THE EFFECTIVENESS OF MONETARY POLICY IN CONTROLLING INFLATION IN NIGERIA

BY

SALIHU TIJJANI YUSUF

BU/17C/BS/2728

DEPARTMENT OF ECONOMICS

FACULTY OF MANAGEMENT AND SOCIAL SCIENCES

BAZE UNIVERSITY, ABUJA.

SEPTERMBER,2020

THE EFFECTIVENESS OF MONETARY POLICY IN CONTROLLING INFLATION IN NIGERIA (1981-2019)

BY

SALIHU TIJJANI YUSUF

BU/17C/BS/2728

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc.) DEGREE IN ECONOMICS

TO THE

DEPARTMENT OF ECONOMICS,

FACULTY OF MANAGEMENT AND SOCIAL SCIENCES

BAZE UNIVERSITY, ABUJA

SEPTEMBER, 2020

DECLARATION

I hereby declare that this project titled “The Effectiveness of Monetary Policy in Controlling Inflation in Nigeria” has been undertaken by me under the supervision of Dr. Abbas Abdullahi Marafa of the Department of Economics, Baze University, Abuja. I further certify that this work has not been previously submitted for the award of a degree or certificate elsewhere. All ideas and views are products of my research. Where the views of others have been expressed, they have as well been duly acknowledged.

Salihu Tijjani Yusuf **Date**
BU/17C/BS/2728

CERTIFICATION

This is to certify that this research work "The Effectiveness of Monetary Policy in Controlling Inflation in Nigeria" by Salihu Tijjani Yusuf, BU/17C/BS/2728 meets the regulation governing the award of degree of B.sc Economics in Baze University, Abuja, Nigeria.

Dr. Abbas Abdullahi Marafa **Date**
Supervisor

Dr. Badamasi Babangida Usman **Date**
Head of Department

Prof. Osita Agbu **Date**
Dean, Faculty of Management and Social Sciences

External Examiner **Date**

DEDICATION

I dedicate this project to God Almighty. I also dedicate this project to my parents who have supported, encouraged, advised and motivated me from start to finish.

ACKNOWLEDGEMENT

I would like to express my profound gratitude to Allah (S.W.T) for given me the opportunity to complete this project. I would like to thank my family, most especially my parents for their guidance throughout my course of studies at Baze University.

I would also like to thank my supervisor, Dr. Abbas Abdullahi Marafa, the H.O. D, Dr.Badamasi Usman, Dr. Sa'ada Abdullahi, Dr. Aliyu Yusuf, Dr. Ishaq Saidu, Miss. Pauline Owoh, Miss. Lucy Abeng and other lecturers of the department for always encouraging and motivating me to work and study harder.

Also, a special thanks and congratulations to my fellow departmental mates and graduating set of Baze University.

ABSTRACT

This paper investigated the effectiveness of monetary policy in controlling inflation in Nigeria using secondary annual data spanning from 1981 to 2019. Money Supply, Treasury bills rate, monetary policy rate and exchange rate were the variables used in the study to check inflation. The paper employed cointegration method to check for the long run relationship between the variables, Augmented Dickey Fuller unit root test to check if the variables are stationary or non-stationary, Granger causality test to know if the variables are uni-directional, bi-directional or have no causal relationship and Ordinary Least Square (OLS) was adopted because of its property of Best Linear Unbiased Estimator. The study commenced with the analysis of testing the variables of interest using Augmented Dickey Fuller (ADF) unit root test and the result indicates that the variables were non-stationary at level but was stationary at first differences. The Johansen co-integration test revealed the existence of long-run relationship between the variables. While the empirical result of the OLS test showed that monetary policy rate, money supply and treasury bill rates exert positive influence on inflation in Nigeria. While exchange rate depreciation leads to inflationary growth. This result is consistent with the prediction of economic theory. The study therefore concluded that money supply, treasury bills rate, monetary policy and exchange rate had influence on inflation within the period under consideration and recommends that since open market operation using annual Treasury bill rate as proxy has not been effective in managing inflation; therefore, schemes to make it more effective should be adopted perhaps by offering competitive rates and the monetary authority should re-assess the effectiveness of monetary policy rate given its ineffectiveness as a tool to manage inflation in Nigeria during the period.

TABLE OF CONTENT

CHAPTER TWO: LITERATURE REVIEW

CHAPTER THREE: METHODOLOGY

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMEMDATION

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Monetary policy is the action taken by the monetary authority (Central Bank) to control the supply of money in the country, with the objective of promoting price stability and economic growth.

The connection between money in circulation and inflationary rate are the main indicator for the measurement of an economy's prosperity, performance and growth abilities. The regulation of the volume of money in circulation and maintaining price stability has been one of the main objectives of emerging nations such as Nigeria. Monetarist economist has maintained that there is an indicating relationship between inflation and money supply and uncontrollable increase in the volume of money may have adverse effect on economic condition (Chaudhry, Ismail, Farooq & Murtaza, 2015).

The key target of Nigerian policy architects is to ensure price stability and maintain inflation rate at single digit. They try to achieve this through the manipulation of monetary policy instruments so as to ensure a stable and strong financial system and enhance economic growth. In regards to this, Fabian and Charles (2014) opined that monetary policy is one of the major tools hired by Central Bank of Nigeria (CBN) to regulate financial activities through the control of monetary policy rate (MPR), introduced towards the end of 2006 to influence the level of economic activities in the money market.

Irrespective of the policy thrust of policy makers in controlling inflation, just a little have been achieved in curbing the threat of inflation in Nigerian economy as inflation is the leading cause of economic impedance and social and political unrest in developing countries like Nigeria (Philip, Christoper and Pius, 2014). Furthermore, the paraphernalia of general price increase include continuous fall of the purchasing power of money, inequality in distribution of income, loss of social welfare due to price increases and fall in reserves and investments (Philip et al. 2014). “Inflation causes excessive relative price variability and misallocation of resources”.

Inflation is the general rise in the price of goods and services. The delinquent of inflation has always been a problem as a result of its effect on economic activities. Rise in general amount of goods and services leads to the decrease in the value of money, this leads to fall in unit a currency can buy. Inflation can as well result to rise in the cost of production, and excess demand over supply.

One of the fundamental objectives of Central Bank of Nigeria is to sustain price stability in the economy through monetary policy. This is achieved by ensuring the rate of inflation is sustained within a certain limit to enable a sustainable economic activity in all facets of the economy.

The financial and economic condition of any nation or state is mainly centered on the monetary policy being instigated by the monetary authority or Central Bank of the state or nation. It has been generally agreed that monetary policy contributes to sustainable growth by maintaining the stability of prices. Christiano and Fitzgerald (2003) identifies that when inflation rate is adequately low, individuals do not have to take account when taking daily choices. A government controls its economy through combined actions of monetary and fiscal policies. The fiscal policy is geared towards government expenditures, both investments and recurrent, the government regulates its spending in order to control and positively impact the state’s economy.

Monetary policy as one of the main tools of economic planning, contributes to the fulfilment of the aims of economic policy.

Monetary policy according to (Fisher, 1911) influences "all prices in the economy, and a price indicator of the general price level covers prices of everything acquired or purchasable". How fast monetary policy induce the price level, that is, "the swiftness of the process depends on how rapidly prices absorb shocks". Consumer prices are among the stickiest in the economy and absorb shocks slowly, while asset prices are among the most flexible and absorb shocks quickly. Central Banks commonly estimate the rate of inflation using a consumer price index, but because consumer prices are sticky, this may cause the policy maker to misjudge the underlying monetary inflationary pressure in the short run and pursue the wrong monetary policy. This is one of the reasons why Alchian and Klein (1973), Goodhart (2001) and Bryan et al. (2002) argue that flexible asset prices should be included in the Central Bank's price index.

Monetary policy resolutions are based on diverse pointers that provide "key information on impending inflation and output growth". In monetary policy, the output gap can be used as one of the indicators of inflation. Therefore, the important task for policymakers is to study the link between output gap and inflation and thereby ensure the required changes in policy rates.

Monetary policy is one of the macroeconomic instruments in which countries (like Nigeria) manage their economies. It involves those measures and activities triggered by the Central Bank which focus at inducing the availability and cost of credit. It entails measures planned to impact or control the volume, prices and direction of money in the economy to attain vital target of price stability, balance of payment equilibrium and provision of employment. Directing the supply or price of money may apply a powerful impact over the economy. The attainment of the

fundamental targets and objectives is crucial in determining the value of the currency both internally and externally.

Typically, macroeconomic strategies in emerging economies and nations are intended to stabilize the economy, increase growth and decrease poverty.

Ajie and Nenbee (2010) and Masha et al., (2004) identifies that "the achievements of these objective are grounded on the posture of fiscal and monetary policies. Monetary policy invention is based on the both money supply and credit obtainability in the economy. In ensuring monetary stability, the Apex Bank through the commercial banks gears policies that pledge the orderly growth of the economy through suitable changes in the level of money supply. The reserves of the banks are determined by the Central Bank through various tools of monetary policy. These tools include the cash reserve requirement, liquidity ratio, open market operations and primary operations to influence the movement of reserves".

Inflation remains one of the main economic variables that disrupt economic activities in both developed and developing economies which affects investment and growth of any economy. It has received various attention as a result of its sensitivity to economic issues. Inflation rates have been on the rise since late 1970s, and has caused major economic disruptions in the Nigerian economy.

Nigeria, regrettably has reached the point where it threatens the entire system. Producers are faced with high cost of production and low utilization of capacity which has decreased level of production and has affected unit cost. Consumers bear burden of high prices which decreases their disposable income.

A typical instance of Central Bank of Nigeria price stability was practically introduced during the pandemic of coronavirus which has affected most nations in the world.

1.2 STATEMENT OF THE PROBLEM

Many years ago, the Nigerian economy has been faced with inflationary pressure which has retarded her growth process. Gbadebo and Muhammed (2015) stated that this could be traced to 1970s when inflation increased to a double digit. The trends of inflation in the economy indicated that inflation rate rose in 1990s from 63.6% to 72.8%. However, the economy experienced stability in 2003 through economic reforms programs which was later followed by inflationary pressure with rises in inflation rate at 12.9%, and 14% in 2000 and 2001 respectively. Headline inflation rate remained at double digits between 2002 and 2005 as it recorded of 15%, and 17.9% respectively. However, it decreased dramatically to 8.24% and 5.38% in 2006 and 2007 before increasing immensely to 11.60% and 12.00% in 2008 and 2009 respectively in that order, although dropped slightly to 11.8% and 12.3% in 2010 and 2013 respectively (Gbadebo & Muhammed, 2015). There is drop in the rate to 8.1% in 2014 but rises to 9.1% in 2015 with a sharp rise in 2016 to 15.7%.

The problem of inflation has always been a problem as a result of its effect on economic activities. Rise in general price of goods and services which leads to the drop in the value of money, this leads to fall in unit a currency can buy. Inflation can as well result to rise in the cost of production, excess demand over supply.

Inflation has been an economic problem in Nigeria due to continuous spike in prices of goods and services in the country which results to panic and uncertainty in the economy resulting to citizens not willing to spend too much for a little in return or invest so as to not make losses when prices fall.

Inflation decreases the standard of living of the citizens in an economy. This has imposed the need for this study due to the unceasing increase in the prices of goods and services in the nation due to the outbreak of COVID-19 (Coronavirus).

1.3 RESEARCH QUESTIONS

The study has answered the following questions:

i. What is the relationship between monetary policy on inflation in Nigeria?

ii. What is the nature of relationship between monetary policy on inflation in Nigeria?

1.4 OBJECTIVES OF THE STUDY

The broad objective of this paper is to examine the effectiveness of monetary policy on inflation in Nigeria.

To achieve that, the following specific objectives were pursued:

i. To examine the relationship between monetary policy on inflation in Nigeria

ii. To examine the nature of relationship between monetary policy on inflation in Nigeria.

1.5 RESEARCH HYPOTHESIS

H_0: There is no significant relationship between monetary policy on inflation in Nigeria

H_0: There is no causal relationship between monetary policy on inflation in Nigeria.

1.6 SIGNIFICANCE OF THE STUDY

The central monetary authority has implemented several policies over the years to reduce inflation in Nigeria but has not been too effective. This justified the detailed study to analyze the effectiveness of monetary policy in controlling inflation in Nigeria.

The findings and recommendation of this study will be useful to monetary authority and economic policy planners who can adopt the recommendations in reducing and controlling inflation in the country.

This research will be a source of information base on future researchers (both academic and non-academic) on matters regarding the relationship between monetary policy and inflation.

The study of monetary policy on inflation is a timeless topic as it remains a paramount topic as long as inflation still exist. Therefore, it shall be of great benefit to students who intend to do more research in this area, while serving as a reference material in the near future to other researchers.

1.7 SCOPE AND LIMITATION OF THE STUDY

This study will focus on assessing the effectiveness of monetary policy in controlling inflation in Nigeria. The data covers the period from 1981 to 2019. It is therefore appropriate to establish the limitation of this research work. Thus, the main limitations are factors such as:

Time Constraints: This study is limited by time constraints as researcher needed time to study for the final year examinations while also ensuring that this study does not suffer from dateline.

Fund: The inabilities to access more material in order to make several consultations was poised by inadequate supply of money.

Availability of Data: The lockdown imposed by the Federal Government as a result of COVID-19 could not allow the researcher to visit ample relevant libraries and data sources.

1.8 ORGANIZATION OF THE CHAPTERS

This study is organized in five chapters.

The first chapter contains the introduction and background of the study, statement of research problem, research questions, objectives of the research, research hypothesis, significance of the study, scope and limitations.

Chapter two contains the review of associated literatures, conceptual and theoretical framework.

Chapter three comprising of the methodology which includes research design, data sources, specification of models and method of data analysis.

Chapter four presents the data analysis, test of hypothesis, and presentation of results.

Chapter five finally comprises the summary, conclusion and policy recommendation.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

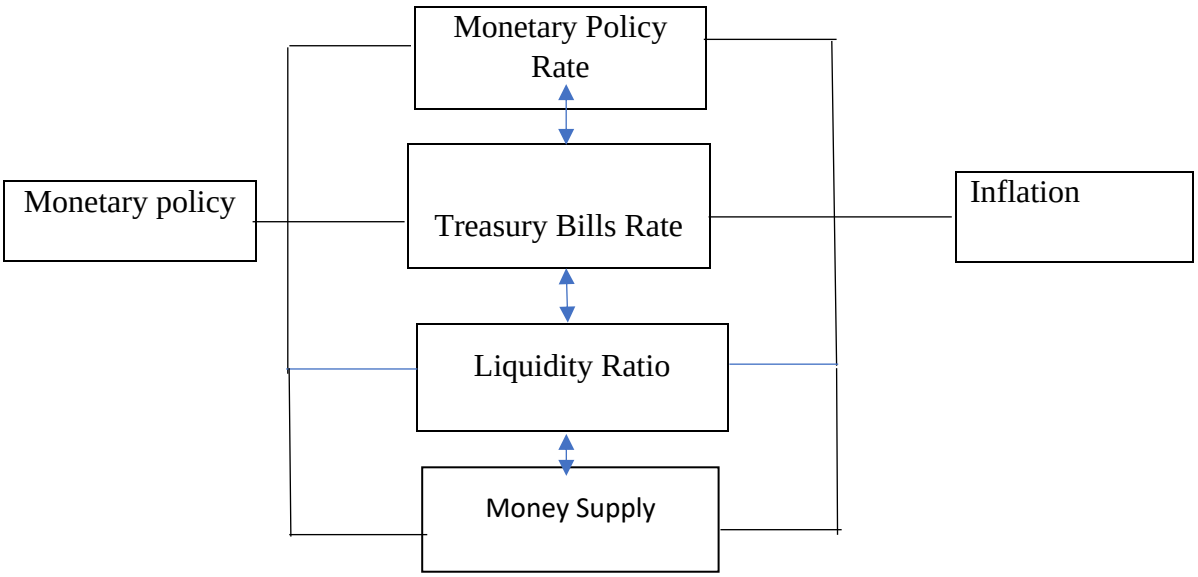
2.1 Introduction

The objective of this chapter is to review a profusion of literatures on the impact and effectiveness of monetary policy on inflation. To achieve the literature review and theoretical framework, this chapter shall however be divided into four sections. Section one covering the introduction. Section two reviews conceptual literature. Section three provides empirical literature. Section four captures the theoretical framework.

2.2 Conceptual Literature

The diagram below demonstrates the relationship between monetary policy and inflation. The concepts of monetary policy, inflation, monetary policy rate, treasury bills rate, exchange rate and money supply are elucidated. The relationship is thereby dictated by the below.

Figure 2.1: Conceptual framework.



MONETARY POLICY

Monetary policy is the set of measures taken by the monetary authority or Central Bank to control the volume, value, and cost of money in a society or an economy with the aim to achieving predetermined macroeconomic goal such as price stability, interest rate stability, exchange rate stability, and economic growth.

Monetary policy can also be said to be the measures taken by the Central Bank to determine the cost, availability and use of money and credit to achieve pre-determined macroeconomic goals.

Friedman (1969) explains monetary policy as the "action taken by the monetary authorities usually the Central Bank to affect monetary and other financial conditions through influence over the availability and cost of credit in pursuit of the broad objectives of sustainable growth of output, price stability and a healthy balance of payments position".

INFLATION

Inflation is the circumstances where a persistence general prices of goods and services is rising on a sustained basis over a period of time in an economy or a country as a result of the local currency losing its value or declining.

MONETARY POLICY RATE (MPR)

Monetary policy rate formally called “Minimum Rediscount Rate”, is an “authorized interest rate of the Central Bank which anchors all other interest rates in the money market and economy”. (CBN, 2006). It is one of the monetary policy instruments used to influence intermediate target and objectives. The volume of money in circulation decreases if MPR is increased.

TREASURY BILLS RATE (TBR)

Treasury bills rate is the rate or percentage at which treasury bills are auctioned in the money market by the treasury or Central Bank. It is used by the Central Bank to balance liquidity in the banking system through Open Market Operations.

EXCHANGE RATE (EXR)

Exchange rate can be said to be the price or amount at which a local currency is being exchanged or traded with a foreign currency.

Or exchange rate is the amount at which a currency (domestic currency) is being exchanged with another currency (foreign currency).

MONEY SUPPLY (M2)

Money supply (M2) or broad money supply is the currency in circulation with non-bank + demand deposit or money in current account. (i.e. money not in banks e.g. in wallet, pockets + money in

account in current and deposit account) + Savings and time deposit as well as currency denominated deposits (treasury bills, commercial paper etc.)

2.3 Empirical Literature

This section presents the review of previous literatures to provide a background for determining the impact and effectiveness of monetary policy in controlling inflation in Nigeria. This section provides a review of most recent ones.

Okotori (2019) examined "the dynamics of monetary policy and inflation in Nigeria". Monthly data was used from 2009-2017. Augmented Dickey-Fuller (ADF) unit root test, Johansen Cointegration test and Error Correction Model (ECM) were employed. The findings showed all variables are stationary at first order except money supply and exchange rate who were stationary at second order. Johansen test showed that there is long-run equilibrium between the variables and concluded that money supply, exchange rate, monetary policy rate, treasury bills rate, reserve requirement, and liquidity ratio have significant impact on inflation rate. The study recommended that the CBN should stay focused on its current exchange rate policy and make unobstructed use of monetary policy tools to maintain inflation threshold in Nigeria.

Oumbe' (2018) examined the "effect of monetary policy on inflation" and "nature of relationship between money supply and inflation in Cameroon". Time series annual data was used between 1980 to 2016. Johansen Co-integration test was used to determine the relationship between money supply and inflation. Autoregressive Distributed Lag (ARDL) estimation technique was used to examine the effect of money supply and inflation in Cameroon. Toda and Yamamoto's causality test were also used to test the causality between money supply and inflation. The result showed that there is a long-run equilibrium relationship between money supply and inflation; money

supply had a significant and positive impact on inflation in Cameroon and there is one-way causality from money supply to inflation. The study also exhibited that inflation has a monetary source in Cameroon. Thus, monetary policy should be planned to maintain the stability of price by controlling the growth of money supply in the economy of Cameroon.

Islam, Ghani, Mahyudin and Manickam (2017) investigated the "determinants of factors that affect inflation in Malaysia" adopting quantitative method. Result indicated that a rise in unemployment rate will lead inflation rate to decrease to a drop and vice versa. The relationship between exchange rate and inflation is negative, whereas money supply and inflation have a positive relationship.

Onyeiwu (2012) investigated "the impact of monetary policy on the Nigerian economy". The study adopted the Ordinary Least Squares Method (OLS) and multiple regressions techniques to examine the annual data from 1981 and 2008. The result revealed that monetary policy proxy by money supply exerts a positive impact on GDP growth and Balance of Payment but negative impact on rate of inflation. The study suggested that monetary policy should facilitate a favorable investment environment through appropriate interest rates, exchange rate and liquidity management mechanism and the money market should provide more financial instruments that satisfy the requirement of the ever-growing sophistication of operators.

Hossain, Ghosh and Islam (2012) examined "the existence of long run relationship between inflation and economic growth in Bangladesh" using annual data from 1978 to 2010. The study adopted the co-integration and Granger causality test and used the GDP deflator (GDPD) as a proxy for inflation and the GDP as a perfect proxy for economic growth. The Johansen co-integration technique test showed that there is no co integrating relationship between inflation and economic growth and the causality test revealed a unidirectional causality running from inflation to economic growth and concluded that inflation impact on economic growth.

Emereni and Eke (2014) examined “the impact of monetary policy rate on inflation in Nigeria”. Monthly data spanning from January 2007 to August 2014 was used. Ordinary Least Square method, Johansen Co-integration test and Augmented Dickey-Fuller test were employed. The findings revealed that expected inflation, money supply and exchange rate influenced inflation in Nigeria during the period of investigation. Exchange rate, broad Money Supply, Annual Treasury Bill Rate, and Monetary Policy Rate in the estimated model used for the analysis accounted for 90% variation in determining the direction of inflation in respect to increase or decrease. The co-integration result revealed that at order one I (1) a long-run relationship existed among the variables and are stationary.

Nenbee and Madume, (2011) empirically examined “the impact of monetary policy on Nigeria’s macroeconomics stability” between 1970 and 2009. The study adopted the co-integration and Error Correction Model (ECM) to reduce the stationarity problem associated with time series data. The result of the study revealed that only 47 percent of the total variations used in the model are caused by the money supply, Minimum Rediscount rate and Treasury bills in the long-run. The study recommended that Nigeria should adopt macroeconomic mix of monetary, fiscal and exchange rate policies in managing inflation to promote price stability which leads to macroeconomic stability.

Apere and Karimo (2014) studied the “Monetary policy effectiveness, output growth and inflation in Nigeria” using annual data from 1970 to 2011. Granger causality test and VAR was adopted. The outcome revealed that, in the short-run, output and inflation drive monetary growth whereas Output growth is affected by inflation only. Production level is more important in controlling inflation in the short-run, while ,monetary policy variables are important in the long-run The study

suggested that it is necessary to distinguish between short and long run monetary policy goals and recommended that, policy makers should focus on short-run output expansion policies and put actions in place to sustain growth in the long-run to control inflation. But to maintain long-run output expansion, monetary authorities should aim at adjusting the inter-bank rate with caution as it can result to problem it is meant to resolve.

Gbadebo and Mohammed (2015) assessed "the effectiveness monetary policy as an anti-inflationary measure in Nigeria". They adopted the co-integration and error correction methods approach using quarterly time series data from 1980Q1 to 2012Q4. The unit root test revealed that all the variables were differenced stationary. The co-integration test revealed a long-run relationship between inflation and vector of independent variables employed. The results revealed interest rate, exchange rate, money supply and oil-price are the main causes of inflation in Nigeria during the study period. The study suggested that anti-inflationary monetary policy measures, backed-up by some necessary fiscal policies are obligatory for structural and economic stabilization.

Sola & Peter (2012) analyzed "money supply and inflation rate in Nigeria". Annual time series data was used spanning from 1970-2008. The study adopted Vector Auto Regressive (VAR) model. The outcome showed that money supply and exchange rate were stationary at level while oil revenue and interest rate were stationary at the first difference. Findings from the causality test shows that there exists a unidirectional causality between money supply and inflation rate as well as interest rate and inflation rate. The paper concluded that government should use the level of inflation as an operational guide in measuring the effectiveness of its monetary policy.

Bakare (2011) investigated “the determinants of money supply growth and its implications on inflation in Nigeria”. The study adopted quasi-experimental research design method for the data analysis and the results revealed that credit expansion to the private sector determines money supply growth by the highest degree in Nigeria. The results also revealed a positive relationship between money supply growth and inflation in Nigeria. The study concluded that, changes in money supply are associated to inflation in Nigeria and strongly support the need for regulating money supply growth in the economy.

Bello and Saulawa (2013) assessed “the relationship between money supply, interest rate, income growth and inflation rate in Nigeria” using annual data from 1980-2010. The paper adopted a co-integration method, VAR, and Granger causality test. The paper revealed that there is no long run relationship among the variables and granger causality test shows a bidirectional relationship between money supply and inflation, income growth and inflation and interest rate and inflation. The granger causality test also shows that money supply, interest rate, and income growth all granger cause inflation. The study recommended appropriate control and management of money supply, interest rate and inflation rate.

Umaru and Zubairu (2012) examined “the impact of inflation on economic growth and development in Nigeria”. Annual time series data was used spanning from 1970-2010. Augmented Dickey-Fuller technique was used in testing the unit root test and Granger causality test were adopted. The outcome of unit root suggested that all the variables in the model are stationary and the results of Causality suggest that GDP causes inflation. The results also showed that inflation has a positive impact on economic growth by increasing productivity and level of output and concluded that policy makers should increase the level of output in Nigeria by improving

productivity/supply in order to reduce inflation so as to increase economic growth and inflation can solely be decreased to the barest minimum by increasing output level (GDP).

Kumapayi et al. (2012) analyzed "impact of inflation on monetary policy and economic development in Nigeria". Annual data spanning from 1980-2010 was used. Simple linear regression was adopted for the study and results showed that domestic credit, fiscal deficit and a one-year lag of inflation were statistically significant in explaining inflation in Nigeria. Fiscal deficit, money supply and interest rate have a positive correlation with inflation while exchange rate, trade openness and past level of inflation have a negative impact on inflation. The results also revealed that inflation impact on economic growth negatively while that of money supply and domestic credit is positive. The study suggested that policy measures aimed at reducing impact of inflation on economic growth should include targeting below double-digit inflation through effective monetary policy and increase in output and productivity through effective agriculture and full capacity utilization in manufacturing sector.

Yunana et al., (2015) assessed "the Impact of Monetary Policy on Inflationary Process in Nigeria" using annual time series data spanning from1986 to 2013. Ordinary least square regression, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for unit roots were employed. Result showed money supply, interest rate and Unemployment were integrated at the second difference. The findings of the regression showed that monetary policy have major influence on inflation. The study recommended that the government should embark on coordination and synergy of both fiscal and monetary authorities with regards to flows of money or liquidity in the economy to aid control inflation. Where deficit financing is unavoidable, it should be put into productive activities in order to create more employment opportunities, increase national output, and improve standard of living the people.

Nwosa and Oseni (2012) examined "monetary policy, exchange rate and inflation rate in Nigeria" using annual time series data spanning from 1986-2010.The paper adopted a Co-integration and Multi-Variate Vector Error Correction Model techniques. The result revealed that there exists at least a co-integrating vector among the variables and the VECM estimate showed that a uni-directional causation exists from exchange rate and inflation rate to short term interest while a bi-directional causality exists from inflation rate to exchange rate. Exchange rate and inflation rate granger caused a change in monetary policy stance. The study recommended appropriate regulation and management of both the exchange rate and inflation rate.

Imoughele and Ismaila (2016) investigated "monetary policy, inflation and economic growth in Nigeria" using annual time series data from 1985-2012. The study adopted co-integration, error correction model and Granger Causality techniques. The Augmented Dickey Fuller (ADF) test statistic showed that the time series properties of the variables realized stationarity at level, first order and second order. The variables were co integrated at most 1 with at least 2 co integrating equations which indicates a valid long run relationship among economic growth, monetary policy variables and inflation. The Error Correction results showed that growth in Nigeria's economy is highly responsive to bank credit to the private sector, exchange rate, broad money supply and inflation. The Granger Causality results showed a unidirectional relationship existed among the macroeconomic variables. The study concluded that for monetary policy and inflation to lead to sustainable economic growth. Government and monetary authority should manage exchange rate instability, interest rate, money supply and inflation and policy makers should not fully depend on policy instrument to induce Nigeria economic performance and policies should be put in place to increase bank credit to the private sector to enhance productivity in the nation economy.

Okwori & Abu, (2017) investigated “the efficacy of monetary policy in curbing inflation in Nigeria”. Annual time series data was used between 1986-2015.Vector Error Correction Model was adopted. The study discovered that monetary policy is significant in curbing inflation threshold in Nigeria, though the effect of monetary policy variables are weak in controlling inflation as a result of the large proportion of informal sector which results into a high currency outside bank economy that is majorly not affected by monetary policy tools. The Monetary Policy Rate (MPR) is not statistically significant which has also affected its transmission mechanism to commercial banks interest rate. The study recommended that the CBN should narrow the asymmetric corridor around the MPR to check commercial banks excess reserves. Required cash ratio and liquidity ratios should be adjusted regularly to curtail banks excess reserves. The CBN should embark on enlightenment campaigns in financial literacy to buttress popularity of monetary policy tools while commercial banks should expand their coverage to reduce the number of un-banked and under banked persons in the economy in order to reduce the dominance of the informal sector.

Riti & Kamah (2015) assessed “Inflation Targeting and Economic Growth in Nigeria: A Vector Auto Regressive (VAR) Approach”. Annual time series data between 1981 – 2010 was used using the VAR model. The variables used were; Consumer Price Index (CPI), Gross Domestic Product (GDP), Exchange Rate (EXR), US Consumer Price Index (CPI, as a proxy for foreign price), Money Supply (M2), and Interest Rate (INTR). The study revealed that exchange rate contributes significantly to inflationary pressures in Nigeria which is a reflection of the import dependent nature of the Nigerian economy. The study recommended that the objective of monetary policy should be made clear by enhancing planning in the private and public sectors. The CBN should also critically and carefully evaluate policy options before implementing them.

Okwori & Abu (2015) assessed "the determinants of money supply in Nigeria". Using annual data between 1986 to 2013. The study adopted the Ordinary Least Square (OLS) technique using multiple regression analysis. The variables used were Broad Money Supply (BRM), Cash Ratio (CR), Liquidity Ratio (LR), Monetary Policy Rate (MPR), Interest Rate (INR), and Treasury Bill Rate (TBR). The study showed that monetary policy has not significantly determined liquidity management in Nigeria within the study period and recommended that, the Central Bank should maintain a flexible monetary policy rate so as to avoid commercial banks from liquidity surfeit. The government should also complement the monetary authority by providing a good regulatory environment rather than being a burden to the CBN.

Bassey & Essien (2014) investigated "the issues, problems, and prospects of inflation targeting framework for monetary policy in Nigeria". The study recommended that, the extent of the success of Inflation Targeting, if and when adopted, will crucially depend on the availability of executive capacity, quality and timely data and the political will and commitment to the success of the programme on the part of monetary authorities**.**

Chinaemerem & Akujuobi (2012) assessed "Inflation Targeting and Monetary Policy Instruments in Nigeria and Ghana". Three Vector Auto Regressive (VAR) Models were built. The VAR two variable model including money supply and prices show that inflation is an inertial phenomenon in Nigeria and Ghana. It also shows that money innovations are not strong and statistically important in determining prices when compared with price shocks themselves. In the short run, innovations in prices are mostly explained by their own shocks, and the monetary policy instruments have little or no effect on prices. The study concluded that policy linkage between inflation and monetary policy instruments in Nigeria and Ghana is not strong in the short run. The study recommended amongst others that the monetary authorities must reduce the influence of

inflationary expectations by pursuing more transparent policies. This should be done by frequently informing the public about the changes in monetary policy and explaining the reasons for those changes.

Odior (2012) assessed "Inflation Targeting in an Emerging Market: VAR and Impulse Response Function (IRF) Approach in Nigeria" using annual data from 1970 to 2010. The VAR and IRF techniques were used to estimate the consumer price index, broad money supply, exchange rate, gross domestic product and government expenditure. The results showed that, money supply and past level of inflation have the potentials of causing significant changes in inflation in Nigeria and therefore recommended that more policy attention be given to broad money supply, exchange rate, gross domestic product, consumer price index, and government expenditure in order to have stable inflation rate in Nigeria.

Salunkhe and Patnaik (2017) investigated "the impact of monetary policy on output and inflation in India". Monthly data was used from January 2002 to December 2015. Granger causality test, unit root test and SVAR test was employed and the result showed that there is a bi-directional causal relationship between policy rate and inflation as well as policy rate and output. The study concluded that any attempt to control inflation will affect output with equal or larger magnitude than inflation. Inflation and output gap are positively related.

Ahiabor, (2013) investigated "the effects of monetary policy on inflation in Ghana" using annual data from1985-2009. Interest rate, money supply and exchange rate were the variables used on inflation. The result revealed that there is a long-run inverse relationship between interest rate and inflation, long-run positive relationship between money supply and inflation and suggest that monetary policy should not be used independently but apply fiscal policy and alternative measures to control inflation.

Dania (2013), investigated "the determinants of inflation in Nigeria" using annual time series data from 1970-2010. Error correction model was used to determine the long-run equilibrium. The result showed that expected inflation, calculated by lagged term of inflation, money supply, determine inflation significantly, whereas trade openness, considering the probability of imported inflation, interest rate, exchange rate and income level were discovered not to be significant with all showing signs that conform with apriori in the short run. None of the variables was significant in the long-run.

Iya and Aminu (2014) assessed "the determinants of inflation in Nigeria" adopting times series data from 1980-2012. Ordinary Least Square (OLS), Vector Error Correction technique, Granger causality test, Augmented Dickey-Fuller (ADF) were employed. Money supply, interest rate, government expenditure, exchange rate and inflation were the variables used. The findings of unit root suggested that all the variables in the model are stationary. The findings of Causality proposed causation between inflation and some of the included variables. The Johansen co-integration findings exhibit that there is an existed long run relationship between inflation and the included variables. The VEC error correction findings also showed the existence of long run relationship between the variables of the model with solely money supply and exchange rate causing interest rate. Money supply and interest rate influenced inflation positively, government expenditure and exchange rate influenced inflation negatively and recommended that a good performance of the economy in respect of price stability may be attained by reducing money supply and interest rate and also increasing government expenditure and exchange rate in Nigeria.

Hossain and Islam (2013) investigated "the determinants of inflation in Bangladesh". Annual time series was used from 1990-2010 adopting Ordinary Least Square. The findings revealed that money supply, interest rate lagged value by one-year affect inflation significantly and positively.

lagged value of money supply by one year and one-year lagged value of fiscal deficit affect inflation rate negatively. There existed an insignificant relationship between interest rate, fiscal deficit and nominal exchange rate. The independent variables accounted for 87 percent of the variation of inflation during the study period and recommended that money supply is to be controlled to reduce inflation. Additionally, reduction of last year interest rate will reduce inflation.

Odusanya and Atanda (2010) examined "the determinants of inflation in Nigeria" using time series data from 1970-2007. The findings presented that growth of money supply, growth rate of Gross Domestic Product (GDP), real share of import, first lagged of inflation rate and interest rate have positive influence on inflation rate. Whereas, only GDP and past inflation rate have significant impact on inflation rate in Nigeria during the study period.

Maku and Adelowokan (2013) investigated "the determinants of inflation in Nigeria" using annual time series data from 1970-2011 adopting partial adjustment model. The findings exhibited that fiscal deficit and interest rate apply slow pressure on dynamics of inflation rate in Nigeria. Whereas, real output growth rate, broad money supply growth rate, and previous level of inflation rate apply more increasing pressure on inflation rate in Nigeria. Real output growth and fiscal deficit were determined to be major determinants of inflation rate in Nigeria during the study period.

Ratnasiri (2009) examined "the determinants of inflation in Sri Lanka" using annual data from 1980-2005. Vector Autoregressive analysis was employed. The outcome revealed that, in the long run, money supply growth and rise in price of rice are the major determinants of inflation in Sri Lanka. Contrarily, exchange rate depreciation and output gap had no significant effect on inflation statistically. Price of rice was the most significant variable as it was a completely dependent variable in the short run. Money supply growth and exchange rate were not so significant variables

as they were weakly independent in the process of adjustment. Output gap did not statistically impact on inflation in both the long run and short run.

Enu and Havi (2014) investigated "the macroeconomic determinants of inflation in Ghana" adopting a co-integration method. Population growth, foreign direct investment, foreign aid, agricultural and service's output were variables used. The result showed service output, population growth affect inflation positively, while foreign direct investment and foreign aid and agricultural output increase impact of inflation negatively. The study concluded that foreign aid, foreign direct investments, population growth and service output are the main determinants of inflation in Ghana in the long-run. While in the short-run, previous inflation by two years had significant impact on current inflation during the period of study.

Chimobi and Uche (2010) investigated "the relationship between money, inflation and output in Nigeria" using time series data covering from 1970 to 2005.The study employed co-integration and granger-causality test and discovered that there is no existence of a co-integrating vector in the series used. Money supply was discovered to granger cause output and inflation. The study recommended that monetary stability can contribute towards price stability in the Nigerian economy since the disparity in price level is mainly triggered by money supply, the study settled that inflation in Nigeria is a monetary phenomenon to some extent.

Asuquo (2012) examined "inflation accounting and control through monetary policy measures in Nigeria" with annual data from 1973 to 2010. He adopted Ordinary Least Squares (OLS) estimation method and multiple regression analysis and found that money supply, exchange rate and interest rate had significant impact on inflation and domestic credit was statistically not significant.

Danjuma, et al (2012) investigated "the impact of monetary policy on inflation in Nigeria" using annual data from 1980– 2010". Least squares technique, granger causality was used to determine the impact of monetary policy in Nigeria and the result showed that liquidity ratio and interest rate were the foremost monetary policy instruments in combating inflation in Nigeria while cash reserve ratio, broad money supply and exchange rate were labeled as being "impotent" in effective monetary policy decision in Nigeria.

Adodo, Akindutire & Ogunyemi (2018) investigated the "effectiveness of monetary policy and control of inflation in Nigeria" using annual data from 1985 to 2016. Augmented Dickey- Fuller (ADF), Vector Error Correction Model (VECM) and Johansen co-integration test were employed. The outcome of the unit root test at 1st difference discovered money supply, exchange rate and interest rate were stationary while the outcome of the Johansen co-integration test revealed that there is a long run equilibrium relationship among the variables. Outcome of the VECM revealed money supply and interest rate are statistically significant in explaining the variation in Inflation rate while exchange rate is insignificant in explaining the variation in Inflation rate. It was settled that monetary policy is partially effective in controlling inflation in Nigeria and suggest that the monetary authority should adopt adequate indirect instruments for the aim of controlling the volume of money in circulation for efficient and effective control of inflation rate in Nigeria. Interest rate should be completely favorable for the purpose of making a strong monetary policy instrument for regulating price level and economic activities. The money market and its instruments should be sufficiently developed for the purpose of making it an effective control mechanism for inflation in Nigeria. A vigorous and effective exchange rate regime should be deployed by regulatory authorities in order to ensure the stability of exchange rate capable of controlling inflationary pressure in the economy.

Chaudhry et al, (2015) analyzed “the impact of money supply growth on the rate of inflation in Pakistan”. Autoregressive Distributed Lag (ARDL) was used with times series annual data ranging from 1973-2013. Diagnostic and stability tests confirm that models are econometrically stable and sound. The results showed that, in the long-run, interest rate and money supply are vital policy variables in controlling inflation while in the short-run, national output level puts descending pressure on inflation rate.

Ngerebo-A (2016) assessed “the effectiveness of monetary policy in controlling inflation in Nigeria” employing annual time series data spanning from1985 to 2012. The result indicated that MPR, PLR, TBR, MLR and NDC are not statistically significant, while M1g, M2g, SR, NCG and CPS are statistically significant in explaining Inflation rate changes in Nigeria.

Anowor and Okorie (2016) reexamined “the impact of monetary policy on economic growth of Nigeria”. Time series data was used from 1982 to 2013 adopting Vector Error Correction Model technique. Findings of the study showed that a unit increase in the Cash Reserve Ratio (CRR) increases economic growth by seven units in Nigeria. Nasko (2016) investigated “the impact of monetary policy on economic growth in Nigeria” using times series data from 1990-2010 and adopted multiple regression technique using interest rate, money supply, financial deepening and gross domestic products as variables. Result showed that all variable used have marginal impact on the economic growth in Nigeria.

Philip et al. (2014) investigated “the effectiveness of monetary policy in reducing inflation in Nigeria” adopting annual time series data from 1970 to 2012. Co-integration test and Error Correction technique were employed in the study. The result of the co-integration and unit root test shows that there is a long run relationship between the variables, while the Granger causality test revealed uni-directional relationship between monetary policy and inflation rate. The Vector

Error Correction Model (VECM) test revealed that inflation rate, Gross Domestic Product (GDP) and exchange rate are related negatively and related positively with broad money supply(M2) and domestic credit.

Mohammed (2016) investigated the "role of fiscal and monetary policies on inflation in Sudan" using annual data from 1970 to 2014. The study examined the impact of money supply, exchange rate, gross domestic product (GDP), budget deficit and government expenditure on inflation. Ordinary least squares method was adopted and the study revealed that, the money supply has a positive and significant effect on inflation during the study period. The results revealed that money supply, budget deficit and shrinking of gross domestic product are simultaneously influencing inflation in Sudan. While exchange rate and government expenditure were found to have no effect on inflation rate during the study period. The study recommended that the government should depend on real sources in financing budget deficit rather than monetizing deficit by and borrowing from the central Bank, which have significant impact on increasing money supply.

2.4 Theoretical Literature

The history associated with inflation is very long which is the case with the theories of inflation that seeks to clarify what causes inflation. The classical economists examined the roots of inflation through the quantity theory of money. In their own view or perspective, the overall level of prices rises in ratio to the rise in money supply whereas real output remains the same. The classical theory stresses the role of money and ignores the real or non-monetary factors causing inflation and therefore considers it to be one-sided and not complete (Friedman, 1968). Keynes attributed inflation to excess aggregate demand at full employment level or the level of potential output –

which is called inflationary gap. Keynes stressed the role of a non-monetary factor, that is, aggregate demand in real terms and disregards the influence of monetary expansion on the price level. Keynes theory does not fully elucidate the phenomenon of inflation too. The modern monetarists tried to renew the classical view in a modified form, emphasizing the role of money vis-a-vis inflation (Dornbusch & Fischer, 1994). Subsequently, modern theories of inflation regard the role of both demand-side and supply-side factors on the price level (explaining its causation in the general equilibrium framework).

Theories of inflation are based on the features as well as characteristics of the western developed countries. The logic is that the features and the institutional framework of the developed countries do not exist in the developing countries like Nigeria. Within the context of conventional theories, inflation only occurs the minute the economy is in a situation of full engagement with "natural rate of unemployment". In contrast, in developing economies, inflation and large-scale unemployment go hand in hand which is described as stagflation. This has been the experience of most emerging countries especially Nigeria endeavoring to attain a high rate of growth over public sector investments.

(Myrdal, 1968) stated in regards to the institutional factors, "that emerging economies are considered by highly fragmented markets, market imperfections, immobility of factors, wage inflexibilities, camouflaged unemployment and underemployment, and sectoral imbalances with surplus in some sectors and shortages in others". Moreover, inflation in developing countries has generally been a consequence of their efforts of growth. Based on these reasons, inflation theories formulated on the experience and characteristics of the developed countries have little effect to developing countries. Economists such as Myrdal and Streeten argue strongly against direct application of the so-called modern theories of inflation in developing countries. Efforts to find a

befitting explanation to inflation in developing countries led to the rise of a new school of economists called 'structuralists' and a new class of inflation theories known as structuralist theories of inflation (Kirkpatrick & Nixon, 1976). According to the structuralist view, "inflation in developing countries is an inevitable result of their over-ambitious development programmes affected mainly by the structural imbalances in such economies". The operational inequalities in developing countries are:

i. Food Insufficiency: the unevenness between demand for and supply of food.

ii. Input Inequality: deficiency of capital and excess labor

iii. External exchange impediments: inequalities between exports and imports and deficits in balance of payments

iv. Infrastructural deficit: inadequate supply of transport, communication and electricity etc.

v. Social and Political Limitations

Inflation in Nigeria is as a result of "factors including the invisible factors developed in the early years of planning, foreign dependency, continued deficit financing, exhaustion of foreign exchange reserves, floods affecting low performance of the agricultural sector, heavy indirect taxation, and administered prices etc. This combined with demand-pull and cost-push inflation is a major challenge for the Nigerian economy".

2.4.1 Quantity Theory of Money

"The relationship between national income assessed at market price and the velocity of money circulation can be said to be equal relationship. The equation shows a positive relationship between price level and money supply, and can be represented using the quantity equation MV=PY".

M = is the stock of money in circulation

V = is velocity of circulation

P = is the general price level

Y = is the total income

Based on this theory in an economy, money supply and price level will have a proportionate relationship. This means that if money supply increase by certain percentage, price level is also expected to increase by the same percentage. Ordinarily, it means that expansion in money supply leads to inflation.

2.4.2 Structuralism Theory

The main drive of inflation according to the structuralism theory is inelasticity in the structures of the economy which is mostly obtainable in Less Developed countries. This is due to institutional framework, level of production, unemployment structures, agricultural sector, labor force and formation of capital. Hence, Inflation is as a result of the structure inefficiencies in the economy.

2.4.3 The Monetarist Theory

The monetarists, following from the Quantity Theory of Money (QTM), have propounded that "the quantity of money is the main determinant of the price level, or the value of money, such that any change in the quantity of money produces an exactly direct and proportionate change in the price level. The QTM is traceable to Irving Fisher's famous equation of exchange: MV=PQ, where M stands for the stock of money; V for velocity of circulation of money; Q is the volume of

transactions which take place within the given period; while P stands for the general price level in the economy".

Dornbush, et al, 1996 related that "transforming the equation by substituting Y (total amount of goods and services exchanged for money) for Q, the equation of exchange becomes: MV=PY. The introduction of Y provides the linkage between the monetary and the real side of the economy. In this framework, however, P, V, and Y are endogenously determined within the system. The variable M is the policy variable, which is exogenously determined by the monetary authorities. The monetarists emphasize that any change in the quantity of money affects only the price level or the monetary side of the economy, with the real sector of the economy totally insulated. This indicates that changes in the supply of money do not affect the real output of goods and services, but their values or the prices at which they are exchanged only. An essential feature of the monetarists model is its focus on the long-run supply-side properties of the economy as opposed to short-run dynamics".

2.4.4 The Keynesian Theory

The Keynesian opposed the monetarists view of direct and proportional relationship between the quantity of money and prices. According to this school, "the relationship between changes in the quantity of money and prices is non-proportional and indirect, through the rate of interest. The strength of the Keynesian theory is its integration of monetary theory on the one hand and the theory of output and employment through the rate of interest on the other hand. Thus, when the quantity of money increase, the rate of interest falls, leading to an increase in the volume of investment and aggregate demand, thereby raising output and employment. In other words, the

Keynesians see a link between the real and the monetary sectors of the economy an economic phenomenon that describes equilibrium in the goods and money market (IS-LM). Equally important about the Keynesian theory is that they examined the relationship between the quantity of money and prices both under unemployment and full employment situations. Accordingly, so long as there is unemployment, output and employment will change in the same proportion as the quantity of money, but there will be no change in prices. At full employment, however, changes in the quantity of money will induce a proportional change in price".

2.4.5 The Neo-Keynesian Theory

The neo-Keynesian theoretical exposition combines that "both aggregate demand and aggregate supply. It assumes a Keynesian view on the short-run and a classical view in the long-run. The simplistic approach is to consider changes in public expenditure or the nominal money supply and assume that expected inflation is zero. As a result, aggregate demand increases with real money balances and, therefore, decreases with the price level. The neo-Keynesian theory focuses on productivity, because, declining productivity signals diminishing returns to scale and, consequently, induces inflationary pressures, resulting mainly from over-heating of the economy and widening output gap".

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter is to present the methodology adopted in achieving the specific objectives of the study by presenting the procedure that is followed in operationalizing the models. Accordingly, research design, method of data collection, types and its sources, method of data analysis and model specification are delineated in this chapter.

3.2 Research Design

The research is quantitative in nature. In the empirical analysis, E-views 9 econometric software is employed. The regression analysis will be used to estimate the relationship between the endogenous variable Inflation rate (INF) and exogeneous variables Monetary Policy Rate (MPR), Treasury Bills Rate (TBR), exchange rate (EXG) and Broad Money Supply (M_2). To examine the ability of the variables to predict each other over the study period, Granger Causality will be used.

3.3 Method of Data collection, Type and Sources

This study used secondary annual data spanning from 1981 to 2019 on the variables: INF, MPR, TBR, EXG, and M_2 for the empirical analysis. The data is obtained from the publication of Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS). The choice to study period is informed by data availability.

3.4 Model specification

The objective of this study is to assess the effectiveness of monetary policy in controlling inflation in Nigeria. Specifically, the study investigated the relationship between inflation (the dependent variable) and the Monetary Policy variables proxied by: Monetary Policy Rate (MPR), Treasury Bills Rate (TBR), Exchange rate (EXG) and Money supply (M_2) in Nigeria. The model is specified as follows:

$$INF = f(M2, MPR, TBR, EXG,) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.1)$$

The above regression model was translated into a regression equation as stated below:

$$INF = \beta_O + \beta_1 M2 + \beta_2 MPR + \beta_3 TBR + \beta_4 EXG + \mu \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.2)$$

where;

M2= Broad Money Supply

MPR = Monetary Policy Rate

TBR = Treasury Bills Rate

EXG = Exchange Rate

β_o = Intercept

β_1, β_2, β_3 = are coefficients of the explanatory variables, and each, as expected $\neq 0$

μ = is Stochastic error term

The variables are employed in their log form as follows:

$$lINFPt = \beta_0 + \beta_1 lM2_t + \beta_2 lMPR_t + + \beta_3 lTBR_t + \beta_4 lEXG_t + \mu t \ldots\ldots (3.3)$$

where

lINF – log of Inflation

lM2 – log of Broad money supply

lMPR – log of monetary policy rate

lTBR – log of Treasury bill rates

lEXG – log of Exchange rate

t - signifies time,

βi - the coefficients,

μ - the error terms.

The apriori expectation is that a positive relationship is established between inflation growth and each of the monetary policy variables.

3.4 Method of data Analysis

3.4.1 Unit Root Test

Prior to the empirical analysis, pre-estimation diagnostic checks of the time series properties of the data, notably the descriptive statistics and unit root test will be conducted. The study employed Augmented Dickey-Fuller (ADF) unit root test to determine the stationarity of the chosen variables.

A generalized ADF test, with intercept and deterministic trend is presented in equation 3.4.

$$\Delta y_t = u + \beta t + \alpha y_{t-1} + \sum_{i=1}^{k} C_t \Delta y_{t-i} + \varepsilon_t \qquad (3.4)$$

Where *k* is the number of lags incorporated into the model to ensure that the residuals are *white noise*, meaning: $\varepsilon_t \sim iid(0, \sigma^2)$. The ADF test is primarily concerned with the estimate of α. In equation 3.4 we test the null hypothesis of $\alpha = 0$ of non-stationary against the alternative of $\alpha < 0$ of stationary series.

The unit root test is adopted to know the stochastic properties of the time series.

Null hypothesis: The variables are not stationary

Alternative hypothesis: The variables are stationary

Decision rule: Reject the null if p-value is less than alpha (α=5%)

3.4.2 Cointegration Test

Co-integration is the existence of a long run equilibrium relationship in time series variables. The result of the unit root test will allow for co-integration procedure if and only if the variables are all stationary or all non-stationary. This study will consider Johansen co-integration test, because it provides more powerful alternative to the Engle-Granger test, and also it is a multivariate VAR-based approaches that allow for all variables to be endogenous. The VAR based test can be written as:

$$\partial Z_t = Z_{i-1} + \sum \partial Z_{t-I} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

However, co-integration test cannot be carried out if and only if the time series has properties of stationary and non-stationary at the same time. Depending on the cointegration of the variables in each model, if the variables used are found to be cointegrated, an error correction model (ECM) test will be conducted to supplement the long-run relationship test.

The hypothesis that will be used for the co-integration is as follows:

H_0: There is no co-integration among the variables

H_1: There is co-integration among the variables

Decision Rule: Reject the null hypothesis if p-value is less than alpha (α= 5%)

3.4.3 Ordinary Least Square

Multiple regression of Ordinary Least Square (OLS) technique is employed. OLS was chosen because if its properties of Best Linear Unbiased Estimator (BLUE). The OLS estimation is conducted using Econometric views (E-views 9). The estimated model is evaluated using diagnostic and summary of statistics such as t-statistics, coefficient of determination (R^2), F-statistics, Durbin Watson (d) statistics etc.

3.4.4 Granger Causality Test

The Granger Causality test is used to indicate if a variable can be used to predict another variable. The test will allow us to know if there is a uni-directional, bi-directional or no causal relationship between monetary policy and inflation along with other chosen variables in the study.

The model can be specified as,

$$y_t = \alpha_1 + \sum_{i=1}^{n} \beta_i x_{t-1} + \sum_{j=1}^{m} \gamma_j y_{t-j} + e_{1t} \quad (3.6)$$

$$x_t = \alpha_2 + \sum_{i=1}^{n} \theta_i y_{t-1} + \sum_{j=1}^{m} \delta_j x_{t-j} + e_{2t} \quad (3.7)$$

When the lagged values of x_t are significant in explaining y_t, x_t Granger-cause y_t and vice-versa. When lagged x_t and y_t are significant in each other's equation, there is bidirectional causality, while the insignificants of the variables in explaining each other implies no causality among them (they are independent). The standard joint F- test is used to examine the Granger causality in a VAR system Asterious and Hall (2007) and Brooks (2008).

The granger causality test hypothesis:

H_0: monetary policy does not granger cause Inflation

H_1: monetary policy granger causes Inflation

Decision Rule: Reject the null hypothesis if p-value below 0.1 and F-statistics is greater than 3.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

The aim of this chapter is to present the empirical results of the models developed in chapter Three. To achieve that, the sections in this chapter are organized as follows: Section 2 provides a descriptive statistic of the variables used and their trend analysis. Section 3 presents the results of the Unit Root Test. Section 4 presents the results of Co-integration tests. Section 5 presents the Ordinary Least Square result, while section 6 presents the Granger Causality Test.

4.2 Descriptive Statistics

Table 4.1 present the descriptive statistics on the variables and while Figure 4.1 plotted the data to get the glimpse of data.

Table 4.1: Descriptive Statistics

	EXG	INF	MPR	MS	TBR
Mean	102.4723	19.96030	13.07692	5768.372	13.02017
Median	109.5500	12.17000	13.50000	878.4600	12.95083
Maximum	308.0000	76.75887	26.00000	29137.80	26.90000
Minimum	0.600000	0.220000	6.000000	14.47000	4.500000
Std. Dev.	92.86848	18.03008	4.046666	8369.833	4.868224
Skewness	0.783123	1.682079	0.669289	1.354266	0.343590
Kurtosis	3.000935	4.843408	4.332329	3.579402	3.122500
Jarque-Bera	3.986329	23.91304	5.796199	12.46677	0.791736
Probability	0.136264	0.000006	0.055128	0.001963	0.673096
Sum	3996.420	778.4516	510.0000	224966.5	507.7867
Sum Sq. Dev.	327733.1	12353.18	622.2692	2.66E+09	900.5849
Observations	**39**	**39**	**39**	**39**	**39**

Source: Author's Computation with E-views 9.

From table 4.1 above, the Descriptive Statistic result indicated a total of 39 observations. Exchange rate (EXG), Inflation rate (INF) and Monetary policy rate (MPR) mean value stood at

102.47, 19.96 and 13.08 respectively. They range from 0.60 to 308.0, 0.22 to 76.76 percent and 6.00 to 26.0 percent respectively. Their median value was 109.55, 12.17 and 13.5; standard deviation 92.87, 18.03 and 4.05; skewness was 0.78, 1.68 and 0.67 and kurtosis stood at 3.00, 4.84 and 4.33 respectively. Analysis on money supply and treasury bill rate can be seen on Table 4.1.

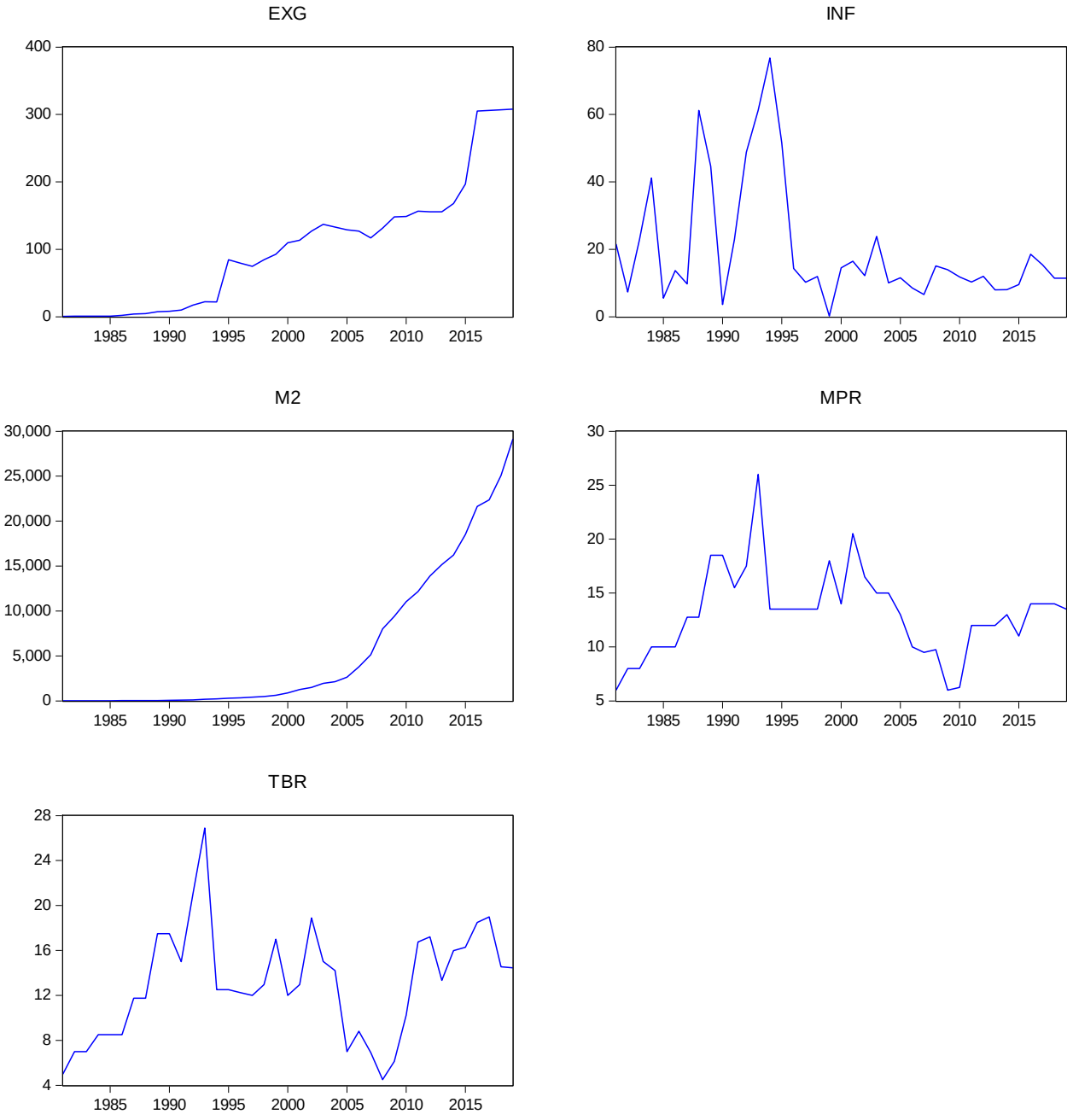


Figure 4.1: Trends on the Variables (1981 – 2019)

There is high fluctuation in Inflation (INF), monetary policy rate (MPR) and treasury bill rate, with fluctuations in inflation rate is much higher as compared to either the MPR or the TBR. Trend in other variables can be observed in Figure 4.1.

4.3 Unit Root Test

The study tested for stationarity using Augmented Dickey Fuller (ADF) Unit root test so as to ascertain their order of integration. This is to avoid estimating spurious regression. The result of ADF unit root test is presented in table 4.2 below:

Table 4.2: Unit Root Test Results

VARIABLES	ADF UNIT ROOT TEST				ORDER OF INTEGRATION
	LEVEL		DIFFERENCE		
	t-stats	Prob	t-stats	Prob	
EXG	-1.703928	0.7299	-5.627956	0.0002	I(1)
INF	-4.090604	0.1140	-3.235340	0.0063	I(1)
MPR	-3.242532	0.0916	-8.515384	0.0000	I(1)
MS	4.062497	1.0000	-3.616262	0.0420	I(1)
TBR	-2.964678	0.1551	-6.792089	0.0000	I(1)

Source: Author's Computation with E-View 9.

From table 4.2 above, the Augmented Dickey Fuller (ADF), unit root test indicated that all the variables were stationary at first differences having found to be non-stationary at their levels at 5% level of significance. Since they are all stationary at 1st difference, hence, the need for long run analysis.

4.4 Co-integration Test

Johansen cointegration technique was used to determine the long run relationship between the variables since all the variables are integrated to the same order I(1). The main aim behind this analysis is to prove and predict the existence of co-integration and the co-movement (long run relationship) between the variables in the series that is under consideration.

Table 4.3: Co-integration Test Results

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.700257	107.0674	69.81889	0.0000
At most 1 *	0.518276	62.48876	47.85613	0.0012
At most 2 *	0.391929	35.46453	29.79707	0.0100
At most 3 *	0.271080	17.05840	15.49471	0.0289
At most 4 *	0.134845	5.359320	3.841466	0.0206

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.700257	44.57866	33.87687	0.0018
At most 1	0.518276	27.02422	27.58434	0.0588
At most 2	0.391929	18.40613	21.13162	0.1154
At most 3	0.271080	11.69908	14.26460	0.1225
At most 4 *	0.134845	5.359320	3.841466	0.0206

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's Computation using E-Views 9

Table 4.3 shows the Unrestricted cointegration test result (Trace and Maximum Eigenvalue). The Johansen co-integration trace test result indicated 5 co-integrating equations at the 0.05 percent significance level between the variables. This denotes the rejection of the null hypothesis at 0.05% level. While the Maximum Eigenvalue test indicated 1 co-integrating equation at 0.05% level. Both tests result suggests that there exist a long-run relationship between the variables.

4.5 Ordinary Least Square Result

Table 4.4 present the Ordinary Least Square Regression result of the relationship between monetary policy variables (EXG, MPR, MS and TBR) and Inflation (INF) – the dependent Variable.

Table 4.4: OLS Regression Result

Dependent Variable: LINF
Method: Least Squares
Date: 09/08/20 Time: 23:25
Sample: 1981 2019
Included observations: 39

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXG	-1.168367	4.746643	0.246146	0.0070
LMPR	3.675857	17.53425	0.209639	0.0352
LM2	3.677137	3.628475	-1.013411	0.0180
LTBR	8.946385	11.79662	0.758385	0.0534
C	8.597838	33.85307	0.253975	0.0010

R-squared	0.713635	Mean dependent var	19.96030
Adjusted R-squared	0.621122	S.D. dependent var	18.03008
S.E. of regression	16.90293	Akaike info criterion	8.612060
Sum squared resid	9714.108	Schwarz criterion	8.825337
Log likelihood	-162.9352	Hannan-Quinn criter.	8.688582
F-statistic	2.309232	Durbin-Watson stat	1.680904
Prob(F-statistic)	0.000868		

Source: Author's Computation with E-Views 9.

Table 4.4 shows the OLS regression results. The R2 of 0.713635 which indicates 71 percent of total variation in the dependent variable can be explained by the explanatory variables. The adjusted R2 of 0.6211 or 62 percent, showed that the explanatory variables were robust in explaining the variation in inflation within the period. The Durbin-Watson statistic of 1.6809 which is close to 2.0 indicates no presence of autocorrelation in the data. Nonetheless, the F-statistic has a value of 2.309 with probability value of 0.000868 which means, it is statistically significant at 5% and the model is a good fit. Therefore, the explanatory variables have a joint significant impact in determining the movement in inflation rate in Nigeria within the period 1981 - 2019.

The estimated coefficient of exchange rate (-1.168367) is rightly signed. It is negative and statistically significant. This is true for an import dependent country like Nigeria. This by implication means that a 1 percent depreciation in Naira exchange rate will increase inflation by 1.17 percent. This is in conformity with economic theory and the result obtained in the works of Odusanya and Atanda (2010) and Iya and Aminu (2014) for Nigeria. The estimated coefficient of monetary policy rate (3.675857) is rightly signed (positive) and statistically significant. A 1 percent increase in monetary policy rate will increase inflation by 3.68 percent. under investigation.

The coefficient of money supply (3.677) is positive as expected and statistically significant. A 1 percent increase in money supply will increase inflation by 3.68 percent. The estimated coefficient of treasury bill rate (8.946385) is rightly signed (positive) and statistically significant. A 1 percent increase in treasury bill rate will increase inflation by 8.95 percent. Therefore, relationship existed between inflation and monetary policy rate in Nigeria during the period

4.6 Granger-Causality Test

Table 4.5 shows the result of the Granger causality relationship between INF and the selected monetary policy variables. The decision rule is that we reject the null hypothesis if the p-value is less than 0.05 and the F-statistics is greater than 3.

Table 4.5: Granger Causality Test Result

Pairwise Granger Causality Tests
Date: 09/08/20 Time: 23:29
Sample: 1981 2019
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LM2 does not Granger Cause LINF	37	2.20237	0.1270
LINF does not Granger Cause LM2		3.58098	0.0395
LMPR does not Granger Cause LINF	37	0.32980	0.7215
LINF does not Granger Cause LMPR		2.54293	0.0944
LTBR does not Granger Cause LINF	37	0.25803	0.7742
LINF does not Granger Cause LTBR		3.01446	0.0632
LEXG does not Granger Cause LINF	37	1.06804	0.3556
LINF does not Granger Cause LEXG		0.23848	0.7892
LMPR does not Granger Cause LM2	37	2.34546	0.1121
LM2 does not Granger Cause LMPR		0.55260	0.5808
LTBR does not Granger Cause LM2	37	0.65570	0.5259
LM2 does not Granger Cause LTBR		0.14809	0.8629
LEXG does not Granger Cause LM2	37	2.84767	0.0727
LM2 does not Granger Cause LEXG		0.77930	0.4672
LTBR does not Granger Cause LMPR	37	4.57056	0.0179
LMPR does not Granger Cause LTBR		0.67831	0.5146
LEXG does not Granger Cause LMPR	37	0.76432	0.4740
LMPR does not Granger Cause LEXG		6.96264	0.0031
LEXG does not Granger Cause LTBR	37	0.50019	0.6111
LTBR does not Granger Cause LEXG		5.61083	0.0082

Source: Author's Computation using E-Views 9.

Table 4.5 shows the result of the Granger causality analysis. The result shows that we reject the null hypothesis of LINF does not Granger Cause LM2, LTBR does not Granger Cause LMPR, LMPR does not Granger Cause LEXG and LTBR does not Granger Cause LEXG at 5% level of significance while the opposite cannot be rejected. This result indicates that there is a unidirectional causal relationship between LINF and LM2, LTBR and LMPR, LMPR and LEXG and LTBR and LEXG. The results show that changes in inflation will lead to a significant change

in money supply but not vice versa. There was no case of bidirectional causality at 5% significance level.

4.7 Test of Hypothesis

The hypothesis of the research:

H_1: There is a significant relationship between monetary policy and inflation growth in Nigeria.

Regression analysis shows that monetary policy is positive and negative (as the case may be) and significant in explaining inflation growth in Nigeria. The findings show the significant impact monetary policy variables has on inflation growth. Hence, we reject the null hypothesis of the study that monetary policy has significant impact on inflation growth in Nigeria.

H_0: Is there a causal relationship between monetary policy and inflation growth in Nigeria?

The Granger causality test results were used to determine the relationship between monetary policy and inflation growth and it shows a unidirectional causality from inflation to money supply and not vice-versa. This means that changes in inflation will cause growth in money supply in the economy, but money supply does not cause inflation. Hence, we cannot reject the null hypothesis that there is no causal relationship between monetary policy and inflation in Nigeria during the period under review.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The study analyzed the effectiveness of monetary policy variables on inflation in Nigeria between 1981 and 2019. The study introduced four predictor variables: monetary policy rate, money supply, exchange rate and treasury bills rate, in order to achieve robustness in the analysis of data and hypotheses testing. The study furthermore analyzed the relationship between monetary policy rate, money supply, exchange rate, treasury bills rate and inflation rate in Nigeria. The research made use of secondary data sourced from Central Bank of Nigeria (CBN) Statistical bulletin 2019 and the National Bureau of Statistics (NBS) on monetary policy rate, exchange rate, treasury bills rate, money supply and inflation. The Ordinary Least Square (OLS) and Granger Causality test techniques were employed in the data analysis.

The study commenced with the analysis of testing the variables of interest using Augmented Dickey Fuller (ADF) unit root test and the result indicates that the variables were non-stationary at level but was stationary at first differences. The Johansen co-integration test revealed the existence of long-run relationship between the variables. While the empirical result of the OLS test showed that monetary policy rate, money supply and treasury bill rates exert positive influence on inflation in Nigeria. Exchange rate depreciation leads to inflationary growth. This result is consistent with the prediction of economic theory. Specifically, the study found that;

1. The Augmented Dickey Fuller (ADF), unit root test indicated that all the variables were stationary at first differences having found to be non-stationary at their levels. Hence, the need for long run analysis since they are all stationary at 1^{st} differences.

2. The Johansen co-integration trace test result indicated 5 co-integrating equations at the 0.05 percent significance level between the variables. This denotes the rejection of the null hypothesis at 0.05% level. While the Maximum Eigenvalue test indicated 1 co-integrating equation at 0.05% level. Both tests result suggests that there exists a long-run relationship between the variables.

3. The OLS results indicated that the estimated coefficient of exchange rate (-1.168367) is rightly signed. It is negative and statistically significant. This by implication means that a 1 percent depreciation in Naira exchange rate will increase inflation by 1.17 percent; The estimated coefficient of monetary policy rate (3.675857) is rightly signed (positive) and statistically significant. A 1 percent increase in monetary policy rate will increase inflation by 3.68 percent. The coefficient of money supply (3.677) is positive as expected and statistically significant. A 1 percent increase in money supply will increase inflation by 3.68 percent. The estimated coefficient of treasury bill rate (8.946385) is rightly signed (positive) and statistically significant. A 1 percent increase in treasury bill rate will increase inflation by 8.95 percent. Therefore, relationship existed between inflation and monetary policy rate in Nigeria during the period.

4. The Granger causality analysis result shows that we reject the null hypothesis of LINF does not Granger Cause LM2, LTBR does not Granger Cause LMPR, LMPR does not Granger Cause LEXG and LTBR does not Granger Cause LEXG at 5% level of significance while the opposite cannot be rejected. This result indicates that there is a unidirectional causal relationship between LINF and LM2, LTBR and LMPR, LMPR and LEXG and LTBR and LEXG. The results show that changes in inflation will lead to a significant change in money

supply but not vice versa. There was no case of bidirectional causality at 5% significance level.

5.2 Conclusion

The focus of this study was on the effectiveness of monetary policy on inflation in Nigerian economy. Monetary policy rate, money supply, treasury bills rate and exchange rate were used as the determinant of inflation. The empirical result showed that money supply, treasury bills rate, monetary policy rate and exchange rate had influence on inflation within the period under consideration.

5.3 Recommendations

Based on the results and conclusion, the study made the following recommendations:

a. This study has identified that the major driver of inflation is expected inflation. It is thereby recommended that government should handle and manage information on crucial macroeconomic variables relating to control of inflationary pressures.

b. Secondly, the Central Bank should identify practical means of contracting money supply in the system and make better use of exchange rate to lessen inflation. The study discovered that annual Treasury bill rate through open market operation as proxy has not been effective in influencing inflation. Hence, schemes to make it more effective should be implemented perhaps through competitive rates.

c. The monetary authority should re-evaluate the effectiveness and potency of monetary policy rate as a tool to curb inflation in Nigeria during and after the study period especially now that the occurrence of COVID-19 pandemic has shown the world the need to exercise a lot of caution in formulating policies in Nigeria and globally.

d. The Central Bank should assess policies before implementation particularly regarding treasury bills rate.

e. Finally, the Central Bank should clearly elucidate the objectives its policies and ensure appropriate control and management of monetary policy variables.

References

- Abiola Adeola Kumapayi, Joseph Ufuoma Nana, Bright Onoriode Ohwofasa (2012) "Impact of Inflation on Monetary Policy and Economic Development in Nigerian, 1980-2010. Evidence from Empirical Data" Asian Journal of Empirical Research Vol. 2, No. 2, pp. 28-39
- Ahiabor, G. (2013). The Effects of Monetary Policy on Inflation in Ghana. *Developing Country Studies*, *3*(12), 82-89.
- Asuquo, A. (2012). Inflation accounting and control through monetary policy measures in Nigeria: Multi-regression analysis (1973-2010). IOSR Journal of Business and Management, 1(2), 53-62.
- Adodo, F., Akindutire, O., & Ogunyemi, J. (2018). MONETARY POLICY AND CONTROL OF INFLATION IN NIGERIA. *International Journal Of Management, IT & Engineering*, *8*(12), 154-170.
- Anowor, O.F. & Okorie, G.C. (2016). A reassessment of the impact of monetary policy on economic growth: Study of Nigeria. International Journal of Developing and Emerging Economies, 4(1), 82-90
- Ajie, H.A. and S.G. Nenbee (2010). Monetary Policy and Stock Prices in Nigeria, 1980 - 2008: An Econometric Analysis. The International Journal Series on Tropical Issues, 11(2):183 194, July.
- Alchian, A.A. and B. Klein (1973) "On a Correct Measure of Inflation", Journal of Money, Credit and Banking 5(1), 173-191.
- Asterious, D. and Hall, S.G. (2007). Applied Econometrics: A Modern Approach, London: Palgrave and Macmillan
- Brooks, C. (2008). Introductory Econometrics for Finance (2nd), New York: Cambridge University Press
- Bakare, A. (2011). An empirical study of the determinants of money supply growth and its effects on inflation rate in Nigeria. *Journal Of Research In International Business And Management*, *1*(5), 124-129.
- Bassey, G. E. & Essien, E. B. (2014). Inflation Targeting framework for Monetary Policy in Nigeria: Issues, Problems and Prospects. Journal of Economics and Sustainable Development (JESD) Vol. 5, No. 8, pp. 88 – 101
- Bryan, M.F., S.G. Cecchetti and G. O'Sullivan (2002) "Asset Prices in the Measurement of Inflation". NBER working paper, 8700
- Chinaemerem, C. O. & Akujuobi, L. E. (2012). Inflation Targeting and Monetary Policy Instruments: Evidence from Nigeria and Ghana. Arabian Journal of Business and Management Review.Vol. 1, No.11, pp. 52 – 81
- Chimobi, O. P. and U. C. Uche (2010). Money, Price and Output: A Causality Test for Nigeria. American Journal of Scientific Research, 8, 78-87.
- Chaudhry, I.S., Ismail, R., Farooq, F. & Murtaza, G. (2015). Monetary policy and its inflationary pressure in Pakistan. Pakistan Economic and Social Review, 53(2), 251-268

- Central Bank of Nigeria. (2006). *HOW DOES THE MONETARY POLICY DECISIONS OF THE CENTRAL BANK OF NIGERIA AFFECT YOU? PART TWO*. Nigeria: Central Bank of Nigeria.
- Central Bank of Nigeria (2019). CBN Statistical Bulletin. Abuja, 2015
- Christiano, L. J., & Fitzgerald, T. J. (2003). The band pass filter. International Economic Review, 44, 435–465
- Danjuma, I., Jibrin, S. M. & Blessing, S. E. (2012).An Assessment of the Effectiveness of Monetary Policy in Combating Inflation Pressure on the Nigerian Economy.Erudite Journal of Business Administration and Management (EJBAM), Vol. 1(1), pp. 7 – 16
- Dania, Evelyn N. (2013) "Determinants of Inflation in Nigeria (1970 – 2010)". The Business & Management Review, vol. 3. No. 2. Pp. 106-114
- Dornbusch, R. et al (1996). Macroeconomic. Sydney: The McGraw-Hill Companies, Inc.
- Dornbusch, R. & Fischer, S. (1994). Macroeconomics. New York: McGraw-Hill, Inc. pp. 209. 6th edition
- Enu, Patrick and Havi, Emmanuel Dodzi K. (2014) "Macroeconomic Determinants of Inflation in Ghana: A Co-integration Approach". International Journal of Academic Research and Social Sciences, vol.4. No.7. Pp. 95-110
- F.N. Emerenini, & C.N. Eke, C (2014), The impact of monetary policy rate on inflation Nigeria, Journal of Economics and Sustainable Development, 5, (28), 2014
- Friedman, M. (1969). The Role of Monetary Policy. The Optimum Quantity of Money, ed. Milton Friedman. Chicago: Aldine.
- Fabian, E.M. & Charles, E.N. (2014). The impact of monetary policy rate on inflation in Nigeria. Journal of Economics and Sustainable Development, 5(28), 146-153.
- Fisher, I. (1911) "The Purchasing Power of Money". The Macmillan Company, New York, USA.
- Friedman, M. (1968). The Quantity Theory of Money. International Encyclopaedia of Social Sciences. London, Corwell Collier and Macmillan, Inc. Vol. 10
- Gbadebo, A.D. & Muhammed, N. (2015). Monetary policy and inflation control in Nigeria. Journal of Economics and Sustainable Development, 6(8), 108-115.
- Goodhart, C. (2001) "What Weights Should be Given to Asset Prices in the Measurement of Inflation?", The Economic Journal 11, 335-356.
- Hossain, E, Ghosh, B.C. and Islam, K. (2012). Inflation and Economic Growth in Bangladesh, Journal of Arts, Science & Commerce, 4(2)
- Hossain, Tanjil and Islam, Nazrul (2013) "Economic Analysis of the Determinants of Inflation in Bangladesh". The International Journal of Social Sciences, vol. 11. No. 1. Pp. 29-36
- Islam, R., Ghani, A.BA., Mahyudin, E. & Manickam, N. (2017). Determinants of Factors that Affecting Inflation in Malaysia. International Journal of Economics and Financial Issues, 7(2), 355-364.
- Ifeakachukwu Nwosa, P., & Olasunkanmi Oseni, I. (2012). Monetary Policy, Exchange Rate and Inflation Rate in Nigeria A Co-integration and Multi-Variate Vector Error Correction Model Approach. *Research Journal Of Finance And Accounting*, *3*(3), 62-69.

- Imoughele, L., Ismaila,M.(2016). MONETARY POLICY, INFLATION AND ECONOMIC GROWTH IN NIGERIA: EXPLORING THE CO-INTEGRATION AND CAUSALITY RELATIONSHIP. *Global Journal Of Research In Business & Management*, *4*(1), 236-245.
- Iya, I. B. and Aminu, U (2014) "An Empirical Analysis if Determinants of Inflation in Nigeria". Journal of Economics and Sustainable Development, vol. 5. No. 1. Pp. 140-150
- Kirkpatrick, C. H. & Nixon, F. I. (1976). The Origins of Inflation in Less developed Countries: A Selected Review. In Parkin, M. &Zis, G. (eds.), Inflation in Open Economies. Manchester University Press
- Maku, Adejoke O. and Adelowokan, Oluwaseyi A. (2013) "Dynamic of Inflation in Nigeria: An Autoregressive Approach". European Journal of Humanities and Social Sciences, vol. 22. No.1.
- Mohamed, I. (2016): The Impacts of Monetary Policies on Inflation Rates in Sudan (1970–2014). International Journal of Advance Research in Management, Engineering and Technology 1(1), P. 75-81
- Masha I. S. N., Essien M. L., Musa D., Akpan B. and M. O. Abeng (2004). Theoretical Issues in Financial Intermediation, Financial Markets, Macroeconomic Management and Monetary Policy. In Nnanna, O. J., Englama A. and F. O. Odoko (eds) CBN. Financial Markets in Nigeria, pp. 7 – 27
- Myrdal, G. (1968). Asian Drama: An Inquiry into the Poverty of Nations. Penguin: Hormondsworth
- Nenbee, S., & Madume, J. (2011). THE IMPACT OF MONETARY POLICY ON NIGERIA'S MACROECONOMIC STABILITY. *International Journal Of Economic Development Research And Investment*, *2*(2), 174-183.
- Ngerebo-A, T.A. (2016). Monetary policy and inflation in Nigeria. International Journal of Finance and Accounting, 5(2), 67-76
- Nasko, A.M. (2016). Impact of Monetary policy on the economic growth of Nigeria. Pyrex Journal of Business and Finance Management Research, 2(10), 163-179.
- Onyeiwu, C. (2012). Monetary Policy and Economic Growth of Nigeria. Journal of Economics and Sustainable Development, 3 (7). 62-71
- Oyinpyere Apere, T., & Moses Karimo, T. (2014). Monetary Policy Effectiveness, Output Growth and Inflation in Nigeria. *International Journal Of Economics, Finance And Management*, *3*(6), 301-307.
- Okwori, J., & Abu, J. (2017). Monetary Policy and Inflation Targeting in Nigeria. *International Journal Of Economics And Financial Management*, *2*(3), 1-12.
- Okwori, J. & Abu, J. (2015). Determinants of Money Supply in Nigeria. Journal of Economic and Social Research (JESR). Vol. 6, No. 1, pp. 77 – 103
- Odior, E. S. O. (2012). Inflation Targeting in an Emerging Market: VAR and Impulse Response Function Approach.European Scientific Journal. Vol. 8, No. 6, pp. 79 – 98
- Odusanya, Ibrahim A and Atanda, Akinwande A. (2010) "Analysis of Inflation ant its Determinants in Nigeria". Pakistan Journal of Social Sciences, vol.7. No.2. Pp. 97-100S

- Philip, N.O., Christopher, D.Z. & Pius, O.A. (2014). Effectiveness of monetary policy in reducing inflation in Nigeria (1970-2013). Journal of Economics and Sustainable Development, 5(13), 73-81
- Riti, J. S. & Kamah, M. (2015). Inflation Targeting and Economic Growth in Nigeria: A Vector Auto Regressive (VAR) Approach. European Journal of Contemporary Economics and Management. Vol. 2, No. 1, pp. 42 – 63
- Ratnasiri, H.P.G.S. (2009) "The Main Determinants of Inflation in Sri Lanka: A VAR Based Analysis". Central Bank of Sri Lanka-Staff Studies, vol.39. No.1&2. Pp. 1-14
- Salunkhe, B., & Patnaik, A. (2017). THE IMPACT OF MONETARY POLICY ON OUTPUT AND INFLATION IN INDIA: A FREQUENCY DOMAIN ANALYSIS1. *ECONOMIC ANNALS*, *62*(212), 113-154.
- Sola, O., & Peter, A. (2012). Money Supply and Inflation in Nigeria: Implications for National Development. *Scientific Research*, *4*(3), 161-170.
- Tékam Oumbé Honoré. Monetary Policy and Inflation: Empirical Evidence from Cameroon. International Journal of Economics, Finance and Management Sciences. Vol. 6, No. 5, 2018, pp. 200-207. doi: 10.11648/j.ijefm.20180605.11
- Tonprebofa Waikumo Okotori. "The Dynamics of Monetary Policy and Inflation in Nigeria." IOSR Journal of Economics and Finance (IOSR-JEF) , vol. 10, no. 2, 2019, pp. 37-49
- Umaru, A., & Abdulrahman, A. (2012). Effect of Inflation on the Growth and Development of the Nigerian Economy (An Empirical Analysis). *International Journal Of Business And Social Science*, *3*(10), 180-191.
- Wuyah Yunana, T., Michael, B., & James Essein, A. (2015). Impact of Monetary Policy on Inflationary Process in Nigeria. *European Journal Of Business And Management*, *7*(31), 62-68
- Zayyanu Bello, M. & Abdullahi Saulawa, M. (2013). Relationship between Inflation, Money Supply, Interest Rate and Income Growth (Rgdp) in Nigeria 1980-2010. an Empirical Investigation. *Journal Of Economics And Sustainable Development*, *4*(8), 4-13.

APPENDIX

DATA FOR THE STUDY

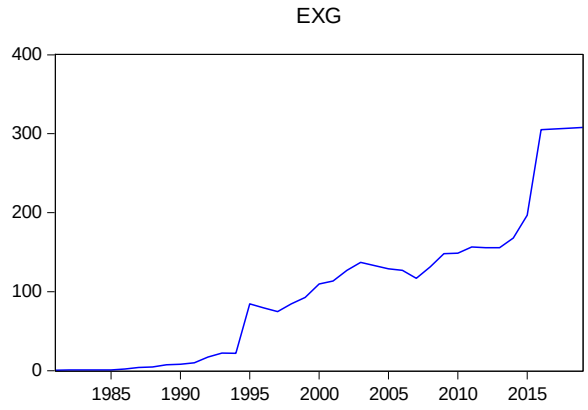
Years	EXG	MPR	MS	INF	TBR
1981	0.60	6.00	14.47	21.54613	5.00
1982	0.70	8.00	15.79	7.330331	7.00
1983	0.70	8.00	17.69	23.02843	7.00
1984	0.80	10.00	20.11	41.14562	8.50
1985	0.90	10.00	22.3	5.487196	8.50
1986	2.00	10.00	23.81	13.67347	8.50
1987	4.00	12.75	27.57	9.694794	11.75
1988	4.50	12.75	38.36	61.21113	11.75
1989	7.40	18.5	45.9	44.67005	17.50
1990	8.00	18.5	47.42	3.614035	17.50
1991	9.90	15.5	75.4	22.9597	15.00
1992	17.30	17.5	111.11	48.80198	21.00
1993	22.10	26	165.34	61.26226	26.90
1994	21.9	13.5	230.29	76.75887	12.50
1995	84.58	13.5	289.09	51.58756	12.50
1996	79.6	13.5	345.85	14.31	12.25
1997	74.63	13.5	413.28	10.21	12.00
1998	84.37	13.5	488.15	11.91	12.95
1999	92.53	18	628.95	0.22	17.00
2000	109.55	14	878.46	14.53	12.00
2001	113.45	20.5	1269.32	16.49	12.95
2002	126.9	16.5	1505.96	12.17	18.88
2003	137	15	1952.92	23.81	15.02
2004	132.85	15	2131.82	10.01	14.21
2005	129	13	2637.91	11.57	7.00
2006	127	10	3797.91	8.55	8.80
2007	116.8	9.5	5127.4	6.56	6.91
2008	131.25	9.75	8008.2	15.06	4.50
2009	148.1	6	9411.11	13.93	6.13
2010	148.81	6.25	11034.94	11.82	10.25
2011	156.7	12	12172.49	10.28	16.75
2012	155.76	12	13893.22	11.98	17.20
2013	155.74	12	15154.64	7.96	13.34
2014	168	13	16238.52	8	15.99
2015	197	11	18525.22	9.55	16.28
2016	305	14	21624.63	18.55	18.50
2017	306	14	22363.43	15.37	18.98
2018	307	14	25079.72	11.44	14.55

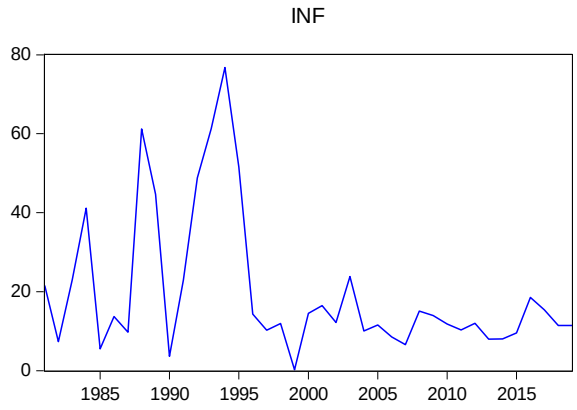
2019	308.0	13.50	29,137.80	11.4	14.45

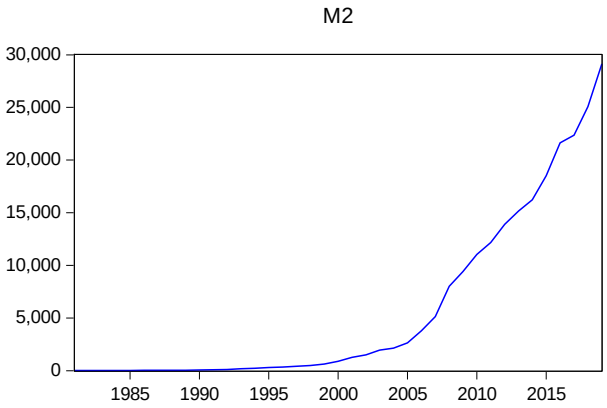
DESCRIPTIVE STATISTICS

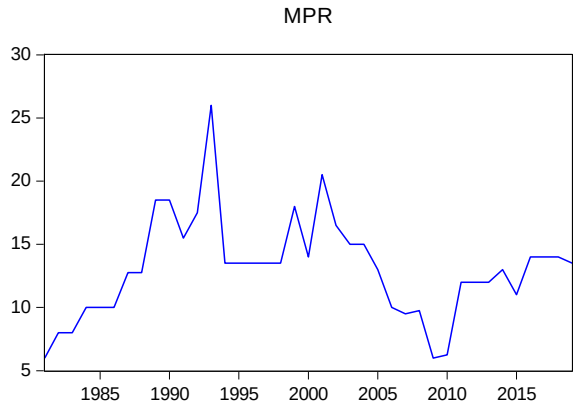
	EXG	INF	MPR	MS	TBR
Mean	102.4723	19.96030	13.07692	5768.372	13.02017
Median	109.5500	12.17000	13.50000	878.4600	12.95083
Maximum	308.0000	76.75887	26.00000	29137.80	26.90000
Minimum	0.600000	0.220000	6.000000	14.47000	4.500000
Std. Dev.	92.86848	18.03008	4.046666	8369.833	4.868224
Skewness	0.783123	1.682079	0.669289	1.354266	0.343590
Kurtosis	3.000935	4.843408	4.332329	3.579402	3.122500
Jarque-Bera	3.986329	23.91304	5.796199	12.46677	0.791736
Probability	0.136264	0.000006	0.055128	0.001963	0.673096
Sum	3996.420	778.4516	510.0000	224966.5	507.7867
Sum Sq. Dev.	327733.1	12353.18	622.2692	2.66E+09	900.5849
Observations	39	39	39	39	39

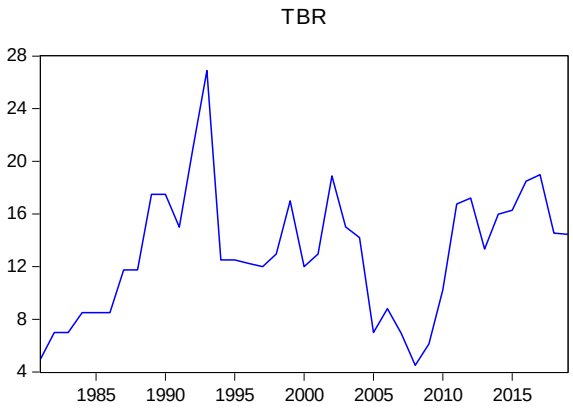
TREND ON THE VARIABLES











ADF UNIT ROOT TEST

Levels

Null Hypothesis: EXG has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.703928	0.7299
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXG)
Method: Least Squares
Date: 09/08/20 Time: 16:58
Sample (adjusted): 1982 2019
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXG(-1)	-0.177255	0.104027	-1.703928	0.0973
C	-8.810669	8.145052	-1.081720	0.2868
@TREND("1981")	1.748982	0.820657	2.131197	0.0402

R-squared	0.129215	Mean dependent var	8.089474
Adjusted R-squared	0.079456	S.D. dependent var	20.59343
S.E. of regression	19.75836	Akaike info criterion	8.880687
Sum squared resid	13663.75	Schwarz criterion	9.009970
Log likelihood	-165.7331	Hannan-Quinn criter.	8.926685
F-statistic	2.596810	Durbin-Watson stat	1.756965
Prob(F-statistic)	0.088806		

Ist Difference

Null Hypothesis: D(EXG) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.627956	0.0002
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXG,2)
Method: Least Squares
Date: 09/08/20 Time: 16:58
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXG(-1))	-0.973424	0.172962	-5.627956	0.0000
C	-0.507289	7.287675	-0.069609	0.9449
@TREND("1981")	0.429631	0.333052	1.289981	0.2058

R-squared	0.482643	Mean dependent var	0.024324
Adjusted R-squared	0.452210	S.D. dependent var	28.17683
S.E. of regression	20.85447	Akaike info criterion	8.990618
Sum squared resid	14786.90	Schwarz criterion	9.121233
Log likelihood	-163.3264	Hannan-Quinn criter.	9.036666
F-statistic	15.85932	Durbin-Watson stat	1.978300
Prob(F-statistic)	0.000014		

Levels

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.090604	0.1140
Test critical values:	1% level	-4.226815	
	5% level	-4.091601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 09/08/20 Time: 17:00
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.680384	0.166329	-4.090604	0.0003
D(INF(-1))	0.264004	0.162410	1.625541	0.1136
C	24.16239	7.470317	3.234453	0.0028
@TREND("1981")	-0.513568	0.249061	-2.062017	0.0472

R-squared	0.342398	Mean dependent var	0.109991
Adjusted R-squared	0.282616	S.D. dependent var	17.42911

S.E. of regression	14.76219	Akaike info criterion	8.323822
Sum squared resid	7191.438	Schwarz criterion	8.497975
Log likelihood	-149.9907	Hannan-Quinn criter.	8.385219
F-statistic	5.727449	Durbin-Watson stat	1.968177
Prob(F-statistic)	0.002862		

1st Diff

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.235340	0.0063
Test critical values:	1% level	-4.284580	
	5% level	-3.162882	
	10% level	-3.015267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 09/08/20 Time: 17:00
Sample (adjusted): 1989 2019
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-2.200736	0.680218	-3.235340	0.0038
D(INF(-1),2)	1.146271	0.613919	1.867136	0.0753
D(INF(-2),2)	0.652581	0.544543	1.198400	0.2435
D(INF(-3),2)	0.565392	0.438185	1.290303	0.2103
D(INF(-4),2)	0.220614	0.336033	0.656527	0.5183
D(INF(-5),2)	0.161312	0.229146	0.703970	0.4888
D(INF(-6),2)	0.124031	0.143999	0.861335	0.3983
C	-5.404173	6.631815	-0.814886	0.4239
@TREND("1981")	0.149849	0.270012	0.554970	0.5845

R-squared	0.740098	Mean dependent var	-1.663108
Adjusted R-squared	0.645589	S.D. dependent var	22.10089
S.E. of regression	13.15720	Akaike info criterion	8.229515
Sum squared resid	3808.461	Schwarz criterion	8.645834
Log likelihood	-118.5575	Hannan-Quinn criter.	8.365225
F-statistic	7.830930	Durbin-Watson stat	1.122859
Prob(F-statistic)	0.000059		

Levels

Null Hypothesis: MPR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.242532	0.0916
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MPR)
Method: Least Squares
Date: 09/08/20 Time: 17:01
Sample (adjusted): 1982 2019
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR(-1)	-0.411723	0.126976	-3.242532	0.0026
C	6.156912	1.969247	3.126532	0.0035
@TREND("1981")	-0.029746	0.046850	-0.634924	0.5296

R-squared	0.237163	Mean dependent var	0.197368
Adjusted R-squared	0.193572	S.D. dependent var	3.526520
S.E. of regression	3.166861	Akaike info criterion	5.219016
Sum squared resid	351.0154	Schwarz criterion	5.348299
Log likelihood	-96.16130	Hannan-Quinn criter.	5.265014
F-statistic	5.440686	Durbin-Watson stat	2.296164
Prob(F-statistic)	0.008761		

1st Diff

Null Hypothesis: D(MPR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.515384	0.0000
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MPR,2)
Method: Least Squares
Date: 09/08/20 Time: 17:02
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(MPR(-1))	-1.359618	0.159666	-8.515384	0.0000
C	0.877876	1.197074	0.733351	0.4684
@TREND("1981")	-0.032574	0.052707	-0.618009	0.5407

R-squared	0.680813	Mean dependent var	-0.067568
Adjusted R-squared	0.662038	S.D. dependent var	5.867652
S.E. of regression	3.411131	Akaike info criterion	5.369570
Sum squared resid	395.6178	Schwarz criterion	5.500185
Log likelihood	-96.33704	Hannan-Quinn criter.	5.415618
F-statistic	36.26038	Durbin-Watson stat	2.160838
Prob(F-statistic)	0.000000		

Levels

Null Hypothesis: MS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		4.062497	1.0000
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MS)
Method: Least Squares
Date: 09/08/20 Time: 17:03
Sample (adjusted): 1991 2019
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS(-1)	0.414336	0.101990	4.062497	0.0008
D(MS(-1))	-0.021062	0.168640	-0.124893	0.9021
D(MS(-2))	-0.159764	0.168065	-0.950609	0.3551
D(MS(-3))	-0.856229	0.344344	-2.486552	0.0236
D(MS(-4))	0.078580	0.237028	0.331521	0.7443
D(MS(-5))	-0.781255	0.237618	-3.287865	0.0043
D(MS(-6))	-1.329389	0.352803	-3.768079	0.0015
D(MS(-7))	0.513690	0.276846	1.855512	0.0809
D(MS(-8))	0.259580	0.279040	0.930263	0.3653
D(MS(-9))	-2.267809	0.474517	-4.779192	0.0002
C	-736.1682	475.2245	-1.549096	0.1398
@TREND("1981")	54.63209	28.28766	1.931304	0.0703

R-squared	0.904187	Mean dependent var	1003.117
Adjusted R-squared	0.842190	S.D. dependent var	1100.150
S.E. of regression	437.0379	Akaike info criterion	15.29142
Sum squared resid	3247036.	Schwarz criterion	15.85720

Log likelihood	-209.7256	Hannan-Quinn criter.	15.46862
F-statistic	14.58441	Durbin-Watson stat	2.146557
Prob(F-statistic)	0.000001		

1st Diff

Null Hypothesis: D(MS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.616262	0.0420
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MS,2)
Method: Least Squares
Date: 09/08/20 Time: 17:04
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MS(-1))	-0.688235	0.190317	-3.616262	0.0010
C	-568.6078	252.3315	-2.253416	0.0308
@TREND("1981")	57.22436	15.94897	3.587966	0.0010

R-squared	0.298394	Mean dependent var	109.6422
Adjusted R-squared	0.257123	S.D. dependent var	729.2564
S.E. of regression	628.5483	Akaike info criterion	15.80231
Sum squared resid	13432480	Schwarz criterion	15.93292
Log likelihood	-289.3427	Hannan-Quinn criter.	15.84836
F-statistic	7.230131	Durbin-Watson stat	1.844900
Prob(F-statistic)	0.002419		

Levels

Null Hypothesis: TBR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.964678	0.1551
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR)
Method: Least Squares
Date: 09/08/20 Time: 17:05
Sample (adjusted): 1982 2019
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBR(-1)	-0.376582	0.127023	-2.964678	0.0054
C	4.880430	1.840565	2.651593	0.0120
@TREND("1981")	0.013192	0.056325	0.234212	0.8162

R-squared	0.205536	Mean dependent var	0.248684
Adjusted R-squared	0.160139	S.D. dependent var	4.025469
S.E. of regression	3.689099	Akaike info criterion	5.524298
Sum squared resid	476.3307	Schwarz criterion	5.653581
Log likelihood	-101.9617	Hannan-Quinn criter.	5.570296
F-statistic	4.527443	Durbin-Watson stat	1.968053
Prob(F-statistic)	0.017836		

1st Diff

Null Hypothesis: D(TBR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.792089	0.0000
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TBR,2)
Method: Least Squares
Date: 09/08/20 Time: 17:05
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TBR(-1))	-1.150016	0.169317	-6.792089	0.0000
C	0.778344	1.449778	0.536871	0.5949
@TREND("1981")	-0.026914	0.063829	-0.421651	0.6759

R-squared	0.575755	Mean dependent var	-0.056757
Adjusted R-squared	0.550799	S.D. dependent var	6.166983
S.E. of regression	4.133263	Akaike info criterion	5.753616

Sum squared resid	580.8514	Schwarz criterion	5.884231
Log likelihood	-103.4419	Hannan-Quinn criter.	5.799664
F-statistic	23.07116	Durbin-Watson stat	2.070316
Prob(F-statistic)	0.000000		

Cointegration test

Date: 09/08/20 Time: 23:28
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments
Trend assumption: Linear deterministic trend
Series: LINF LM2 LMPR LTBR LEXG
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.700257	107.0674	69.81889	0.0000
At most 1 *	0.518276	62.48876	47.85613	0.0012
At most 2 *	0.391929	35.46453	29.79707	0.0100
At most 3 *	0.271080	17.05840	15.49471	0.0289
At most 4 *	0.134845	5.359320	3.841466	0.0206

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.700257	44.57866	33.87687	0.0018
At most 1	0.518276	27.02422	27.58434	0.0588
At most 2	0.391929	18.40613	21.13162	0.1154
At most 3	0.271080	11.69908	14.26460	0.1225
At most 4 *	0.134845	5.359320	3.841466	0.0206

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LINF	LM2	LMPR	LTBR	LEXG
0.856719	0.310483	6.383822	-5.191583	0.111011
0.235156	1.061837	6.055585	-1.467878	-1.597086
-1.130633	0.618575	5.595572	-3.216811	-0.694114
-0.166402	-1.004134	0.984514	0.074232	1.170547
0.122670	-0.490117	0.169217	-2.124515	0.323911

Unrestricted Adjustment Coefficients (alpha):

D(LINF)	-0.583742	0.064906	0.517566	-0.087523	-0.087954
D(LM2)	-0.018771	0.003201	0.033029	0.042466	0.004146
D(LMPR)	-0.100480	-0.073212	-0.045066	0.007267	0.021465
D(LTBR)	-0.008724	-0.067978	0.002807	-0.060878	0.078824
D(LEXG)	-0.124898	0.109335	-0.046818	-0.027399	0.037140

1 Cointegrating Equation(s): Log likelihood 15.41850

Normalized cointegrating coefficients (standard error in parentheses)

LINF	LM2	LMPR	LTBR	LEXG
1.000000	0.362409	7.451477	-6.059843	0.129577
	(0.23547)	(1.45997)	(0.91436)	(0.29452)

Adjustment coefficients (standard error in parentheses)

D(LINF)	-0.500103
	(0.15028)
D(LM2)	-0.016082
	(0.01543)
D(LMPR)	-0.086083
	(0.02396)
D(LTBR)	-0.007474
	(0.04100)
D(LEXG)	-0.107003
	(0.03439)

2 Cointegrating Equation(s): Log likelihood 28.93061

Normalized cointegrating coefficients (standard error in parentheses)

LINF	LM2	LMPR	LTBR	LEXG
1.000000	0.000000	5.854569	-6.043934	0.733542
		(1.36739)	(0.99981)	(0.10176)
0.000000	1.000000	4.406372	-0.043899	-1.666528
		(1.51870)	(1.11045)	(0.11302)

Adjustment coefficients (standard error in parentheses)

D(LINF)	-0.484840	-0.112322
	(0.15548)	(0.19362)
D(LM2)	-0.015329	-0.002429
	(0.01599)	(0.01992)
D(LMPR)	-0.103299	-0.108936
	(0.02182)	(0.02717)
D(LTBR)	-0.023459	-0.074890
	(0.04106)	(0.05114)
D(LEXG)	-0.081292	0.077317
	(0.03094)	(0.03852)

3 Cointegrating Equation(s): Log likelihood 38.13367

Normalized cointegrating coefficients (standard error in parentheses)

LINF	LM2	LMPR	LTBR	LEXG
1.000000	0.000000	0.000000	0.140010	0.014080
			(0.44560)	(0.09109)
0.000000	1.000000	0.000000	4.610373	-2.208023
			(0.91219)	(0.18647)
0.000000	0.000000	1.000000	-1.056259	0.122889

			(0.10816)	(0.02211)

Adjustment coefficients (standard error in parentheses)

D(LINF)	-1.070017	0.207832	-0.437378	
	(0.21182)	(0.18671)	(1.53608)	
D(LM2)	-0.052672	0.018002	0.084367	
	(0.02439)	(0.02150)	(0.17689)	
D(LMPR)	-0.052346	-0.136813	-1.336958	
	(0.03328)	(0.02933)	(0.24131)	
D(LTBR)	-0.026633	-0.073154	-0.451634	
	(0.06646)	(0.05858)	(0.48196)	
D(LEXG)	-0.028358	0.048357	-0.397211	
	(0.04854)	(0.04279)	(0.35201)	

4 Cointegrating Equation(s): Log likelihood 43.98321

Normalized cointegrating coefficients (standard error in parentheses)

LINF	LM2	LMPR	LTBR	LEXG
1.000000	0.000000	0.000000	0.000000	0.042370
				(0.08190)
0.000000	1.000000	0.000000	0.000000	-1.276455
				(0.13440)
0.000000	0.000000	1.000000	0.000000	-0.090538
				(0.03611)
0.000000	0.000000	0.000000	1.000000	-0.202059
				(0.04502)

Adjustment coefficients (standard error in parentheses)

D(LINF)	-1.055453	0.295717	-0.523546	1.263859
	(0.21197)	(0.23680)	(1.53381)	(0.91991)
D(LM2)	-0.059739	-0.024640	0.126176	-0.010342
	(0.02184)	(0.02440)	(0.15803)	(0.09478)
D(LMPR)	-0.053555	-0.144111	-1.329803	0.774624
	(0.03344)	(0.03736)	(0.24199)	(0.14513)
D(LTBR)	-0.016502	-0.012025	-0.511569	0.131527
	(0.06494)	(0.07255)	(0.46990)	(0.28182)
D(LEXG)	-0.023799	0.075869	-0.424186	0.636498
	(0.04833)	(0.05398)	(0.34967)	(0.20972)

ORDINARY LEAST SQUARE

Dependent Variable: LINF
Method: Least Squares
Date: 09/08/20 Time: 23:25
Sample: 1981 2019
Included observations: 39

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXG	-1.168367	4.746643	0.246146	0.0070
LMPR	3.675857	17.53425	0.209639	0.0352
LM2	3.677137	3.628475	-1.013411	0.0180
LTBR	8.946385	11.79662	0.758385	0.0534
C	8.597838	33.85307	0.253975	0.0010

R-squared	0.713635	Mean dependent var	19.96030
Adjusted R-squared	0.621122	S.D. dependent var	18.03008
S.E. of regression	16.90293	Akaike info criterion	8.612060
Sum squared resid	9714.108	Schwarz criterion	8.825337
Log likelihood	-162.9352	Hannan-Quinn criter.	8.688582
F-statistic	2.309232	Durbin-Watson stat	1.680904
Prob(F-statistic)	0.000868		

GRANGER CAUSALITY

Pairwise Granger Causality Tests
Date: 09/08/20 Time: 23:29
Sample: 1981 2019
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LM2 does not Granger Cause LINF	37	2.20237	0.1270
LINF does not Granger Cause LM2		3.58098	0.0395
LMPR does not Granger Cause LINF	37	0.32980	0.7215
LINF does not Granger Cause LMPR		2.54293	0.0944
LTBR does not Granger Cause LINF	37	0.25803	0.7742
LINF does not Granger Cause LTBR		3.01446	0.0632
LEXG does not Granger Cause LINF	37	1.06804	0.3556
LINF does not Granger Cause LEXG		0.23848	0.7892
LMPR does not Granger Cause LM2	37	2.34546	0.1121
LM2 does not Granger Cause LMPR		0.55260	0.5808
LTBR does not Granger Cause LM2	37	0.65570	0.5259
LM2 does not Granger Cause LTBR		0.14809	0.8629
LEXG does not Granger Cause LM2	37	2.84767	0.0727
LM2 does not Granger Cause LEXG		0.77930	0.4672
LTBR does not Granger Cause LMPR	37	4.57056	0.0179
LMPR does not Granger Cause LTBR		0.67831	0.5146
LEXG does not Granger Cause LMPR	37	0.76432	0.4740
LMPR does not Granger Cause LEXG		6.96264	0.0031
LEXG does not Granger Cause LTBR	37	0.50019	0.6111
LTBR does not Granger Cause LEXG		5.61083	0.0082