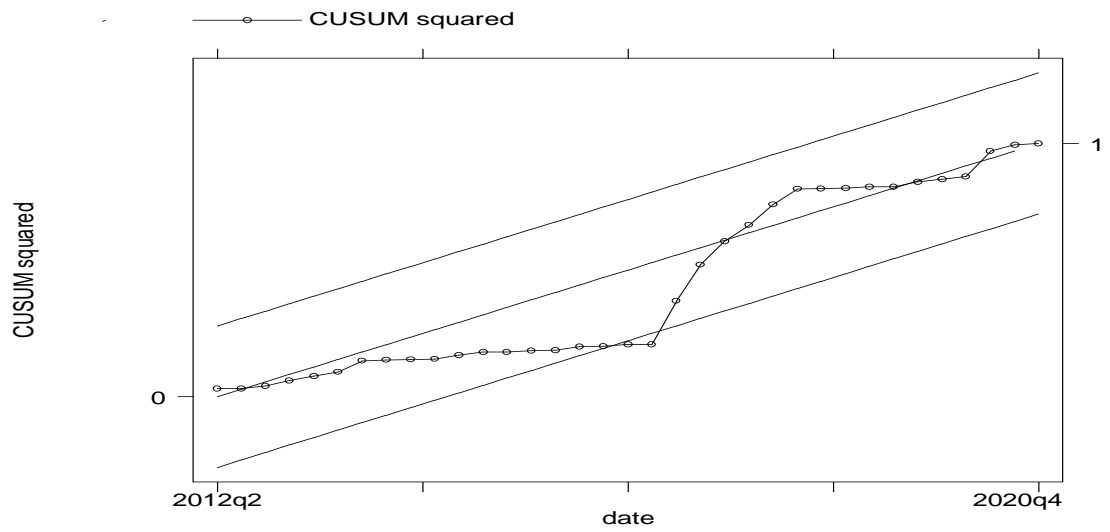


Figure A.2: CUSUM of Squares Parameter Stability of Lending Rate Function

Model

Source: Author's Computations based on Study data

Appendix A.3: Approval of Research Proposal



**KENYATTA UNIVERSITY
GRADUATE SCHOOL**

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
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P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School

DATE: 5th July, 2022

TO: Mr. David Musimbi
C/o Department of Applied Economics
KENYATTA UNIVERSITY

REF: K96/CTY/28833/14

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board at its meeting 20th June, 2022 approved your Ph.D. Research Proposal entitled "Central Bank Rate Pass through Effects on Kenya's Economic Growth, Lending Rates and Stock Market Capitalization".

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision Tracking and Progress Report Forms. The forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your thesis before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.

By copy of this letter, the Registrar (Academic) is hereby requested to grant you substantive registration for your Ph.D. studies.

Thank you.

**JACKSON LUVUSI
FOR: DEAN, GRADUATE SCHOOL**

c.c. Chairman, Department of Applied Economics
Registrar (Academic) Att; Mr. Richard Chweya

Supervisors:

1. Dr. Jennifer Njaramba
C/o Department of Econometrics & Statistics
KENYATTA UNIVERSITY
2. Dr. James Maingi
C/o Department of Applied Economics
KENYATTA UNIVERSITY

JL/cao

Appendix A.4: Research Authorization



KENYATTA UNIVERSITY
GRADUATE SCHOOL

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dean-graduate@ku.ac.ke
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P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: K96/CTY/28853/14

Date: 5th July, 2022

The Director General,
National Commission for Science, Technology & Innovation,
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. MUSIMBI DAVID - REG. NO. K96/CTY/28853/14

I write to introduce Mr. Musimbi who is a Postgraduate Student of this University. He is registered for a Ph.D. degree programme in the Department of Applied Economics in the School of Economics.

Mr. Musimbi intends to conduct research for Ph.D. thesis entitled, "Central Bank Rate Pass through Effects on Kenya's Economic Growth, Lending Rates and Stock Market Capitalization".

Any assistance given will be highly appreciated.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'E. Kimani'.

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

RM/cao

Appendix A.5: Research Permit



Ref No: 147732

RESEARCH LICENSE



This is to Certify that Mr. David Mwangi Mwachibi of Kenyatta University, has been licensed to conduct research as per the provisions of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: **CENTRAL BANK RATE PAUSE THROUGH EFFECTS ON KENYA'S ECONOMIC GROWTH, LENDING RATES AND STOCK MARKET CAPITALIZATION for the period ending: **18/March/2024**.**

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