

EFFECTS OF MONETARY POLICY ON ECONOMIC GROWTH IN KENYA**Reynold Njue Nyaga**

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ABSTRACT

Kenya's Long-term development blueprint places a high premium on macroeconomic stability as one of the key foundations to spur rapid economic growth. To maintain a stable macroeconomic environment, the government uses both monetary and fiscal policies to correct any imbalances within the economy and bring it back to equilibrium. Monetary policy is usually the first line of defense for any government in the event of any imbalance as it does not require any approval from the executive and legislative authorities. It has been used by governments and central banks as an interventionist measure, as a way to influence the level and pattern of economic activity through money supply. The central bank of Kenya formulates and implements monetary policies through various instruments aimed at influencing the quantity, cost and availability of money in the economy with the objective of promoting economic growth, maintaining stable prices & stable exchange rates, attaining full employment and achieve equilibrium in the balance of payments. Even though the central bank of Kenya implements monetary policies aimed at stimulating growth, the country still experiences sluggish economic growth. Kenya's annual growth rate has averaged 3.73% per annum from 1987-2016 which is below the envisioned growth rate of 10% per annum. The broad objective of this study is to determine the effects of monetary policy on economic growth in Kenya. The study makes use of annual time series data from 1987 to 2016 to show the effects of monetary policy on economic growth. The main findings of the study indicated that the use of monetary policy to stimulate growth was positive and significant. Monetary policy instruments such as Treasury bills and Exchange rate policy were both found to have a negative and significant relationship with economic growth. The study

found that cash reserve ratio as an instrument of monetary policy has direct and significant relationship with economic growth. The study recommends that the central bank of Kenya should use monetary policy in to intervene in the economy in case of any shocks (internal and external) that may cause an imbalance in the economy to stimulate growth but this should be complimented by other policies so as to promote growth in the long run. It also found that treasury bills, exchange rate and cash reserve ratio are viable monetary policy instruments that can used to either increase or reduce money supply in the economy.

Key words: *Broad Money Supply, Treasury Bill Rate, Exchange Rate, Cash Reserve Requirement, Economic Growth*

Background to the Study

Kenya's Long-term development blueprint places a high premium on macroeconomic stability as one of the key foundations to spur rapid economic growth. To maintain a stable macroeconomic environment the government uses both monetary and fiscal policies to correct any imbalances within the economy and bring it back to equilibrium. Monetary policy is usually the first line of defense for any government in the event of any imbalance within the economy as it does not require any approval from the executive and legislative authorities. It has been used by governments and central banks as an interventionist measure, as a way to influence the level and pattern of economic activity through money supply.

(Suleiman & Migiro, 2014) Defines monetary policy as an economic strategy taken by the government normally through the apex bank of a nation – Central Bank to influence the economy. It is geared towards creating stability in the economy and fostering economic growth which has been the quest of every nation. This is done through various monetary policy instruments that determine the quantity, cost and availability of money in the economy. The overall objective is to correct any imbalances in the economy that might slow down economic activities. The use of Monetary policy is different from government to government as each uses it to achieve certain desired goals/objective that are different from each other for example developed countries use monetary policy to stabilize and maintain equilibrium in the economy while developing countries use it to create a suitable environment for economic progress. These desired macroeconomic goals include stable prices, full employment, economic growth, stable exchange rates and achieve equilibrium in the balance of payments.

The Central Bank of Kenya is responsible for formulating monetary policy and promoting price stability in the country as stated in Article 231 of the Kenya Constitution 2010. The establishment of the Central Bank of Kenya in the Constitution was because of the need to give it autonomy devoid of any control from any individual or authority in the exercise of its powers. The central bank is responsible for ensuring a stable macroeconomic environment by formulation monetary policies that are aimed at maintaining low levels of inflation, a stable exchange rate, and low-interest rates. Under the Economic pillar of Kenya's long-term blueprint Vision 2030, Kenya aims to achieve and maintain an annual economic growth rate of 10%. To achieve this the country must formulate monetary policies that aim to maintain low levels of inflation at below 5%, stable positive real interest rates to facilitate adequate expansion of credit to the private sector to support the envisaged economic activities and a stable exchange rate. This study aims to determine the effects of monetary policy on economic growth in Kenya.

Statement of the Problem

Monetary policy is used to influence the level and pattern of economic growth by influencing the quantity, cost and availability of money in an economy. The Central bank of Kenya is solely

responsible for formulating and implementing of monetary policy in the country with the aim of ensuring a conducive environment for growth such as a favorable balance of payments, stable prices, employment and low-interest rates.

Kenya's long-term economic blueprint "Kenya Vision 2030" recognizes the importance of a stable macroeconomic environment as a necessary condition to achieve economic growth. To achieve this, prudent monetary policies must be pursued by the Central Bank of Kenya (CBK) to ensure the economy is operating in a favorable environment that promotes growth, poverty reduction, and employment. The average GDP annual growth rate of Kenya averaged 3.73 percent from 1987 until 2016 which is below the targeted Gross Domestic Product (GDP) growth rate of 10 % per annum as specified in Kenya's long-term economic blueprint. The low rate of economic growth shows that the monetary policies being pursued have not been effective in achieving their objectives. This may be attributed to the shortcomings of the monetary policy instruments used by CBK limiting its ability to effectively maximize its policy objective. (Onderi, 2015) in his study found that even though the central bank of Kenya formulates and implements policies that are aimed to achieve the objective of fostering economic growth it has not been able to ensure a conducive environment for growth since the country has been experiencing sluggish growth and high levels of inflation implying that there is still a point of disconnect between what Central bank of Kenya Pursues and the outcome of the objectives.

This should be a concern for the monetary authorities since an effective monetary policy regime has the ability to influence the level of growth of any economy. If monetary policies pursued by the CBK are not effective then the targeted level of inflation of below 5% and double digit economic growth of 10% as envisioned in our long-term blueprint "Vision 2030" may not be achieved. This study seeks to investigate the effects monetary policies on economic growth in Kenya and provide information to the monetary authorities on which policy instruments are more effective in fostering growth in Kenya.

Specific Objectives

1. To establish the effect of broad money supply on economic growth in Kenya.
2. To establish the effect of Treasury bill rate on economic growth in Kenya.
3. To establish the effect of exchange rate on economic growth in Kenya.
4. To establish the effect of cash reserve ratio on economic growth in Kenya.

LITERATURE REVIEW

Classical Approach: Quantity Theory of Money

The quantity theory of money is a classical theory that related the amount of money in the economy to nominal income. This theory states the changes in the quantity of money tend to affect the purchasing power of money inversely, That is, with every increase in the quantity of money, the unit of money tends to buy a smaller quantity of goods and services while a decrease in the quantity of money has the opposite effect.

The Quantity Theory of Money (QTM) was formulated by economists Irvin Fisher and Cambridge Economists Arthur C. Pigou and Alfred Marshall. Fisher formulated the most common version of QTM known as the Fishers theory of demand for money which laid emphasis on the medium exchange function of money. This theory is given by the equation of exchange; $MV=PT$ Where M is the quantity of money in circulation, V is the Velocity of money circulation, P is the price level and T is the number of transactions. The equation of exchange is an identity which states that the current market value of all final goods and services (nominal

GDP) must equal the supply of money multiplied by the average number of times a shilling is used in transactions in a given year.

Keynes's Theory of Demand for Money

This theory is also known as the liquidity preference theory and was developed by an economist known as John Maynard Keynes. The theory suggests that individuals demand money because of its perfect liquidity characteristic. Keynes rejected the classical economist view that V is constant. Keynes believed that money demand was given in terms of liquidity preference and the demand for money was due to three motives i.e. The transactions motive, precautionary motive and speculative motive.

Transaction Motive

Keynes agreed with the classical theory that money is used as a medium of exchange. So people's demand for money is for the purpose of transactions; and as income rises, people have more transactions and will hold more money. It relates to money demand for the current transactions of individuals and firms. Individuals demand money in order to bridge the interval between receipt of income and expenditure. A certain amount of money is thus kept in hand to make current expenditures.

Money demand for this motive will depend upon the size of an individual's income, the interval at which income is received and the method of payment prevailing in the economy. According to Keynes money demanded for this function depends on Y/p (Real income) and is not influenced by the interest rate.

Precautionary Motive

It refers to the desire of people to hold cash for unforeseen contingencies. People hold a certain amount of money to provide for contingencies requiring sudden expenditure (unemployment, sickness etc.) and for unforeseen opportunities of advantageous purchase. The amount of money demanded for this motive depends on the type of individual and the condition in which he lives. Since the amount of money held depends on the amount of transactions people expect to make, money demand is again expected to rise with income.

Speculative Motive

Keynes suggested that people also hold money as a store of wealth. Because wealth is tied closely to income, the speculative motive for money demand is related to income. Keynes assumed that people stored wealth with either money or bonds. This motive is based on the desire by an individual to have his resources in liquid form so as to take advantage of future changes in bond prices in order to make speculative gains in the market due to the fluctuating nature of bond prices.

When interest rates are high, the future rate would then be expected to fall and bond prices would be expected to rise. So bonds are more attractive than money when interest rates are high. When interest rates are low, they then would be expected to rise in the future and thus bond prices would be expected to fall. So money is more attractive than bonds when interest rates are low. At lower rates less is lost by not investing money while at higher current rates holders of money will lose more by not investing. Therefore this motive is a reducing function of the rate of interest. So under the speculative motive, money demand is negatively related to the interest rate.

Friedman Theory of Money Demand

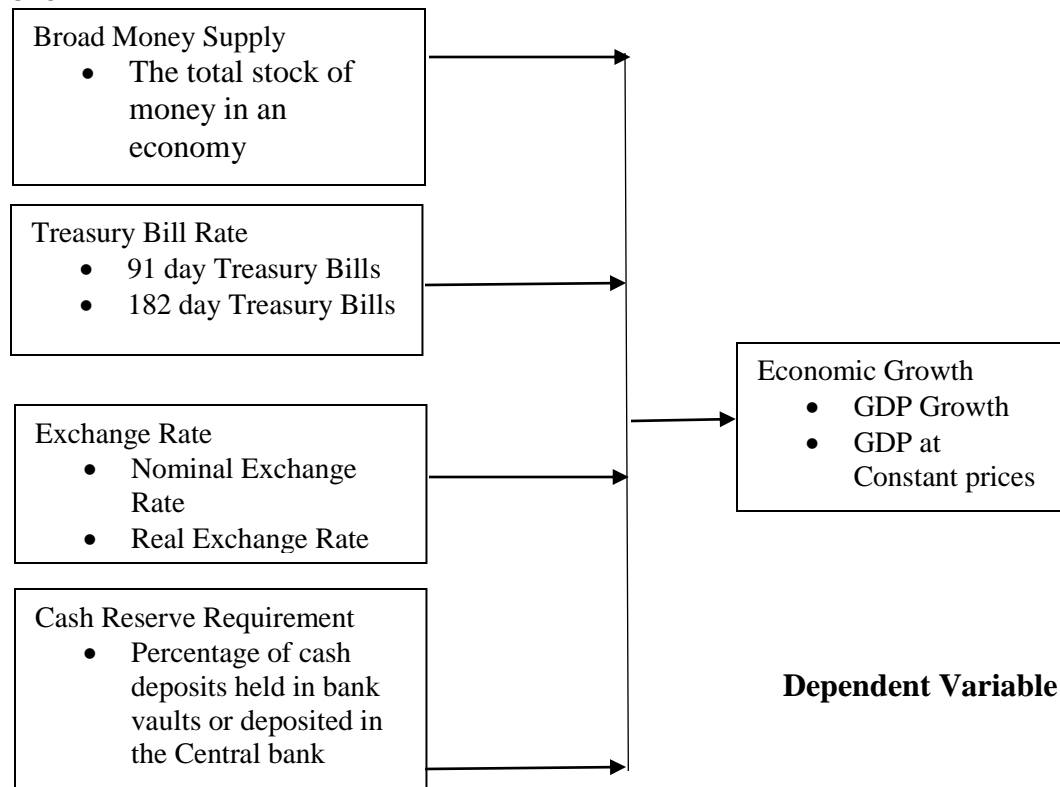
A noted monetary economist, Milton Friedman put forward a money demand function which played an important role in the determination of prices. He stated that the Money demand is influenced by the same factors that influence the demand for any asset. He treated money as one type of an asset in which wealth holders can keep a part of their wealth. He believed that money like any other capital good yield returns. The theory of asset demand indicates that the demand for money should be a function of the resources available to individuals (their wealth) and the expected returns on other assets relative to the expected return on money.

Friedman argued that since money might be demanded for reasons other than anticipated transaction, it can be held in different forms such as money, bonds, equities, physical goods and human capital. Each form of this wealth has a unique characteristic of its own and a different yield. These effects will ultimately increase aggregate money demand and expand output.

Conceptual Framework

A conceptual framework is defined as a visual or written product one that “explains, either graphically or in narrative form, the main things to be studied, the key factors, concepts, or variables and the presumed relationships among them” (Miles & Huberman, 1994). A conceptual framework identifies the research variables to be studied and the relationship between the dependent and independent variables. It highlights the researcher’s understanding of how the particular variables in his study connect with each other. This study uses Gross domestic product as its dependent variable and Broad money supply, Treasury bill rate, exchange rate and Cash reserve requirement as the independent variables as shown in Figure 1 below.

Conceptual Framework



Independent Variable

Broad Money Supply (M2)

Money supply is defined as the total stock of money in an economy at any given time. Money supply is measured using M0, M1, M2, M3 and M4. The Central Bank of Kenya (CBK, 2016) defines M1 as including coins and notes circulating in the economy and other money equivalents easily convertible into cash. M2 includes M1 and short time deposits in banks and 24-hour money market funds. M3 consists of M2 and includes longer-term time deposits and money market funds with more than 24 – hour maturity. M1 is also referred as narrow money while broad money describes M2 and M3.

This study uses broad money M2 as one of the variables that determine economic growth. The money supply growth in Kenya is given by the annual percent increase in M2, also known as 'broad money' or 'money plus quasi-money'. The M2 measure includes the money in circulation as well as bank deposits such as checking, time, and savings accounts. This is a good measure of the money supply and is the economic indicator usually used to assess the amount of liquidity in the economy, as it is relatively easy to track.

Treasury Bills

The Treasury Bills are debt obligations issued by the Central Bank of Kenya, on behalf of the Kenya Government for 3 months at either a discount or face value, at a competitive auction on a weekly basis. The difference between the discounted price and the face value determines the yield/ interest earned. The yield on 91-day Treasury bills is the average 91-day discount rate. It is used by lenders to adjust interest rates on loans and corporate bonds as economic conditions change. When the rate goes up, interest rates on any loans or corporate bond tied to it also go up. (CBK, 2016)

Buying and selling government treasury bills allows the central bank to control the supply of reserve balances held by banks, which helps the bank to increase or decrease short-term interest rates as needed. When the central bank of Kenya buys government securities they increase the amount of reserves held in banks thereby increasing the amount of money that commercial banks have available to lend. The banks will lower their interest rates in order to attract borrowing customers and vice versa.

Nominal Exchange Rate

The exchange rate is defined as the price of one currency in terms of another. Exchange rate policy is used as an indirect monetary policy instrument geared towards achieving stable prices and a favorable balance of payment. Central banks can either buy or sell their foreign reserves in the foreign exchange market in order to increase or decrease money supply in the economy.

This study uses the nominal exchange rate as one of its dependent variable. The nominal exchange rate is the actual currency exchanged for another foreign currency. In this case, the study uses the nominal exchange rate between the Kenyan shilling and the US dollar. The exchange rate between the dollar and the shilling is used since the dollar is the generally accepted currency used for international trade.

Cash Reserve Ratio (CRR)

Cash Reserve Ratio (CRR) is a minimum fraction of total customer deposits which commercial banks have to hold as reserves in either cash in their vaults or deposits with the central bank. Commercial banks in Kenya are required by law to keep a specified proportion of their total deposits at the Central Bank. This proportion of deposits is called the Cash Reserve Ratio (CRR) and they are held as non-interest bearing deposits by the central bank. When the Central Bank needs to significantly adjust the amount of money in the market, it can increase or decrease the ratio. The CRR is currently set at 5.25 percent of the total of a bank's domestic and foreign currency deposit liabilities.

The central bank of Kenya (CBK) uses the reserve requirement as a tool for monetary policy to either raise or lower the monies available to commercial banks to give out as loans. If the reserve requirement is raised, banks will have less money to loan out and this effectively reduces the amount of capital in the economy, therefore lowering the money supply. It will mean less money for investment and spending and would stunt the growth of the economy. (Tradimo, 2016).

Economic Growth

Economic growth is the increase in the market value of the goods and services produced by an economy over time. It used to measure how well a country's economy is doing over a period of time. Monetary policy is implemented with the aim of ensuring a favorable economic environment so that economic growth is realized.

Economic growth is measured by the annual Gross Domestic Product, which measures the market value of all final goods and services produced in an economy over a certain period of time. Classical economists believed that use of monetary policy has no effect on GDP growth but will only affect price level, while the Keynesian economist believes that monetary policy will affect GDP growth through the multiples process of interest rates and the Monetarist believe that monetary policy will affect GDP growth in the short run but in the long run only prices will be affected. This study tries to identify the effects of monetary policy on the annual percentage GDP growth of Kenya.

RESEARCH METHODOLOGY

Research Design

The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data (De Vaus, 2001) (William, 2006). Designing a study helps the researcher to plan and implement the study in a way that will help the researcher to obtain intended results, thus increasing the chances of obtaining information that could be associated with the real situation (Burns & Grove, 2001). The method that will be used in this study is longitudinal research design. Longitudinal research design is an observational research method in which data is gathered from the same subjects repeatedly over a period of time with the aim of identifying a correlation among the various variables. The study will use quarterly time series data from 2001-2015 to investigate the effects of monetary policy on economic growth which will be measured by establishing causal relationship between monetary policy tools and economic growth.

Target Population

A population is a well-defined collection of individuals or objects known to have similar characteristics. It consist of the total number of all items under study that we make inferences from. The population in this study spans from 1966 when the central bank of Kenya (CBK) was established to 2015. All Data that relates to GDP, Money supply, Treasury bill rate, and Exchange rate and Cash reserve ratio from 1966- 2015 represent the target population.

Sampling Techniques

This study employed the use of sample for this study. This process involved selecting a portion of the entire population to represent the entire population. The sample chosen was done deliberately to capture the effects of monetary policy on economic growth after the year preceding the change of government which allowed the central bank of Kenya the autonomy to operate monetary policy without the influence of executive. Quarterly time series data on the variables will be collected from the year 2001- 2015. This period will be long enough to capture effectively how monetary policy affects economic growth.

Data Collection

This study will use secondary data from various government agencies such as the Central Bank of Kenya (CBK) and Kenya National Bureau of Statistics (KNBS) economic surveys. (Kothari & Gurav, 2014) Stated that secondary data should only be used in research only when the data is reliable, suitable and adequate. This study will use quarterly secondary data on GDP, Money supply (M_2), Treasury bill, Exchange rate and Cash reserve requirement. Authenticated quarterly data will be collected over a 15-year period from 2001 to 2015.

Data Analysis

The raw data will be analyzed using descriptive statistics to describe the basic features of the data. These results will be summarize and presented using simple graphs and tables which will form the basis for quantitative analysis of data.

Pre- estimation tests will be conducted to test the credibility and reliability of the data. The test for multicollinearity and unit root test using the augmented dickey fuller test (ADF) and Phillip Perron test will be conducted. Unit roots test determine the order of integration of a series being considered using the Augmented Dickey-Fuller (ADF) test. The ADF test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationarity. Post estimation tests will also be conducted on the data, whereby the Jarque-Bera test will be conducted to test for normality; while a test for heteroskedasticity shall be conducted to ensure validity of the test based on white – noise errors in the regression model by ensuring that the errors are indeed white noise.

Co-integration is the existence of long-run equilibrium relationship between variables. Co-integration solves the problem associated with de-trending or by attempts to address the non-stationarity through differencing. The study used the 2 step Engle- Granger co-integration test to test whether the variables have a long run equilibrium relationship. Presence of Co-integration among variables establishes the existence of an error correction mechanism (ECM) in the model. ECM will be used to determine the short-run relationship between the various components of monetary policy on economic growth.

The data will be analyzed using *EViews* software. E views offers a set of tools for building and solving simultaneous models in general. It is an excellent interactive program, which provided an excellent tool for use in detailed data analysis particularly in developing and evaluating models,

conducting residual analysis and testing various hypotheses (Agung, 2009). The data will be presented in simple graphs and tables, descriptive statistics for ease of understanding.

RESEARCH FINDINGS

Introduction

This chapter presents the analysis and findings of the study as set out in the study objectives. The analysis is presented in descriptive statistics, pre-estimation and post-estimation test and finally the model adopted to achieve the study objectives.

Descriptive Statistics

The study conducted descriptive statistics analysis as way to establish the basic features of the data. A summary of the statistics is presented in table 1 below which shows the mean, standard deviation maximum and minimum statistics.

Descriptive Stats

	GDP	M2	TBILL	ER	CRR
Mean	3.733333	0.612612	13.07800	64.58283	8.200000
Median	4.600000	0.329734	10.95000	72.64865	6.000000
Maximum	7.000000	2.342624	39.34000	101.5000	20.00000
Minimum	-0.200000	0.001163	1.400000	16.51500	4.500000
Std. Dev.	2.127704	0.697043	7.737739	23.89971	4.630018
Observations	30	30	30	30	30

From the table 2 above Kenya's average growth rate during the period under study was 3.73 percent. The maximum growth rate during this period was 7 percent and minimum growth was -0.2. Broad money supply had a mean of 0.61 billion and its maximum and minimum value during the period was 2.3 and 0.001 billion respectively. The treasury bill rate averaged 13.1 percent with its highest rate being 39.34 percent and lowest being 1.4 percent. The Kenya shilling averaged 64.6 against the dollar with the maximum and minimum exchange rate being 101.5 and 16.52 respectively. The Cash reserve ratio had an average of 8.2 percent with the maximum and minimum value of the CRR being 20 and 4.5 during the study period.

The standard deviations of all the variables from 1987 to 2016 were 2.13, 0.697, 7.74, 23.8 and 4.63 for GDP, M2, TBILL, ER and CRR respectively.

Pre-Estimation Tests

Pre-estimation tests such as unit root test and test for multicollinearity were conducted on the data to avoid the results of spurious regression from being obtained.

Test for Multicollinearity

Multicollinearity exists when there is a high correlation among two or more explanatory variables. According to (Alin, 2010) multicollinearity may cause serious difficulty with the reliability of the estimates of the model parameters. It leads to skewed or misleading results when analyzing a series of data with multiple independent variables. This study conducted a test for multicollinearity on the variables as shown in the table 3 below.

Correlation Matrix

	GDP	M2	TBILL	ER	CRR
GDP	1	0.45416	-0.38312	0.07353	-0.27066
M2	0.45416	1	-0.44082	0.75057	-0.41002
TBILL	-0.38312	-0.44082	1	-0.32737	0.43946
ER	0.07353	0.75057	-0.32737	1	-0.15305
CRR	-0.27066	-0.41002	0.43946	-0.15305	1

Unit Root Test

Most macroeconomic time series data exhibit trending behavior or non-stationarity implying that they have a mean, variance and covariance that changes overtime which violates the assumption that variables in a classical linear regression models should have a constant mean, variance and the covariance of two time periods should be equal to zero. If these assumptions are violated then regressing the variables without testing for stationarity will lead to the problem of spurious regression. To avoid this unit root test was conducted using the Augmented Dickey Fuller (ADF) test and Phillip Perron test (PP) to test for stationarity or non stationarity of the variables. Table 4 below shows the summary of the ADF test and PP test which tested the null hypothesis of presence of unit root test. The test results rejected the null hypothesis of presence of unit root (non-stationarity) at first difference. The variables GDP, M2, TBILL, ER and CRR all became stationary at first difference meaning they are integrated of order one.

Unit Root Test

Variable	ADF test			PP Test		
	Intercept	Trend and intercept	integration order	Intercept	Trend and intercept	integration order
GDP	-4.7122***	-4.6939***	I(1)	-5.17427***	-6.1388***	I(1)
M2	--6.0580***	-6.0732***	I(1)	- 6.05499***	-6.0699***	I(1)
TBILL	-9.9289***	-4.1457**	I(1)	-9.92892***	-9.7576***	I(1)
ER	-7.9875***	-7.9394***	I(1)	-8.03912***	-8.2919***	I(1)
CRR	-4.7770***	-4.7447***	I(1)	-4.75186***	-4.7435***	I(1)

***, ** and * imply rejection of the null hypothesis at 1%, 5% and 10% levels of significance respectively

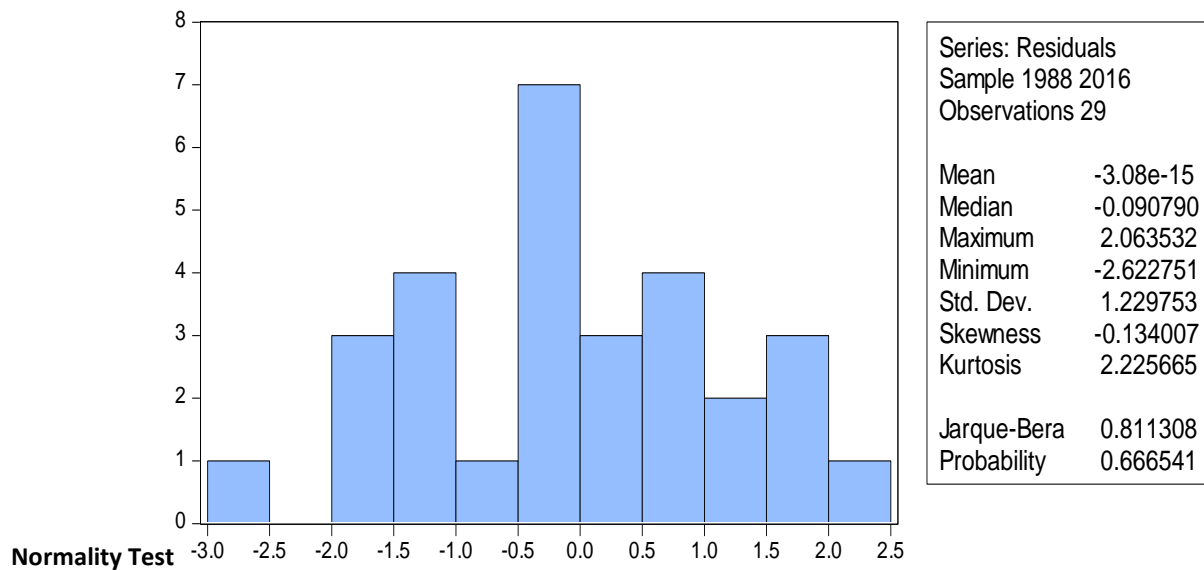
Since all the variables are integrated of order we use the Engle Granger test for Co-integration test and the Error Correction Model (ECM) to determine the short run and long run relationship of economic growth and money supply.

Post Estimation Test

To ensure that the ordinary least square assumptions were not violated the study conducted a test for normality, heteroskedasticity and autocorrelation.

Test for Normality

Classical ordinary least square assumptions posit that the residuals (error term) in the model should be normally distributed. To test for normality in the error term the study used the Jarque-Bera test which gives a more conclusive result than the graphical approach. The null hypothesis that the error term is not significantly different from normal was tested and the results of the Jarque-Bera test are shown in figure 1 below. Since the P- value of 0.66 is greater than the conventional 0.5 we accept the null hypothesis that the error term has a normal distribution which obeys the ordinary least square assumption.



Test for Heteroskedasticity

A test for heteroskedasticity was conducted using the Breusch-Pagan-Godfrey test to determine whether the residuals of the regression model are heteroskedastic. Ordinary least square assumptions require that residuals of a regression model have a constant variance (homoskedastic). The Breusch-Pagan-Godfrey test was used to test the null hypothesis that the residuals have a constant variance i.e. they are homoskedastic. The result from the table 4 below indicate that the P-value of 0.64 was greater than the critical value thereby accepting the null hypothesis that the residuals have a constant variance (homoskedastic) thereby obeying the OLS assumption.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.754542	Prob. F(8,20)	0.6450
Obs*R-squared	6.723442	Prob. Chi-Square(8)	0.5667
Scaled explained SS	1.959735	Prob. Chi-Square(8)	0.9822

Test for autocorrelation

The study also conducted a test for autocorrelation to determine whether the residual are correlated across time. The Breusch-Godfrey Serial Correlation LM Test was used to test the null hypothesis that the no first order serial/auto correlation exists. Since the P-value 0.59 is greater than the test statistic at 5% level of significance we accept the null hypothesis that there is no serial autocorrelation of any order.

Table 1: Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.775669	Prob. F(2,18)	0.4752
Obs*R-squared	2.301061	Prob. Chi-Square(2)	0.3165

Regression Results**Regression between GDPG and broad money supply (M2)**

A regression analysis between GDP growth and broad money supply was carried out to find out the effects of money supply on economic growth. The table below presents the findings of the analysis. The results show that Broad money supply has a significant effect on economic growth since the P- value of 0.00117 is less than the critical values at 0.05 level of significance. The results also show that the broad money supply has positive effect on growth implying that a unit increase in moneys supply will lead to 1.39 increase in economic growth. This is represented in the following model:

$$Y = 2.88 + 1.386M2$$

The R-squared of 0.20 implies that broad money supply explained 20% of variation in economic growth meaning 80% of growth is explained by other factors.

Dependent Variable: GDP

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2	1.386335	0.513937	2.697482	0.0117
C	2.884048	0.472421	6.104826	0.0000
R-squared	0.206268			
Adjusted R-squared	0.177921			
F-statistic	7.276411			
Prob(F-statistic)	0.011698			

Regression between GDPG and Treasury Bill (T bill) rate

To determine the effects of Treasury bill rate on economic growth a regression analysis was carried out and the results presented below. The results show that T-bill rates is significant determinant of economic growth as shown by the P-value of 0.0366 that is less than the critical value at 5% level of significance. The coefficient of determination has a negative sign meaning that a unit increase in the Treasury bill rate will lead to a decrease in growth by 0.105 units as shown in the model below.

$$Y = 5.11 - 0.105Tbill$$

The R squared of 0.14 implies that Treasury bill rate explains 14% of variations of economic growth and 86% of growth is explained by other factors.

Dependent Variable: GDP

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBILL	-0.105350	0.048001	-2.194760	0.0366
C	5.111102	0.726242	7.037742	0.0000
R-squared	0.146783			
Adjusted R-squared	0.116311			
F-statistic	4.816972			
Prob(F-statistic)	0.036638			

Regression between GDPG and Exchange Rate

To determine the effects of exchange rate on economic growth regression analysis was done and the results are presented in the table below. From the analysis the results show that exchange rate

has insignificant effects on economic growth as the P value of 0.699 is greater than the critical value at 10% level of significance. The model of the analysis is shown below.

$$Y = 3.31 + 0.001Er$$

The R square of 0.001 implies that exchange rate does not explain any variation of economic growth.

Dependent Variable: GDP

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ER	0.006546	0.016779	0.390158	0.6994
C	3.310548	1.153124	2.870940	0.0077
R-squared	0.005407			
Adjusted R-squared	-0.030114			
F-statistic	0.152223			
Prob(F-statistic)	0.699372			

Regression between GDPG and Cash Reserve Ratio

A regression analysis was carried out to determine the effects cash reserve ratio on economic growth and the results are presented below. The results show that cash reserve ratio has significant effect on economic growth at 10% level of significance which is equal to the P value of 0.1. Economic growth and cash reserve ratio have a negative relationship meaning that a unit increase in the cash reserve ratio will lead to a decrease in growth by -0.12 as shown in the model below.

$$Y = 4.75 - 0.12Crr$$

The R squared of 0.1 shows that cash reserve ratio explains only 10% of variations of economic growth and 90% of growth is explained by other factors.

Dependent Variable: GDP

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.124382	0.083604	-1.487742	0.1480
C	4.753263	0.784111	6.061975	0.0000

R-squared	0.073258
Adjusted R-squared	0.040160
F-statistic	2.213375
Prob(F-statistic)	0.147995

The General Model

The relationship between the dependent variable (GDPG) and independent variables M2, TBILL, ER and CRR was estimated in the context of the distributed lag models. This was because the variables in the study have properties of time series (non-stationary) and therefore the distributed lag model would help in predicting the current values of the dependent variable based on the current values of the explanatory variables and the lagged/past values of the explanatory variable. In order to ensure that the model was well specified optimal lag length for each variable was determined using the Akaike Information Criterion (AIC) and Schwartz Bayesian Information Criterion (SBIC). The estimated general model is presented in the table 8 below

General Model

Dependent Variable: GDP

Sample (adjusted): 1988 2016

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.427580	1.487580	4.993064	0.0001
M2	3.988289	4.121468	0.967686	0.3448
M2(-1)	-1.203738	4.625732	-0.260227	0.7973
TBILL	0.060157	0.071813	0.837692	0.4121
TBILL(-1)	-0.230409	0.062659	-3.677215	0.0015
ER	-0.179782	0.060460	-2.973569	0.0075
ER(-1)	0.111037	0.062834	1.767151	0.0925
CRR	0.188441	0.184770	1.019868	0.3200
CRR(-1)	-0.000464	0.132018	-0.003515	0.9972

R-squared	0.673971
Adjusted R-squared	0.543559
F-statistic	5.168031
Prob(F-statistic)	0.001358

To determine whether the general model was the best fit model, the study estimated the residuals of the model which confirmed presence of structural breaks in the model. Therefore in order to obtain the best fit long run model further estimation was done which showed that structural

breaks occurred in the years 2002 and 2003. To obtain the best fit long run model these years were included as dummies in the model to account for the breaks as shown in table 9 below.

Estimated Long- Run Model

Dependent Variable: GDP

Sample (adjusted): 1988 2016

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.813499	1.047185	8.416369	0.0000
M2	3.281529	0.590524	5.556980	0.0000
TBILL(-1)	-0.299155	0.051086	-5.855890	0.0000
ER	-0.236417	0.039262	-6.021511	0.0000
ER(-1)	0.151382	0.033552	4.511837	0.0002
CRR	0.336434	0.083696	4.019721	0.0006
D2002	-3.175334	1.181678	-2.687139	0.0138
D1993	5.053531	1.732190	2.917423	0.0082
R-squared	0.802003			
Adjusted R-squared	0.736004			
F-statistic	12.15173			
Prob(F-statistic)	0.000004			

The long run estimation indicates that the model fits the data well as evidenced by the value of the R-squared which is 80 percent and with a p- value of 0.000. The estimated long-run model above shows that in the long-run the money supply (M2) has a positive and significant relationship with economic growth. The coefficient of money supply is positive and significant implying that a unit increase in money supply in the long-run will lead to an increase in GDP by 3.2 in the long run. The results imply that in the long-run, increase in liquidity in the economy will lead to positive growth. These results agree with the findings of (Onyeiwu, 2012) (Gul, Dr. Mughal, & Dr Rahim, 2012) and (Nouri & Samimi, 2011) which found money supply to have a positive and significant relationship with economic growth.

The results of the lagged Treasury bill rate has a negative but significant relationship with economic growth. This implies that the previous year's Treasury bill rate has a negative and significant effect on the current rate of economic growth implying that an increase in the previous year's Treasury bill rate by one unit will lead to decrease in economic growth by 0.299 units in the current year.

The exchange rate which is measured as the rate of exchange of the Kenya shilling to the US dollar had results that showed a negative but significant relationship to economic growth. The coefficient of the exchange rate implied that a unit increase in the rate of exchange of Kenya shilling to the US dollar leads to 0.236 decrease in economic growth in the long run. The results

agree with the findings of (Fasanya, Onakoya, & Agboluaje, 2013) and (Alavinasab, 2016) who found that exchange rate has significant effects on economic growth.

The variable of the cash reserve ratio had a positive and significant relationship with economic growth. The coefficient of the CRR had a positive sign which implied that whenever there was a unit increase in the reserve requirement economic growth increased by 0.33 units in the long run. The results agree with the findings of (OH, 2009)

The year 2002 and 1993 were included as dummy variables in the long run model. The year 1993 Kenya economic growth was positive due to the liberalization of the Kenyan economy by implementing the structural adjustments programme of the IMF and World Bank. The conduct of monetary policy was under a flexible exchange rate and direct controls of prices and interest rate were abolished leading effective monetary policies by CBK that encouraged growth recovery.

The year 2002 Kenya had a slowdown in economic growth as shown by the negative sign of the coefficient mainly due to uncertainties relating to the general elections that was held during that year. This is attributed to the uncertainties by investors about the outcome of the election that leads to investors unwilling to invest or their withdrawal from the Kenyan market until after the elections.

Co integration Test

Engel Granger Two-step Co integration test

The study conducted a test for co-integration using the 2-step Engel-Granger test for co-integration. The test procedure involves running an estimated relationship of the variables to generate its residuals and then use the augmented dickey fuller test to test for stationarity of the residuals. The results from the ADF test of the residuals at intercept and trend are stationary at 10% level of significance as shown in table 5 below. Since the residuals are stationary it means the variables are co-integrated therefore they have a long run equilibrium relationship.

Engel Granger test for Co integration

Variable	Trend	Test Statistics	Engel Granger Critical Values @ 5%	Engel Granger Critical Values @ 10%	Results
Residuals	Intercept	-4.53889	-3.34	-3.04	S
Residuals	Trend and Intercept	-4.929156	-3.34	-3.04	S

Error Correction Model

The short run model was estimated using the error correction model as shown in Table 8 below.

Error

Correction

Model Results

Dependent Variable: D(GDP)
Sample (adjusted): 1989 2016
Included observations: 28 after adjustments

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
The coefficient of broad money supply is negative but not significant as it P value is greater than the critical value at	C	0.630492	0.468459	1.345883	0.1920
	D(M2)	-0.229951	3.184303	-0.072214	0.9431
	D(TBILL)	0.119113	0.062490	1.906122	0.0698
	D(ER)	-0.183411	0.065420	-2.803584	0.0104
	D(CRR)	0.010238	0.122728	0.083418	0.9343
	RESID01(-1)	-0.701531	0.388318	-1.806588	0.0845
	R-squared	0.327986			
	Adjusted R-squared	0.175255			
	F-statistic	2.147481			
	Prob(F-statistic)	0.097458			

10%. Therefore money supply does not affect economic growth in the short run.

The coefficient of Treasury bill rate is positive and significant at 10% level of significance. This implies that the Treasury bill rate has positive effect on economic growth in the short run. That is a unit increase in the Treasury bill rate in the short run will lead to 0.12 unit increase in economic growth.

In the short run exchange rate has a negative and significant relationship with economic growth. The coefficient of exchange rate has a negative sign implying that a unit increase in the exchange rate leads to decrease in economic growth by 0.18 units in the short run.

The cash reserve ratio has a positive and insignificant effect on economic growth in the short run as it is P- value is greater than the critical value at 10% level of significance.

The speed of adjustment to the equilibrium growth as measured by the error correction term RESID01 (-1) had the expected negative sign and was significant at 10% level of significance. The coefficient of the RESID01 (-1) is -0.70 implying that the speed of adjustment to the equilibrium growth level is 70% in each time period. It implies that the system corrects the previous period disequilibrium at a speed of 70% annually.

Recommendations

From the empirical results of the study, several policy recommendations can be drawn that would help in the formulation and implementation of monetary policy in Kenya. These recommendations are based on the objectives of the study that sought to determine the effects of monetary policy on economic growth.

Money Supply- The study established that money supply in the economy has a positive and significant relationship with economic growth but only in the long run. Money supply is controlled by the central bank of Kenya through the use of various instruments as means of creating stability in the economy and promoting growth. From the study since money supply has positive impact on growth it is necessary for the CBK to formulate and implement monetary policies that aim at increasing the money supply in the long run in order to boost economic growth.

Treasury Bills- The use of treasury bills as a monetary policy instrument was found to be significant with a negative relationship with economic growth in the long run. The study established that CBK can use treasury bills to either increase or decrease money supply in the economy though indirectly through interest rates. When the CBK wants to reduce the amount of money in circulation it can sell treasury bills in the open market which will lead to a reduction in prices of treasury bills due to increased supply and an increase in the rate of interest of treasury bills. Whenever Treasury bill rate increases it will lead to an increase in interest rates in the economy thereby making credit/loans expensive and hence limiting the number of investors willing to take up loans. Treasury bills can be used by the Central Bank of Kenya to reduce the amount of money in circulation especially when there is excess liquidity in the economy that may cause instances of inflation and eventually slow down growth.

Exchange Rate- The use of exchange rate is an indirect monetary policy instrument that the Central Bank of Kenya can use to control money supply in the economy. From the study exchange rate was found to have a negative and significant effect on economic growth. Since Kenya is an open economy that engages in international trade the central bank must ensure that the country has a stable exchange rate in order to promote trade and economic progress. This is done through purchase of sufficient foreign reserves by the CBK to help sustain the Kenya shilling against external shocks. The central bank of Kenya can increase or decrease the amount of money in circulation by either purchasing or selling dollars in the foreign exchange market. The central bank must ensure that we have enough foreign exchange reserves to cushion the country from external shocks that may destabilize the exchange rate and lead to slow economic growth.

Areas of Further Research

A more rigorous analysis can be done by increasing the study period to determine whether these results will hold. For future empirical work it would be important to focus the analysis on both monetary and fiscal policies as they are both important government policies that complement each other. An introduction of fiscal policy variables in the model is essential as it will provide a more comprehensive analysis.

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