Monetary Policy, Inflation and Economic Growth in Nigeria

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Certification

This is to certify that Kayode Olusegun Fadare with Matriculation Number LCU/PG/001774 carried out this research work titled "Monetary Policy, Inflation and Economic Growth in Nigeria" in the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan, Oyo State Nigeria, for the award of Masters Degree (M.Sc) in Economics and that this has not been previously submitted.

…… ……

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Dr. O. O. Ogunjinmi (Head of Department) Date

Dedication

This thesis is dedicated to the Almighty God and my late father, Mr. Roland Olalekan Fadare.

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Abstract

This study examined the effect of monetary policy on inflation and economic growth and ascertained the monetary policy threshold of growth-inflation relationship. This is as a result of the alarming rate of inflation having devastating effects on Nigerian and the failure of policy efforts to curb it. To achieve the objectives, secondary quarterly data from 2009 to 2020 were sourced from CBN and subjected to econometric analysis using the ARDL estimation technique. It was found that only MPR was found to have significant impact on inflation in both the long run and short run, while other variables (LR, INT, GMS, EXR, YG) only have significant relationship in the short run. Also, LR, INT and GMS was found to have a significant impact on economic growth in both the long run and short run. Other variables are only found to be significant in the short run. The interaction of monetary policy (MPR) and inflation on economic growth was found to be negative and significant in the long run be positive and significant in the short run. However, the net effect for both the log and short run were positive. The monetary policy threshold at which inflation can be controlled and growth sustained was found to be 11.36 percent in the short run and 15.20 percent in the long run. The conclusion is that MPR, LR and INT are most effective policy tools in influencing inflation and economic growth in both the long run and short run. It was recommended that the monetary policy authority should increase the use of MPR, INT, and LR as tools in combating inflation and enhancing growth and that the CBN should ensure that the monetary policy rate is between 11.36 and 15.20 percent in order to produce a controlling effect on inflation and sustainable growth.

Keywords: Inflation, Monetary Policy, Economic Growth, Monetary Policy Threshold.

Word Count: 299

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Chapter One

Introduction

1.1 Background to the Study

Inflation has assumed an epidemic dimension in Nigeria, having ravaged the the nation's economy for years. The persistent rising inflation is undermining the recovery of Nigeria's economy, thereby driving millions of Nigerians into poverty and encouraging criminal activities as rising prices indicate a further decline of the purchasing power and livelihood of many Nigerians.

Inflation, unlike other macroeconomic phenomena, does not discriminate in its effect. The effects are distributed to every individual in the economy. While few may be capable of absorbing the effects, most Nigerians are feeling the full devastating effects of inflation. That, coupled with rising unemployment, is leading more Nigerians into criminal enterprises to make up for lost earnings. A surge in insecurity over the past two years has further slowed economic activity and left more people unemployed, fueling a vicious cycle of violence and criminality[1].

In the period of high inflation, the value of the domestic currency diminishes which negatively affects the economy. As real income falls, due to the eroded purchasing power of the currency, there is a reduction in the amount of goods and services each unit of the currency can buy. Confronted with an already diminished disposable income, consumers are now faced with higher prices owing to higher production costs. The high inflation trend in the country has also led to increased demand by workers, especially those in the public sector, for higher wages. This has also led to a decline in the desire to save and invest which adversely affects economic growth[2].

The phenomenon of high inflation arising from the 1970s oil crisis and the collapse of Bretton Woods's system has brought price stability to the base of the monetary policy. While inflation, growth, exchange rate and interest rate should be in harmony in order to prevent financial-based crises[3]. The Nigerian government efforts through it monetary authority-the Central Bank of Nigeria has made several monetary policies targeted at controlling inflation has at some point yielded result and at other times has no significant effect. These policies span through different administration.

Economists have described inflation as a persistent and appreciable increase in the general price level in an economy. However, the term "appreciable" is ambiguous as it does not specify the extent to which the rate of increase in the price level is considered as "appreciable". This varies from country to country and from time to time. What then is the desirable rate of inflation? There has been no precise or unique answer to this question, however, based on the past experience, it is sometimes suggested that 1 – 2% inflation in developed countries and 4 – 6% in Less Developed Countries (LDCs) is the appropriate and desirable limit of inflation. The Central Bank of Nigeria (CBN) targets single-digit inflation rates as the desirable limit of inflation. Single-digit inflation rate of 2-6 percent has a positive and significant impact on the economy through increased wages, consumption, investment, creativity, invention, and production. Double-digit inflation has a calamitous micro and macroeconomic consequences that erode consumers' purchasing power and diminish indicators of economic growth and development[4,5].

In Nigeria, the syndrome of inflation has been so alarming from the outset of the earlier and current administrations despite the various promises by politician both in the pre-democracy and democracy era to fight against it in Nigeria. Inflation rate

increased from a single digit in the 1970s to double-digits in 1990s at 63.6% and 72.8%, and the inflationary pressure on the inflation rate increased from 12.9%, in 2000 to 14% in 2001. While the headline inflation rate stayed at double digits between 15%, and 17.9% in 2002 and 2005 respectively. The economy experienced relative stability after the 2005 economic and financial reforms translating to the merger and acquisition of banks in Nigeria. The inflation rate decelerated melodramatically to 8.24% and 5.38% in 2006 and 2007. In 2008 it increased geometrically to 11.60% and 12.00% in 2009. Marginal drop in inflation occurred at 11.8% in 2010, 12.3% in 2013 and 8.1% in 2014. In 2015 it increased by 9.1% to by 15.7% in 2016 and 18.3% in the first quarters of 2017 accounting for about 100% increase in prices products and services in Nigeria. Unfortunately, none of them have ever been managed to stabilize or even reduce this despicable syndrome. Particularly, in this current governance, inflation rate has wide-ranged from 9.2% and 18.3% at the end of the first and fourth quarters of 2016 and decline to 11.98% at the end of the fourth quarter in 2017 and increased to 15.75 at the end of 2020 which stands to represent instability of prices in the economy[6,7].

Undoubtedly, there are many factors that are responsible for high inflation in Nigeria, these among others include: volatile nature of the Naira to Dollar rate, lack of keen policy coordination, corruption, elongated deficit budget, political and socioeconomic instability, over dependence on oil export and unfavourable balance of payments problem where import prices are on the high side and in turn leads to high domestic prices and rise in the price of goods and services especially when such country is import dependent like that of Nigeria[8]. However, fiscal and monetary policies are identified as a major instigator of inflation in Nigeria as well as credit and aggregate oil expenditure as factors inducing inflation[9].

The relationship between inflation and economic growth observed by economists has over the ages, been a source of concern for policymakers and governments of both the developed and developing countries, including Nigeria. It is therefore important to note that the level of changes in the output growth affect prices which has been observed as a direct relationship (that is, high output growth in the short-run gives rise to inflationary pressures). This implies a positive relationship between output growth and inflation[10,11].

In recent years, growth-inflation relationship and the role of monetary policy has given rise to a continuous debate among the monetary policy makers as well as academicians as a result of the coexistence of high inflation rate and low economic growth in the country. This is contrary to conventional economic theory following the Philips curve which depict a short-term direct relationship between growth and inflation. In the case of Nigeria however, attempts to control inflation by Central Bank affects economic growth with the same or even greater magnitude than inflation, thereby damaging the growth process[12].

The economic growth of Nigeria has not been pleasant, especially after the global financial crisis in 2007/2008. Though, the economy experienced a highly regarded growth in the post-independence era. In this period, i.e. from 1960-1970, real gross domestic product accounted for 3.1% annual growths. Similarly, real gross domestic product grew by 6.2% annually between 1970 and 1978. Regrettably, a negative growth surfaced in the early 1980's, but declined with the inception of SAP with real gross domestic product registering annual growth of 4% in the period 1988-1997. More recently, the Nigerian economy has recorded an enviable stepping up in growth as real gross domestic product grew by 6.27%, 7.57%, and 7.38%, in 2009, 2010 and

2011, respectively. The oil price shock which started in mid-2014 severely affected the Nigerian economy leading to the economy slowing down sharply in 2015 as annual real GDP growth declined to 2.7% from 6.2% in 2014. In 2016, the economy recorded its first recession since 1991 when it recorded a growth of -1.5% as oil production shortages exacerbated the decline in the oil price. Notably, the under performance in the oil sector spilled over to the non-oil sector through the exchange rate channel, with the non-oil sector contracting 0.2% to record its worst performance since 1985. By 2017, the Nigerian economy exited recession recording a positive growth rate of 0.8%, 1.9% in 2018, 2.2 % in 2019 and then degraded to -1.79% in 2020[13,3,6]. The focal point is that inflation limits growth and development by creating distortions and uncertainties in the economy, discouraging long term planning and also reducing savings and capital accumulation.

The role of monetary policy have been argued to include price stability, maintenance of balance of payments equilibrium, promotion of employment and output growth, and sustainable development. These objectives are necessary for the attainment of internal and external balance, and the promotion of long-run economic growth. In Nigeria, one of the Monetary Policy Committee mandates, through the Central Bank of Nigeria, is promoting and maintaining price stability and ensuring a sound and efficient financial system in the country. However, the success of monetary policy often depends on the operating economic environment, the institutional framework adopted, and the choice and mix of the instruments used. In Nigeria, the design and implementation of monetary policy is the responsibility of the Central Bank of Nigeria (CBN). The mandates of the CBN as stated in the CBN Act of 1958 as amended include; issuing of legal tender currency, maintaining external reserves to safeguard the international value of the currency, promoting monetary stability and a

sound financial system and acting as banker and financial adviser to the Federal Government[1]. All these objectives are aimed towards the maintenance of stable price in the country.

Since the role of monetary policy in influencing macroeconomic objectives became clear, monetary authorities have made several efforts to fight it using different policy measures, of which monetary policy is one of them. This is done by ensuring that rate of inflation is maintained within a certain bound to enable a strong economic activity in all facets of the economy. Among the principal tools of monetary policy being used by the Central Bank of Nigeria to control inflation and economic activities are interest rate, money supply and the monetary policy rate, introduced in December, 2006. "The Monetary Policy Committee of the Central Bank of Nigeria introduced MPR to replace the MRR which from past experience had not been sufficiently responsive to CBN policy initiatives, especially in tackling the problem of excess liquidity in the system. MPR hinges on an interest rate corridor, provides for the CBN lending facility as well as the acceptance of overnight deposit from operators at specified rates. Under MPR, the CBN discount window could be accessed by market operators (Discount Houses and Deposit Money Banks), that are in need of funds to meet liquidity shortages and those with excess liquidity could deposit the funds overnight"[8].

The effectiveness of this monetary policy is tested through its ability to achieve the final objectives of growth and price stability. Interest in price stability emanated not only from the need to maintain overall macroeconomic balance, but also from the fact that price stability promotes investment, output and employment. However, despite several government policies and programmes in Nigeria, the economy has

consistently experienced high inflation with attendant consequences on the most vulnerable[14].

Contrary to traditional economic theory, which suggests that low inflation helps accelerate the real growth of the economy by stimulating overall consumption and investment. It is also important to note that high growth leads to high inflation, following the Phillips curve, which depicts a short-term direct relationship between growth and inflation, this has led to a wide consensus among economic thinkers that monetary policy should have the single objective of low and stable inflation, so that by anchoring inflation expectations in the desired way, monetary policy can create an environment conducive to growth[15].

1.2 Statement of the Problem

Among the major macroeconomic objectives of every nation are price stability and sustainable economic growth and this has led to the emergence of different policy measures by the CBN to ensure the objectives are achieved. In Nigeria however, inflation has been consistently high with it attendant effects on the most vulnerable. There has been an upward trend in inflationary rate and a persistent and large variation in economic growth during the period under review and this has impended the credibility of the different policy measures. These indicate that there is still a point of disconnect between the various objectives that the CBN pursues and the outcome of the policy objectives[16]. This has resulted in the interrogation of the policy framework and its instruments on whether they are capable of delivering the central bank's price stability mandate. The question here is that why has the Nigerian inflation persistently remained above the policy target? Robust evidences have been

provided on the determinants of inflation in Nigeria from the perspective of various monetary policy instruments[17,18].

Notwithstanding the immense research, most researchers and policy makers still remain divided on effectiveness of monetary policy and the appropriate choice of monetary policy instruments, targets and framework. This follows enormous divide in empirical findings on the subject in both developed as well as developing countries. This problem is more pronounced in developing countries such as Nigeria which not only have underdeveloped financial markets but also lack appropriate tool to model their economies[19]. Scholars have also shed light on whether the period of growth be attributed to appropriate monetary policy and if the periods of economic down turn be blamed on other factors apart from monetary policy ineffectiveness[20,21].

Although, inflation is a worldwide phenomenon, whose rate and effects, vary from country to country. The inflation trends in Nigeria had constituted one of the devastating problems since late 1980s. In Nigeria, some of the macroeconomic variables determining inflation are said to be exchange rate, openness of the economy and money supply, interest rate, and monetary policy rate (MPR)[22]. The question arising then is that, are these monetary policy tools only successful in exerting a downward pressure on economic growth without significant effect on inflation? Then, is it possible to reverse this effect such that monetary policy tools that will be significant in controlling inflation and not significant in its effect on growth can be identified? This will then create an avenue for monetary policy makers to implement a contractionary monetary policy using tools that will be effective in controlling inflation with little or no negative impact on growth. In addition, it is also essential to ascertain how the interaction of monetary policy and inflation affect the growth of the economy.

In order to address these issues, this study attempt to examine the major monetary policy tools that are being used by the CBN to control inflation and their effect on inflation and growth, and investigate which policy tool is effective in controlling inflation and stimulating economic growth in Nigeria. Furthermore, this study will also attempt to determine the monetary policy threshold for growth-inflation relationship.

1.3 Objectives of the Study

The main objective of this study is to examine the effect of monetary policy on inflation and economic growth in Nigeria between 2009-2020. The specific objectives are to:

1. investigate the effect of monetary policy on inflation rate in Nigeria.

2. examine the effect of monetary policy on economic growth in Nigeria.

3. ascertain the monetary policy threshold for growth-inflation relationship.

1.4 Research Questions

This seek to address the following questions:

1. How does monetary policy affect inflation in Nigeria?

2. How does monetary policy affect economic growth in Nigeria?

3. What is the monetary policy threshold for growth-inflation trade off?

1.5 Hypotheses

The study seeks to test the following hypothesis:

$H_0$1: Monetary policy has no effect on inflation rate in Nigeria

$H_0$2: Monetary policy has no effect on economic growth in Nigeria

$H_0$3: There is no threshold for monetary policy in achieving trade-off for inflation and economic growth.

1.6 Significance of the Study

This study aim at contributing to the existing body of knowledge on the effects of monetary policy on inflation control for economic growth in Nigeria. The findings of this study will provide significant information for the government and policy makers to identify monetary policy instruments that are effective and significant in controlling inflation and at the same time boost economic growth. In addition, it will provide insight on economic growth and inflation trade-off and the threshold at which this trade-off occurs.

The findings of this study will also contribute to the current monetary policy debate on the appropriateness and choice of monetary policy frameworks and instruments, a debate that is currently sweeping across several sub-Saharan African countries.

The study is also significant to both the local and the international investors who want to make better investment decisions putting in consideration, the impacts of inflation on their returns on investments. As well as academicians and researchers who want to understand the effect of monetary policy on inflation, increase their knowledge base

and identify gaps that require further research and instruments that can be used to offer quality research.

1.7 Scope of the Study

This study seeks to add to the existing body of literature by examining the effects of monetary policy on inflation and economic growth in Nigeria using quarterly data from 2009 to 2020. This is the period following the global economic crisis of 2008 and its characterized by minimal economic growth and high inflation rates. Also, during this period, the Central Bank of Nigeria experienced its highest level of independence whereby the CBN based its policy decision on proven international best practices, rather than on political interference or fiscal dominance. Hence a measure of monetary policy tool effectiveness within that period will be a better means of evaluation.

1.8 Limitations of the Study

This study investigates the impact of monetary policy on inflation and economic growth in Nigeria using data from 2009 Q1 to 2020 Q4. This was as a result of the recurrent issue with inflation and limited growth in Nigeria. The data were from secondary source (Central Bank of Nigeria Statistical Bulletin). As a result of the type and source of the data used, having passed through some processing, it may be difficult to guarantee the accuracy of the information and the reliability of the results.

1.9 Operational Definitions of Terms

Economic Growth: is an increase in the production of economic goods and services in an economy, compared from one period of time to another. It has also been seen as an increase or improvement in the inflation-adjusted market value of the goods and services produced by an economy over time.

GDP Deflator: is a measure of the level of prices of all new, domestically produced, final goods and services in an economy in a year. It is also known as GDP price deflator or the implicit price deflator. It is a more comprehensive inflation measure

Gross Domestic Product (GDP): is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period.

Inflation: is a measure of the rate of rising prices of goods and services in an economy over a given period of time. It is typically a broad measure, such as the overall increase in prices or the increase in the cost of living in a country. If inflation is occurring, leading to higher prices for basic necessities such as food, it can have a negative impact on society.

Interest rate: is a tool used by the monetary policy authority to adjust the supply of money in the economy. The rate can be adjusted to curb high inflation or to prevent economic depression.

Monetary Policy: is an economic policy adopted by the monetary authority of a nation to control the size and growth rate of the money supply in an economy. It is a powerful tool to regulate macroeconomic variables such as inflation and unemployment. These policies are implemented through different tools, such as the adjustment of the interest rates, purchase or sale of government securities, and changing the amount of cash circulating in the economy.

Monetary Policy Rate: is the interest rate at which CBN lends to the commercial banks. The MPR is the benchmark against which other lending rates in the economy are pegged and is usually used as an instrument to moderate inflation in the economy.

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Chapter Two

Literature Review

This section presents the review of related concepts, theories, and empirical studies on the effect of monetary policy on inflation and economic growth in Nigeria. Specifically, this section conceptualizes monetary policy, inflation and economic growth. Also, theories and empirics related to the topic of this study were discussed. Lastly, the gaps in literature were identified.

2.1. Conceptual Review

2.1.1. Inflation

Inflation in economics refers to a general progressive increase in prices of goods and services in an economy. It has also been defined as the persistent increase in average level of commodity prices in an economy. When the general price level rises, each unit of currency buys fewer goods and services; consequently, inflation corresponds to a reduction in the purchasing power of money.

It also describes an economic situation where the increase in the money supply is more than the additional output of goods and services produced in the economy. The effect of inflation on any economy can be either positive and/or negative hence the effort to control it via monetary policy. Scholars have also described inflation as an economic situation where the increase in the money supply is more than the additional output of goods and services produced in the economy considered[1,2]. It is however important to note that not all price rise is termed inflation. For example, an increase in the price of food commodity can have a greater impact on the economy than the

increase in average commodity price. In order to consider an increase in price inflation, it must be general, constant, enduring and sustained.

The persistent increase in the level of consumer prices or a constant decline in the purchasing power of money is as a result of an increase in the amount of money (Currency), credit far exceeding the quantity of available goods and services. The impact of inflation is quite significant because of its potentials to both impacts positively as well as negatively affect an economy, hence scholars have observed that inflation has plunged countries into long periods of instability. As inflation rises, the marginal impact of inflation on bank lending activity and stock market development diminishes rapidly. Additionally, in an inflationary economy, it is difficult for the national currency to act as medium of exchange and a store of value without having an adverse effect on income distribution, output and employment.

Economists have identified three approaches to measure inflation. These are the gross domestic product (GDP) deflator, the consumer price index (CPI) and wholesale or producer price index (PPI). The periodic changes in CPI and PPI are regarded as direct measures of inflation. It is however worthy of note that there is no single unique measure of inflation among the three[3]. Moreover, the consumer price index (CPI) has been used in this study because it reveal the inflationary pressure on the part of the household.

Comparison with Deflation

The opposite of inflation is deflation, a sustained decrease in the general price level of goods and services. Deflation can be caused by an increase in productivity, a decrease in overall demand, or a decrease in the volume of credit in the economy. While it may seem like lower prices are good compared to price increase as in the case of inflation,

deflation can ripple through the economy, such as when it causes high unemployment, and can turn a bad situation, such as a recession, into a worse situation, such as a depression.

Economist have observed that deflation can be caused by a combination of different factors, including having a shortage of money in circulation, which increases the value of that money and, in turn, reduces prices. Other scholars opined that can only be caused by a decrease in the supply of money or financial instruments redeemable in money. In modern times, the money supply is most influenced by central banks. Deflation has a more devastating effect on the economy as its typically a sign of a weakening economy. Economists generally fear deflation because falling prices lead to lower consumer spending, which is a major component of economic growth. Companies respond to falling prices by slowing down their production, which leads to layoffs and salary reductions[4,5].

Inflation on the other hand is usually considered to be a problem when the inflation rate rises above 2%. The higher the inflation, the more serious the problem is. In extreme circumstances, hyperinflation can wipe away people's savings and cause great instability, for example, Germany 1920s, Hungary 1940s, Zimbabwe 2000s. However, in a modern economy, this kind of hyperinflation is rare. Inflation is usually associated with increased money supply and higher interest rates, so savers do not see their savings wiped away. However, inflation can still cause problems. Inflationary growth tends to be unsustainable leading to a damaging period of boom and bust economic cycles. As a result of the uncertainty and confusion that is more likely to occur during periods of high inflation, investment and long term growth tends to be discouraged. Furthermore, inflation can make an economy less competitive[6,7].

Merit and Demerit of Inflation

Several economist, businessmen and politicians have maintained that moderate inflation levels are needed to drive the economic activities such as consumption, assuming that higher levels of expenditure are crucial for economic growth. This imply that there are favourable impacts of inflation in an economy.

Favourable Impacts of Inflation are as Follows:

Moderate inflation enables adjustment of wages and relative prices of commodities. It is argued a moderate rate of inflation makes it easier to adjust relative wages and prices. For example, it may be difficult to cut nominal wages (workers resent and resist a nominal wage cut). But, if average wages are rising due to moderate inflation, it is easier to increase the wages of productive workers; unproductive workers can have their wages frozen – which is effectively a real wage cut.

Inflation can boost growth. At times of very low inflation, the economy may be stuck in a recession. Arguably targeting a higher rate of inflation can enable a boost in economic growth. This view is controversial. Not all economists would support targeting a higher inflation rate. However, some would target higher inflation, if the economy was stuck in a prolonged recession.

Furthermore, a price rise create higher profits which is a benefit to the producers because they can sell at higher prices. It also lead to better investment returns because they receive additional incentives for investing in productive activities. Also an increase in production create increase in demand for the various factors of production, including manpower thereby, creating employment and better income

Unfavourable Impacts of Inflation are as Follows:

Fixed income groups will experience a fall in income in an inflationary economy, since the true income of an individual is the purchasing power of his money income. In other words, real income is equivalent to money income price level. For people belonging to the fixed-income group like salaried individuals, pensioners and so on, this means that they will experience a fall in real income. In other words, their purchasing power will reduce.

In an inflationary economy, there is also an acute inequality in the income distribution process. While the fixed income groups experience a decline in the real income, the businessmen and entrepreneurs experience an increase in profits.

During inflation, the prices of goods, raw materials, and factor services increase. Therefore, the Government has to spend more money to complete any investment project taken up during the planning period. If the Government fails to raise more financial resources through savings or taxation, then it upsets the entire planning process.

Inflation also have a negative impact on income from exports**.** Since the prices of raw materials and factors of production increase, the prices of export items also increase during inflation. Hence, their demand in the foreign markets might fall which leads to a fall in the export income of the country

Additionally inflation brings about harmful effects on capital accumulation. In an inflationary period, people start preferring goods to money since the real value of money will fall in the future. Also, people start preferring immediate consumption to consumption in the future. Therefore, the general desire to save starts reducing. As the

willingness and ability to save reduces, the amount of funds available for further investment reduces too. Therefore, the overall impact on the capital accumulation of the economy is negative since capital accumulation in an economy depends on the growth of investment[8,9].

2.1.1.1 Types of Inflation

There are different forms of inflation in the economy. Studies have however identified two main types of inflation namely demand pull and cost push inflation. This study also look at the different types of inflation. These are:

Demand Pull Inflation: Demand pull inflation refers to a type of inflation that occurs when there is an imbalance in aggregate supply and aggregate demand. That is, when the aggregate demand in the economy exceed aggregate supply, the general price level goes up. This is the most common cause of inflation. It begins with a rise in the level of consumer demand and seller in an attempt to meet and the increase in demand are met with unavailability of additional supply which stimulate the sellers to increase their prices. The result of this is demand pull inflation. This is one of the major propositions of the Keynesian economics.

Cost Push Inflation: Cost push is a form of inflation that describes an economic situation where the supply of goods and services are limited whereas the demand remains the same thereby pushing up prices. It occurs when there is a rising general price due to increase in cost of production. This is caused by the supply side factors such as increase in the price of labour, raw material or capital goods, thereby raising the cost of production, this will create a fall in the supply of goods and services. Where demand is constant, the price of commodities keeps increasing as a result of supply shortages thereby causing an increase in the general price level.

Economists have associated cost push inflation with and unexpected external event like a natural disaster or the depletion of natural resources, monopoly, government regulation, government taxation, and changes in exchange rates. This implies that any event that hinders a company's ability to produce enough of certain goods to keep up with consumer demand. This forces them to raise or inflate prices[10].

Wage Push Inflation: This type of inflation is defined as a general increase in the cost of goods and services as a result of an increase in wages. Since the goal of every organization is to make profits, and increase in wages of employees means that employers must raise the prices of charged in the goods and services they offer in order to maintain a profitable business. This will ultimately this create a wage-price spiral which is a circular effects of a wage increase. This occurs as the employees raises the wages of labour, which typically increases the cost of production of goods thereby increasing the prices of goods. As this occurs, the general price level increases and inflation occur. As goods and services become more costly, there will be need for higher wages to satisfy the increment in prices of goods and services. Workers will then demand for wage increase which will cause the cycle to be repeated.

It is also important to note as scholars have pointed out that wage push inflation is one example of cost push inflation which occurs when supply falls as a result of an increase in the cost of labor, raw materials, or capital goods, resulting in inflation[11].

Imported Inflation: This refers to an increase in the general price level in an economy as a result of increased prices of imported commodities. This increase in price concerns the price of raw materials and all imported products or services used by companies in the economy. However, this inflation may also occur as a result of depreciation of the local currency. The depreciation in the rate of exchange will make

imports more expensive such that more money is needed to buy goods and services from a foreign country. With imported inflation, the cost of production is higher for companies that rely on imported raw materials and this is often reflected in higher prices in selling price of goods or services of such companies.

Creeping Inflation (1-4%): This refers a form of inflation that occur when there is a rise in the general price level at a very low rate of 1% to 4 % per year. It is also referred to as mild or moderate inflation. This type of inflation is regarded as safe and that it is beneficial for economic growth. This, according to some economists, makes consumers expect that prices will keep going up, which boosts current demand. Consumers choose to buy now in order to beat higher future prices. Creeping inflation may not be immediately noticeable, but if the creeping rate of inflation continues, it can become an increasing problem[11].

Walking Inflation (3-9%): This type of inflation describes an economic situation where inflation rises moderately at an annual rate which is a single digit between 3% and 9%. Inflation rate at this level is an indicator signaling the government to control it before it turns into a more dangerous inflation. It is however still harmful at this rate because it stimulates economic growth too quickly such that people start buying more commodities that they are in need of today in order to avoid higher prices tomorrow. more than they need, to avoid tomorrow's much-higher prices. This increased buying drives demand even further so that suppliers can't keep up. More important, neither can wages. As a result, common goods and services are priced out of the reach of most people.

Running Inflation (10-20%): This type of inflation rises rapidly at a significant rate between 10% to 20%. At this rate of inflation, there is significant costs on the

economy and could easily start to creep higher. This type of inflation has tremendous adverse effects on the poor and middle class. Controlling it requires a strong monetary and fiscal measures.

Galloping Inflation (20%-1000%): This refers to an economic condition where the inflation rate rises above 20% to 1000%. At this rapid rate of increase in the general price level, it becomes a serious problem bringing about adverse effect on the economy. The implication of this is that the value of money depreciates drastically such that business and workers wages can not keep up with costs and prices. Foreign investors, in turn, avoid the country where this occurs, depriving it of needed capital. The result of this is that the economy becomes unstable, and government leaders lose credibility. It was reported that many Latin American countries such as Argentina, Brazil had inflation rates of 50 to 700 percent per year in the 1970s and 1980s[8].

Hyperinflation (> 1000%): This is a type of inflation that occurs when the general price level rises at a very fast rate, more than triple digits. It is regarded as an extreme form of inflation. An economy experiencing hyperinflation may get to a situation where the rate of inflation may not be measurable any longer and have gone out of control. This type of situation can lead to a total crash of the monetary system of the economy as a result of the continuous fall of the purchasing power of money. Researchers have however pointed out that this is a very rare type of inflation. Examples of hyperinflation include Germany in the 1920s, Zimbabwe in the 2000s, and Venezuela in the 2010s. The last time the United States experienced hyperinflation was during the Civil War[8].

2.1.2. Monetary Policy

The term monetary policy has been defined by experts from many perspectives. Some have defined it as any policy measure designed by the federal government through the central bank to control cost availability and supply of credit. It has also been defined as combination of measures designed to regulate the value, supply and cost of money on an economy in consonance with the expected levels of economic activities[12]. An observation of these definitions of monetary policy indicates that it add up to adjusting the supply of money in the economy to achieve some combination macroeconomic objectives, especially price stabilization[13]. It is the deliberate use of money supply and other policy tools to influence the economy in order to achieve some combination of inflation and output stabilization.

It has been the fundamental instrument over the years in attaining macroeconomic stability and as a prerequisite to attaining sustainable output growth. Monetary policy instruments or tools used includes the monetary aggregates M1 and M2, Monetary Policy Rate (MPR), Open Market Operations (OMO), Bank Reserve Requirement (Cash Reserve Ratio), and others[14]. The objectives of monetary policy are to achieve price stabilization, promote economic growth, achieve full level of employment, sustain a sound balance of payment, and raise the level of industrialization and economic stability[15].

Monetary policy can broadly be categorized as either expansionary or contractionary policy. An expansionary monetary policy is a type monetary policy with the aims of increasing the money supply in the economy targeted at stimulating the growth of economic activities in domestic economy. The growth in the economy need to be supported by additional money supply. The injection of money enhance consumer

spending, as well as raises capital investments by businesses. On the other hand, contractionary monetary policy is a type of monetary policy measure with the aim of reducing the quantity of money in circulation. This is done by either reducing government spending or a reduction in the rate of monetary expansion by a central bank. It is usually targeted at controlling the rising level of inflation in the economy

The situation of the economy usually determine which of the policy will be implemented by the monetary authority. However, whether an economy is adopting the expansionary or contrationary policy, the goal is to bring inflation within an acceptable range, keep unemployment at acceptable levels, and maintain the value of the country's currency.

Monetary policies are most effective when economies have a financial market that have been well-developed as in the case of developed economies. This makes it possible for any deliberate change in monetary variables to have desired influence on the changes in many other macroeconomic variables in the economy as a whole[16]. Monetary policy comprise of government efforts to control the money in its economy with the aim of achieving target macroeconomic objectives. The responsibility of managing the monetary policy in an economy rest entirely on the monetary authority which in the case of Nigeria is the Central Bank of Nigeria and have over the years been committed to its effective management of these policies.

2.1.2.1 Monetary Policy Tools

Scholars have judged the effectiveness of monetary policies based on its ability to maintain monetary and economic stability, but also whether it enhance the improvement of efficient utilization of the country's economic resources and the welfare of its citizens[14]. The monetary policy tools used by the monetary authorities to

deliver monetary policies are influenced by the level of development in the economy. These tools are discussed as follows:

Interest Rate

Interest rate refers to the amount charged on the amount that is borrowed which is usually expressed as a percentage of the principal. It is charged by the lender to the borrower for the use of money or assets for on e year or any other time period – months, weeks, or days. It is also applicable to the amount that is earned at a bank or credit union from a deposit account. Interest rate serves as a channel for financial intermediation in an economy as a result of its influence on savings and investment decisions of economic agents as well as guide the flow of funds from savers to borrowers. Interest rate is one of the major monetary policy instruments that is used by the monetary authority to curb inflation. One researcher has observed that interest rate in Nigeria is determined by investment demand, the level of savings, demand for money or liquidity preference and money supply[17].

Bank Reserve Requirement (REQ)

This is the fraction of customers deposit a bank holds in reserve to ensure that it is able to meet the liabilities in case of emergency withdrawals. This is set by the monetary authorities to control banks ability to grant loans and in the process control the money supply in the economy. It was observed that the imposition of these reserve requirements is effective because when these banks find that their ratios of reserve assets have fallen to their minimum permitted levels, they will either stop making loans and advances or try to borrow more from their depositors[18]. The goal here is to increase interest rates in order to control the quantity of money in circulation.

Money Supply

Money supply refers to the total quantity of money in circulation in an economy at a particular period of time for use in economic activities. Economists have characterized Nigerian money supply as narrow money (M1) and broad money (M2). Narrow money (M1) are in circulation with non-public and current accounts or demand deposit in the bank. Narrow money and savings, time deposit and foreign currency deposits are broad money (M2). When the amount of broad money is over and above total output in the economy, excess liquidity may arise in the economy[19]. Researchers have also observed in their study that if the percentage growth rate of money supply in relation to that of GDP is constant, there will be no inflation[20].

Exchange Rate (EXR)

This is the rate at which the currency of an economy is exchanged for another country's currency, that is the price at which the currency exchange between two countries take place. Scholars have noted that the financial position of an economy, primarily determined by the capital market is subject to its foreign exchange instability. This makes foreign exchange market advances to have cost implications on every economic agent. Also that a realistic exchange rate is one that reflects the strength of foreign exchange inflow and outflow, the stock of reserves as well as ensuring equilibrium in the balance of payments that is consistent with the cost and price levels of trading partners[21, 22].

The Central Bank of Nigeria is the monetary authority that regulates the foreign exchange market and monitors its developments regularly. This is done by issuing guidelines and circulars guiding the conduct of trading activities and operators in order to achieve the desired monetary policy objectives. It was discovered by some

scholars that the real exchange rate in Nigeria has been principally influenced by external shocks resulting from the vagaries of world price of agricultural commodities and oil prices[20]. It is also important to note that exchange rate can be fixed or flexible. The fixed exchange rate is a phenomenon which occurs when the rate of a currency against other currencies is fixed. Under the pegged exchanged rates, all exchange transactions take place at an exchange rate that is determined by the monetary authorities Whereas, flexible exchange rate occurs when when the currency of a country against other currencies of the world is not stable. The rates are market - driven and because the market is highly unpredictable, this may lead to economic instability, high risk, possibility of incurring loss on investment in foreign exchange.

Monetary Policy Rate (MPR)

This is the rate that the monetary policy authority sets in order to influence changes in the major monetary variables in an economy. This is set with a goal of regulating the activities in an economy. Simply, it is the interest rate at which the central bank lends to the commercial banks and other financial institutions also known as the baseline interest rate. It has been observed by scholars that the monetary policy rate determines the level of interest rate in the economy, since it is the price at which banks and other financial institutions obtain loans from the central bank. These banks will then offer financial products to their clients at an interest rate that is normally based on the policy rate[13].

Treasury Bills Rate (TBR)

Treasury bills are short term instruments of the money market issued by the monetary policy authority, they are backed by the country's treasury and therefore are regarded as low-risk investment. These are short-term investment and are purchased at

discounts which are held until maturity date. They do not yield any interest, but issued at a discount, at its redemption price, and repaid at par when it gets mature

Liquidity ratio (LQR)

This simply describes the ratio of liquid assets to liabilities of a bank as stated by the monetary authority. These assets according to professionals referred to banks cash balance plus all other assets owned by the bank that can be easily converted into cash as against the liabilities owed by the bank, especially depositors money in the bank[20]. Liquidity ratio is an important financial indicator used to determine a the ability of the financial institution to pay off current debt without sourcing for external capital. The ratio assist in determining if the company can use its liquid assets to cover its current liabilities. A high liquidity ratio has a contractionary effect on inflation.

Open Market Operation

The buying and selling of government securities (such as treasury bill) takes place in an open market which comprise of both primary and secondary market. Open market operation is a major tool used by the monetary authority to achieve their monetary policy objectives. The buying and selling of government securities is done with the aim of reducing or increasing the quantity of money in circulation. Open market operations are used to control the cost and availability of reserves and this influence changes in bank credit and money supply. In a recent study, the researcher discovered that central banks in most developed countries conduct their monetary policies through open market operation where money is given out in exchange for securities having been discounted with short run nominal interest rate. The central bank buys or sells securities to the financial institutions. One such security is Treasury Bills. By

selling securities the CB reduces the supply of reserves but by buying security it rises the supply of reserves to the Deposit Money Banks, thus upsetting the money supply[21].

2.1.3. Economic Growth

Economic growth describes an increase in the production of economic goods and services, compared from one period of time to another. It is a sustained increase in an economy's output of goods and services. It is usually indicated by an increase in real national income. It has also been defined as an increase in a country's productive capacity with the aim of improving the economic and financial welfare of the citizens[23]. It implies that the rate on increase in total output must be greater than the rate of population growth. Another quantification of economic growth is that national output should be composed of such goods and services which satisfy the maximum want of the maximum number of people.

Economic growth is an important issue in economics and is regarded as an essential condition for the achievement of better social welfare which is the main objective of economic policy. It is therefore an important ingredient for sustainable development. Economic growth in a country is usually proxied by growth in gross domestic product (GDP).

Although the definition of economic growth is simple and precise, the estimation can be quite challenging. In line with this, economic growth is usually measured as an annual percentage change in GDP. This has however been criticized and applauded based on the facts that attempts to compare growth over time and globally by price, quality and currency variances are complicated.

In Nigeria, the annual real GDP growth rate, which averaged 7 percent from 2000 to 2014, fell to 2.7 percent in 2015 and to -1.6 percent in 2016. Growth rebounded to 0.8 percent in 2017, 1.9 percent in 2018, and then plateaued at 2 percent in the first half of 2019, where it is expected to remain for the rest of the year[24].

It is however important to note that the achievement of growth does not necessarily translate to economic development because and economy can experience growth without development. Economic development involve not only an increase in output in the economy, but also all the other socioeconomic processes and changes caused by the growth experienced.

Economic Development

Economic development refers to economic growth followed by progressive changes in important economic variables which determine the welfare of the citizens of the country. Scholars have also distinguished economic development from economic growth. It was explained that while growth involves a persistent increase in the overall volume of production, development denotes an improvement in the level of growth[25]. Economic development could infer greater and more effective participation of an economy in the global commodity market. Summarily, economic development is more than an increase in GDP and national income but involves an all-inclusive long-term socioeconomic change in the country. For the economic development of any country it is essential that there exist changes in production structure, production of new products, new techniques, new processes of production, raw materials, new energy sources.

2.1.3.1 Determinants of Economic Growth

The determinants of economic growth refers to sets of inter-related factors that influences the growth rate of an economy. There are four major factors that have been identified as important determinant of economic growth such that improvement on them would enhance sustainability of the economy.

Natural Resources

These are resources that are found in nature and can be used for production of goods and services. Having access the natural resources like oil or other mineral resources will enhance the productive capacity of an economy thereby boosting the growth rate in the economy. It is quite impossible to expand the stock of natural resources in a country. Hence, it becomes fundamental that countries monitor the supply and demand balance of its scarce natural resources to avoid irreplaceable depletion. Efficient land management may increase the quality of land and contribute to economic growth.

Human Capital/ Population

This is the economic value of the abilities and qualities of labor that influence productivity, such as education, training, intelligence, skills, health, and other things like punctuality and loyalty. Investing in these qualities produces greater economic output[10]. The quality of labour is very important in defining the growth path of a given economy. An improvement in the investment level on human capital development can undoubtedly serve as boost to the quality of the labour force. This is important because skilled labour force has a significant impact on growth due to its productive nature and it does not only have effect on economic growth but also

enhance development of an economy through its expansive capacity on the knowledge and skills of its people. A growing population implies an increase in the availability of labour or employees either in quantity or quality which translates to a higher labour force. However, higher population relative to available jobs could lead to high unemployment. More so, population growth impacts on a number of variables such as the age structure of a country's population, economic inequality, international migration, and the size of a country's work force[15].

Physical Capital or Infrastructure

This refers to a nation's stock of capital or assets including buildings, equipment, and inventories that are used as inputs for the production of goods and services. Improvements in physical capital will reduces the cost of production in an economy. Highly sophisticated factories and machinery are known to be more productive than physical labor. The effect of improved productivity is to increase and sustain output. For instance, a robust highway system is adjudged to help reduce inadequacies in distributing raw materials or goods across the country, which can thus improve its GDP.

Technology

This is anything that enhances the production of goods and services with better quality, at a cheaper rate and faster. This is an important determinant of economic growth as technology has the potential to increase productivity given the same levels of human and material resources. The supremacy of technology over other determinants of economic growth lies in its capacity to result in sustained long run growth.

2.2 Theoretical Review

Some of the major theories explaining the behaviour of inflation and its determinants include the Quantity Theory of Money, Keynesian Liquidity Preference Theory, Demand Pull Theory and the Cost push Theory. All of these theories in their individual piece made attempt to uncover the peculiar nature of inflation, which has been seen to be a persistent general rise in the price of goods and services, based on the tenets of their schools of thought.

2.2.1 Quantity Theory of Money

The relationship that exist between money supply and the general price level has been of interest among the classical economists which led David Hume being the first to try to show the relationship between the two variables. This laid the foundation for the development of the quantity theory of money. The basic identity underlying the quantity theory was first developed by the great American economist Irving Fisher in 1911. The theory was developed in the inter-war years, and is a basic theoretical explanation for the link between money and the general price level. The theory posited that the short-run monetary control was dictated by interest rates which were sticky but in the long-run the demand of influence was real cash balance. It was further assumed that the rise in commodity prices would precedes the increased in interest rate which was regarded as main channel of the firms' operation cost[26,27].

The quantity theory of money gives the relation between money, prices, and output, this is also referred to as the Fisher equation of exchange which is expressed as:

$$M V = P Y \qquad (2.1)$$

where M is the stock of money in circulation; V is the velocity of circulation of money (i.e., the rate of money turnover or the average number of times each rupee changes hands in financing transactions during a year); P is the general price level; and, T is the number of transactions or the total volume of goods and services sold (or purchased) in the economy for period[28].

Equation (2.1) is the quantity equation, linking the price level and the level of output to the money stock. The quantity equation transformed to classical quantity theory of money when it was argued that both V, the income velocity of money, and Y, the level of output, were fixed. Real output was taken to be fixed because the economy was at full employment, and changes in velocity were assumed to be negligible. If both V and Y are fixed, it follows that the price level is proportional to the money stock. Thus, the classical quantity theory was the theory of inflation. The classical quantity theory is the proposition that the price level is proportional to the money stock. It can be viewed as a theory of price determination suggesting that the equilibrium price level is strictly proportional to the quantity of money[21].

The Quantity Theory of Money has however been subjected to several criticisms. The theory has been criticized that as a result of its failure to capture the inactive balances in the economy. There are always inactive balances in an economy. Under Fisher's formula, the price level depends upon the total quantity of money. But it is only a part of the total quantity of money which influences prices. There always exist inactive balances (hoards) which exert no pressure at all on the prices of goods and services. The theory has also been criticized on the basis of unrealistic assumptions. The quantity equation cannot be used for analysing the effects of changes in M, or T, on the price level except on the assumption that, "other things remain constant". But in

the case of monetary variables such an assumption cannot be made. When M changes, T and V both change. When T changes, M and V change. The net effect on the price level of a change in any of the variables of the quantity equation depends on how the other variables are simultaneously changed. The theory is also based on the assumption of full employment and this as been criticized because an increase in the quantity of money does not always increase prices. If there are unemployed resources an increase of money supply creates employment and does not raise prices[29].

2.2.2 Keynesian Liquidity Preference Theory

Liquidity Preference Theory refers to money demand as measured through liquidity. The interest rate equilibrium determinants in the classical model are the real factors of supply of saving and the demand for investment. Keynesian analysis concentrates on the demand for and supply of money as the determinants of interest rate. It was put forth that the rate of interest is purely a monetary phenomenon. Interest is the price paid for borrowed funds. People like to keep cash with them rather than investing cash in assets. Thus, there is a preference for liquid cash[17].

In 1936 John Maynard Keynes developed the liquidity preference theory which he postulated in his book "The General Theory of Employment, Interest and Money". In this book, the focus was on transaction and asset theories of money demand. The theory distinguished three motives of holding money which are transaction motive, precautionary motive and speculative motive. The speculative demand for money has been described as ans important innovation by Keynes. According to this theory, demand for money is negatively related to interest rate. Implication of the theory is that the demand for speculative money balances depends on both the observable

market nominal interest rates and the people's expectation concerning that rate in the future[29].

Scholars have described some normal value that determines the decision of the people either to hold bonds or money such that if interest rates are above the normal value, people will expect them to fall, bond prices to rise and capital gains to be realized. In such a case, people will hold wealth in terms of bonds and demand for money will fall. If the converse holds, bond prices fall and capital losses are realized. People will demand to hold wealth in terms of money causing high demand for money. At very low interest rate, the expectation will be that it will rise; demand for money in the aggregate will be perfectly elastic with respect to interest rate leading to a liquidity trap[30].

Combining the three demands gives the Keynesian liquidity preference function that describes the total demand for money.

$$Md/P = \mu(R, Y) \quad \mu_1<0; \mu_2>0 \qquad (2.2)$$

μ_i denotes partial derivative of $\mu(R,Y)$with respect to *i*th term.

Where Md is the money demand, P is the price level, R is the nominal interest rate and Y is the level of output.

The function implies that demand for real money balances is inversely proportional to the nominal interest rate and is positively related to real income. In contrast to the quantity theory preposition of velocity being constant, this theory describes velocity as pro-cyclical, because pro-cyclical movements of interest rate bring about pro-cyclical movements in velocity[21].

Furthermore, the theory stated that an aggregate demand driven by increase in private investment, increase in private consumption and increase in government expenditure when an economy is at its full employment lead to an increase in the general price level. This means an aggregate demand level over and above the full employment of production level will create an inflationary trend. The Keynesian position is that if people expect any expansion in demand to lead to an increase in output and employment, then it will. This happens because firms will take on more people in anticipation of an increased level of demand for their product[31].

2.2.3 The Demand Pull Theories of Inflation

The demand-pull theory explains inflation in economics and describes the effect of aggregate supply and demand being imbalanced. This occurs when demand outweighs the supply of a product then the price goes up. Demand-pull inflation exists when aggregate demand for a good or service surpasses aggregate supply. It starts with an increase in consumer demand. Sellers meet such an increase with more supply. But when additional supply is unavailable, sellers raise their prices. That results in demand-pull Inflation, also known as price inflation.

The demand pull inflation may also be referred to as surplus demand inflation because it arises from too much money chasing few goods. This often occur where there is full employment so that the excess pressure on the factors of production leads to higher prices for the factors of production and ultimately leading to an increase in the cost of production. It could also be a short run phenomenon where demand dynamics were not well anticipated. When there are production constraints, demand beyond the possible output level could also create inflation. Demand pull inflation may occur

during cyclical booms during or immediately after war, this explains its high rates in Nigeria during 1969 to 1970 Nigerian civil war[33,32].

The old or new quantity theory of money or the Keynesian theory can be used to explain the demand pull inflation. Where the quantity theory of money attempts to explain the link between money and general price levels emphasizing the influence of money supply as prime determinants of inflation, the Keynesians emphasize on non-monetary factors such as government expenditure, spending pattern and credits. The crude quantity theory of money (of classical economy) state that the quantity of money at any given point in time is proportional to rise in prices[33].

The monetarist school of thought led by Milton Friedman (1942) posits that inflation is "always and everywhere a monetary phenomenon and that it is everywhere since increases in the quantity of money always exceeds output". Irving Fisher's equation of exchange could be employed to explain the monetarist view. Fisher (1913) starts the analysis with a single identity. This identity can be mathematically modelled as follows:

$$MV=PT \qquad (2.3)$$

M = Quantity of money (nominal) in circulation

V = Transaction velocity of money in final expenditures

P = General price level

T = Volume of transactions

Therefore, in reviewing the monetarist view and the concept of circulation, Fisher defines price (P) as a function of money supply (M), volume of transactions (T) and velocity of circulation (V), that is:

$$P = F(M, V, T) \quad (2.4)$$

In equation (2.3), where MV = PT, Fisher assumes V and T to be constant variables, so M varies directly with P.

$$P = M \quad (2.5)$$

It was however observed by other scholars that the Fisher's equation failed to consider the impact of interest rates. It is also doubtful that M.V.P and T are fully independent as a change in any of them impacts on the others and can affect inflation. This shortfall in Fishers' equation, prompted Keynes to focus on the inflationary gap.

Keynes defines the inflationary gap as the excess demand in the market for consumption of goods and services. Which could also be referred to as the excess of planned expenditure over the available output at base prices. Therefore, if there is a state of underemployment in the economy, an increase in the money supply will eventually lead to an increase in aggregate demand, output and employment. However, as aggregate demand, output and employment rise further, and impacts on price. When money supply increases beyond full employment, output causes to rise. The excess money supply leads to an excess demand over supply and leads to an inflationary gap[34]. This to Keynes is the true source of inflation. Keynes inflationary gap is graphically depicted in Figure 2.1 below.

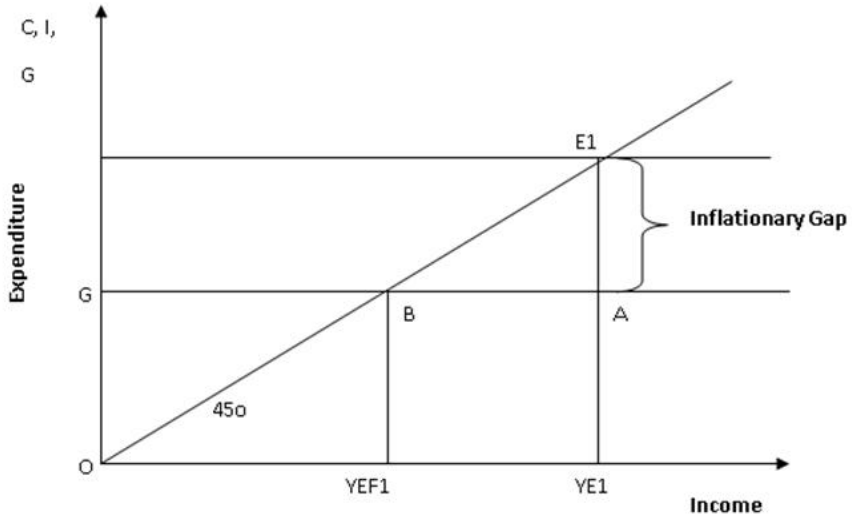

Figure 2.1: Illustration of Keynesians Theory of Demand Pull Inflation[35]

Figure 2.1 shows the points where full employment (YEF1) is equal to the total output (a point of equilibrium). It is being represented by a 45^{o} line which cuts through point B. However, if there are further increases in aggregate demand, it will cause a shift in expenditure as shown at point E, and this will make the total expenditure to be at YE1 while the available output is BAYE. Nonetheless, Keynes analysis has been criticized by different scholars. The major thrust of critics is that the inflationary gap analysis is focused on the commodity market only and the analysis neglects the role of the factor markets. It is argued that inflation affects both commodity and factor markets because the excess demand caused by the commodity market would have an impact on the factor market. In essence, the two main drawbacks of Keynes analysis relates to its emphasis on demand and ignoring the possibility that a rise in price may in turn lead to further increases in aggregate demand, which may in turn lead to further rise in prices[36].

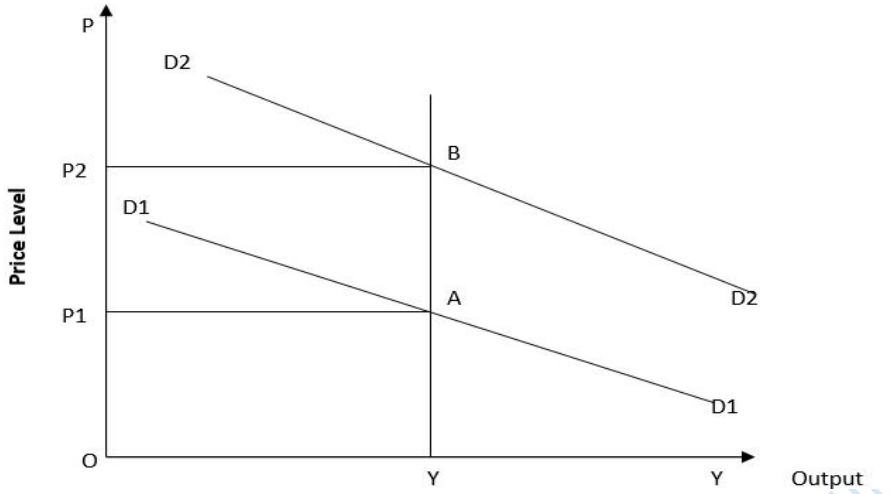

Figure 2.2: The Demand Pull Theory of Inflation (Quantity Theory Version)[34]

Figure 2.2 shows that if the economy is in full employment, the Equilibrium price P_1 cuts the Demand curve D_1 at A. However, further demand as shown in D_2 will raise prices to P_2. It means that employment, and aggregate supply cannot be increased at the short run to offset the excess demand created by the shift. This is because output and supply are fixed at $0Y_1$.

2.2.4 Cost Push Theories of Inflation

Cost push inflation occurs when there is an increase in production costs such as raw materials and wages inevitably is passed on to consumers in the form of higher prices for finished goods. Cost-push inflation is determined by supply-side factors, such as higher wages and higher oil prices. It may also arise out of other factors of production or cost of inputs such as power supply, transport or raw materials. These and other factors cumulatively influence the cost structure of products and determine the prices of the final output. Producers would react to rise in input prices by increasing prices of output including their profits margins, since these are usually set at fixed percentage of cost of production. However, an increase in the cost of production can force producers to cut down production[35].

Cost- push inflation may also arise as a result of profit motives of producers in monopolistic and Oligopolistic industries. Since there is a state of imperfection in such industries, their producers could administer their prices through price discrimination techniques.

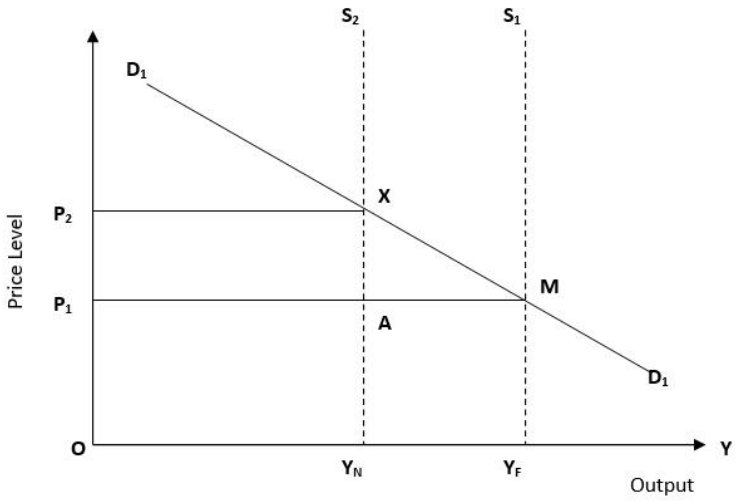

Figure 2.3: Diagram Depicting the Cost – push Inflation[35]

Figure 2.3 illustrates inflationary tendencies caused by supply side factors. Point M is refers to the equilibrium point at full employment. Here, price is P_1 and quantity of output is Y_f, but if the cost of inputs should rise, some suppliers with limited resources could cut production. This will lead to a fall in aggregate output of the particular industry as shown in Y_N. So, supply moves from S_1Y_F to S_2Y_N. This reduction in total supply distorts the full equilibrium position and causes bidding among demand (from buyers) for the available goods, which ultimately shoot-up the price from P_1 to P_2 and a new equilibrium point at X. This explanation makes meaning in a market economy where the market allocates economic resources. Another way to explain the cost push inflation is to look at the behaviour of suppliers. As a result of increasing cost of production suppliers generally shift the burden of

increased cost of production to the consumers by way of general price increases. If all suppliers do so, this is likely to lead to general rise in the prices of products. This is more common in imperfect markets. In Nigeria, cost-push inflation is quite common. Every time government announces a new minimum wage, there is a rise in the prices of goods and services leading to inflation[37]

2.3. Empirical Review

The research findings of past studies have not reached consensus on measures of combating inflation, indicating the need to for further studies. Moreover, the economies of the world are different and diverse with peculiar macroeconomic characteristics. Each must find and adopt their specific measures of dealing with inflation. The findings of these past studies are discussed in this section

2.3.1 Monetary Policy Effects on Inflation

As a result of the failure of the existing literature to analyze explicitly the implication of the various monetary policy reforms on inflation control in Nigeria. Some scholars have attempted to improve upon past studies on the impact on monetary policy on inflation control including non-monetary sources of inflation in Nigeria. Annual data was used from 1980 to 2019. This covers a period of financial innovation and world financial crisis. The main objective of the study is to explore the impact of monetary policy on inflation control in Nigeria. The Augmented Dickey Fuller test, Johansen's co-integration test, the Error Correction model (ECM) estimation was employed in the analysis. The result of the study shows that monetary policy has no significant impact on inflation control in Nigeria both in the short – run and long – run which suggests that the problem of inflation in Nigeria is not a monetary phenomenon rather attributable to the structural rigidity in the country. Money supply and exchange rate

both had negative and insignificant impact on inflation control in Nigeria both in the short – run and long – run. Treasury bill rate has negative but significant effect on inflation control in Nigeria in the short – run, while in the long – run it has positive but insignificant effect on inflation control in Nigeria[36].

Given the chronic effect of inflation rate on the Nigerian economy, there some other scholars have seen the need to evaluate the impact of monetary policy on inflation rate in Nigeria in their study with the aim of bringing silent issues and recommending policies that will suit the economy. The study on monetary policy on inflation control in Nigeria evaluated the effect of monetary policy on inflation in Nigeria. The study uses time series data which covers the period of 1985 to 2016. The study adopted Augmented Dickey – Fuller (ADF), Johansen Co-integration and Error Correction Model (ECM). The result of the study revealed that money supply has significant effect on inflation rate in Nigeria which implies that money soppy serves as one of the major tool of controlling inflation rate and an increase in money supply escalate inflationary pressure. However, finding revealed that, exchange rate has insignificant effect on inflation rate while interest rate proved to be significant in explaining variation in inflation rate in Nigeria. It was however concluded that monetary policy has been partially effective in controlling in inflation rate in Nigeria. It was recommended that the monetary authority should adopt adequate indirect instruments for the purpose of controlling the volume of money in circulation for effective and efficient control of inflation rate in Nigeria[37].

Similarly, amidst the conflicting evidences with regard to whether monetary policy abates inflationary pressure, some researchers have sought to provides new evidence base on an emerging African country, Nigeria. The study carried out by these scholars

attempted to make known empirically the degree at which monetary policy is effective to controlling inflation in the economy. The study employed quarterly time series data spanning from 1980 to 2012 using the cointegration and error correction method of analysis. The estimated result reveals that for the period covered, interest rate, exchange rate, money supply and oil-price are the major causes of inflation in Nigeria. It was also observed that although in the short-run increased in income encourages inflation, proper utilization of the growth would reduce inflation. It was recommended that for structural and economic stabilization, anti inflationary monetary policy measures should be backed-up by some necessary fiscal policies[38].

Similar studies have also investigated the effect of monetary policy variables that were consistently adopted by the Central Bank of Nigeria (CBN), on the inflation rate in Nigeria for the period 2009-2014 addressing two key issues were addressed; first, whether there was a significant relationship between the policy variables adopted and inflation and secondly, whether the combined impact of all these variables adopted, was significant on the inflation rate. The results show that apart from the MPR, all other policy variables were significant at the 5% level of significance and this addressed the first key issue highlighted. For the second key issue, the estimation model displayed that all the explanatory variables adopted by the CBN (as used in this research) accounted for 61% of the variation in the inflation rate as regards its rise or drop. Hence, the combined effect of all the variables adopted by the CBN did reduce the inflation rate, as the monetary policy shocks did get traction on the economy in arriving at the policy trajectory of an inflation band of 6-9%[39].

Tackling the question, “why has the Nigerian inflation persistently remained above the policy target?”, researchers have carried out studies to attempt to provide answers

to this question. The study of the impact of open market operations and money supply on inflation in Nigeria, sheds light on this question by providing robust evidence on the determinants of inflation in Nigeria from both the open market operations and total money supply into the economy. Thus, this study finds out the impact of open market operations and money supply on price instability in Nigeria using time series data covering a period of 36 years; 1981-2016. The vector error correction model approach was used and the findings showed that treasury bills value, monetary policy rate and money supply have positive impact on inflation rate in Nigeria. The study concluded that open market operations while controlling the supply of money had significantly impacted on price stability in the long-run in the Nigerian economy. It was suggested that there is need for an increase use in the open market operations as a tool for achieving stability of price in the country[40].

The dynamics of monetary policy and inflation in Nigeria have also been examined whether these monetary policy variables actually had the desired significant effect on the inflation rate. To achieve this, the study used monthly data from 2009-2017 to estimate the model derived. The Augmented Dickey-Fuller (ADF) unit root test, Johansen Cointegration test and Error Correction model (ECM) were adopted as the method of analysis. The findings showed that money supply, exchange rate, monetary policy rate, treasury bills rate, reserve requirement and liquidity ratio have significant and effective impact on the inflation rate. It was concluded that the results show a causal relationship between the inflation rate and the selected monetary policy instruments as the determinants of the inflation rate in Nigeria, namely, broad money supply, exchange rate, monetary policy rate, Treasury bill rates, reserve requirement, and liquidity ratio. The relationship is not only significant, but they contributed to impacting on the inflation rate for the period under study. Based on the foregoing, it

was recommended that the CBN stay focused on its current foreign exchange rate policy as well as making an unrestricted use of the monetary policy tools in its attempt to arrive and remain at the 6-9% inflation threshold for Nigeria[41].

Other researchers studying monetary policy and inflation targeting in Nigeria have examined the trend of monetary policy instruments and inflation in Nigeria. Time series data between 1986 and 2015 were used with Vector Error Correction Model as the method of analysis.It was discovered that monetary policy is significant in curbing inflation threshold in Nigeria, however the effect of monetary policy variables are weak in controlling inflation. The study concluded that monetary policy is significant in curbing inflation threshold in Nigeria, however the effectiveness of monetary policy variables are weak in controlling inflation in Nigeria[42].

Each of the monetary policy instruments have also been studied to understand their independent effects on inflation control by various scholar with varying results. One of such study examined interest rate, minimum rediscount rate, liquidity ratio, and cash reserve ratio with the aim of determining their roles on inflation management or control in Nigeria between 1982 and 2011 using multiple regression technique. The resultant evidence from this study indicated that inflationary trend and or growth was not significantly related to the combined monetary policy instruments such as interest rate, minimum rediscount rate, liquidity ratio and cash reserve ratio and that, changes in the monetary policy instruments adopted in the study were also not measures in determining changes in the rate of inflation. It was also found that that interest rate, minimum rediscount rate, liquidity ration and cash reserve ratio had no significant influence on inflation[43].

Similar studies have examined the the role of interest rate, minimum rediscount rate, liquidity ratio, and cash reserve ratio in inflation management or control in Nigeria. the study covered a period of 1982 to 2011. The resultant evidence from the study indicated that inflationary trend and or growth was not significantly related to the combined monetary policy instruments such as interest rate, minimum rediscount rate, liquidity ratio and cash reserve ratio[44].

The study on the Impact of Monetary Policy Rate on Inflation in Nigeria as carried of by some researchers focused on the impact of MPR on inflation in Nigeria and at its policy implication. The study was carried out using monthly data from January 2007 to August 2014. The technique of analysis used was the ordinary least square (OLS) method. The result of the study showed that expected inflation, money supply and exchange rate had influence on inflation within the period under consideration. Nevertheless, interestingly the policy interest rate (monetary policy rate} used for macroeconomic stability does not have any statistical relationship with inflation as an independent variable. This means that replacing minimum rediscount rate with monetary policy rate has not proved to be more effective than the minimum rediscount rate. The same is for annual Treasury bill rate. At any rate, combining monetary policy rate with other macroeconomic monetary policy tools proved effective in determining the behavior of inflation during the period. Based on the study, it was recommended that government should manage information on key macroeconomic variables or factors very well. It has been found from the study that the major driver of inflation is expected inflation. Good news about these variables is important[45].

The problem of inflation in Nigeria had also led other researchers to examine the key determinants of inflation and examine the relationship between inflation and money supply as well as examine the trend and magnitude of inflation in Nigeria. Secondary data that ranged between 1970-2008 were sourced from the CBN Statistical Bulletin and was analyzed using the study used Vector Auto Regressive (VAR) model. The results revealed that money supply and exchange rate were stationary at the level while oil revenue and interest rate were stationary at the first difference. Results from the causality test indicate that there exists a unidirectional causality between money supply and inflation rate as well as interest rate and inflation rate. The causality test runs from money supply to inflation, from the interest rate to inflation and from interest rate to money supply. It was concluded that that government should use the level of inflation as an operational guide in measuring the effectiveness of its monetary policy[46].

A reexamination of the effect of money supply on inflation in Nigeria was carried out by some researchers which was borne out of the curiosity to reexamine the immediate cause of the alarming rate of inflation in Nigeria which has adversely affecting the general welfare of Nigerian populace. The data collected covered the period of 1970 to 2016 and the Autoregressive Dynamic Lag Error Correction Model (ADLECM) method was employed. The results showed that money supply does not considerably influence inflation both in the long and short run possibly because the country is in recession. The error correction model has the correct sign of negative and it is significant meaning that about 21% of the errors are corrected yearly. The Granger causality outcome demonstrates that, there is no causality between money supply and inflation in Nigeria within the study period and vice-versa. The study recommended that the government should diversify the economy, minimise importation by

encouraging local production of products and services. The Central Bank of Nigeria should guarantee an exchange rate policy that is essentially determined by the state of the economy and not by speculators being a net importation economy[47].

Assessing the effectiveness of open market operations as an instrument of monetary policy management in Nigeria, a researcher have focused on the evaluation and the analysis of the effectiveness of the open market operation as a monetary policy management in Nigeria from 1993-2014. The investigation was carried out using the Ordinary Least Squares (OLS) method of estimation. The result shows that OMO has a positive and significant relationship with broad money supply (M2) which is used as a proxy for monetary policy. OMO is statistically significant at 1 percent level. This implies that Open Market Operations has been an effective instrument of monetary policy management in Nigeria. It was recommended, among others, that the CBN should review periodically the performance of monetary policy with a view to enhancing the effectiveness of monetary policy instruments in order to achieve macroeconomic stability[48].

Notwithstanding the extensive use of the open market operation in conjunction with other tools such as reserve requirement, discount window operation, and moral suasion as an instrument of price stability in Nigeria since it was introduced in 1993. However, inflation in Nigeria has not reduced to the desired single digit level on a consistent basis. Researchers have thus examined whether Open Market Operations as a Monetary Policy tool have Impact on Price Stability in Nigeria. Using OLS regression on time series data from 1993 to 2007, the result of the study shows that open market operation has positive non-significant impact on consumer price stability as proxied by inflation rate in Nigeria. The result also reveals that there was a positive

correlation between open market operation and consumer price stability of the Central Bank of Nigeria for the period, therefore remains a useful tool, hence it was recommended that it should be used in conjunction with other relevant ones in the maintenance of price stability in Nigeria[49].

Other scholars seek to find the significance of interest rates in determining inflation rate and also responses of inflation rate to shocks from 2000 to 2019 using the vector error correction and vector auto-regression models. It was discovered that interest rates were weak instruments to curb inflation in the short run but inclined to be significant and relevant instruments in the long run. Also that inflation rate responses to interest rates were weak in the short run but proved strong in the long run. The conclusion was not exactly similar to previous authors' because interest rates gradually proved applicable to inflation targeting in the long run. As the Central Bank of Nigeria (CBN) relies on interest rate to curb inflation rate, it is suggested the apex bank should ensure a smooth transmission channel between inflation rate and interest rates. Like in the United States (US) and other advanced countries, the bank should strive to keep inflation and interest rates lower than the current rates and simultaneously improve on macroeconomic policy management[50].

The negative impact of inflation in Nigeria and the missing link triggered worry and inquiries giving birth to a study by some researchers with the aim of providing answers to the question ―Is money supply the cause of the high rate of inflation in Nigeria‖? Or other non-monetary factors? The study investigates the missing link in Nigeria from January 2010 to December 2018 using Granger causality tests and Vector Error Correction Model (VECM). The findings indicated that money supply does not cause inflation. Inflation is caused by non-monetary factors of political

instability, corruption, poor basic infrastructure among others. Money supply and inflation co-integrate in the long-term. The causality test proposed a uni-directional flow from inflation to the money supply. Bi-directional causality was not observed in this study. The VECM result indicated that disequilibrium caused in the previous year can converge back to equilibrium in the current year. The general findings of the study disagreed with the quantity theory of money. It has been established that monetary factors do not affect the price level through inflation in Nigeria, but that non-monetary factors of political instability, corruption, double taxation, and poor infrastructure development among others does. The study recommends that non-monetary factors of political instability, corruption, poor basic infrastructure among others were responsible for the missing link. These factors should be checked and put in perspective to achieve low inflation at a single digit in Nigeria[51].

Extensive studies on inflation using the Philips Curve approach and its variants have been carried out in Nigeria. However, the Philips inflation modelling methodology has been criticized as inadequate in accounting for the dynamic structure of the inflationary process. Particularly, this approach fails to incorporate as many predictor variables as possible, and most times yields a single model from which judgement is based. Perhaps in an attempt to obtain a more robust view of the dynamics of inflation in Nigeria, some authors have used the univariate time series and the error correction and cointegration approaches, employing money growth, income and exchange rate movements as the focal variables. The study on the predictive model for inflation in Nigeria attempt to fit alternative dynamic regression models, select the best fit model based on some model selection criteria and predict future inflation rates from the selected model. The study estimates a dynamic model using quarterly data spanning 1995 to 2016. Four dynamic models: level lagged variables, differenced lagged

variables, log-transformed lagged variables and differenced log-transformed lagged variables were considered. The result of the study provided evidence that expected inflation constitute the most significant predictors of inflation in Nigeria. The prominence of expected inflation in impacting on current inflation rate, perhaps,indicates the anticipatory factor in the Nigerian inflationary process. The study concluded that previous values of interest rate and money supply are significant in predicting future inflation rates in Nigeria[52].

Furthermore, scholars have also examine other determining factors of inflation in Nigeria using quarterly data from January 1999- December 2018 while the Autoregressive distributed lag (ARDL) method of analysis was used. It was discovered that poor infrastructural development, exchange rate, political instability, corruption, and double taxation significantly stimulate inflation rather than just money supply. The results also showed a causal relationship between other determining factors and inflation. The ARDL result shows a significant long-short run relationship. The study recommended that non-monetary factors of instigating inflation should be controlled and security expenditure should be review along with-related mechanisms to achieve low inflation at single digits at most and economic growth and development[53].

Inflation being a global phenomenon impacting every economy negatively, especially the developing countries, has been studied extensively by other countries. In Ghana for example, the effects of monetary policy on inflation have been examined with the objective of assessing the impact of monetary policy on inflation. Annual data from 1985-2009 were used to estimate the model. Surprisingly, there was a weak correlation between money supply and inflation and could be attributed to the fact that

some important variables were omitted and catered for by the stochastic error term. There was also a weak correlation between inflation and interest rate. The conclusion is that monetary policy alone is incapable of controlling inflation. It should therefore be supplemented by fiscal measures, non-monetary and non-fiscal measures[54].

A related study in Kenya seek to determine the various impacts of the monetary policy tools and how each of them impacts to the inflation rate and thus rate them on their effective trends between 2009 to 2013. It was noted in the result that there is a relationship between monetary policies and inflation. Evidence from the statistics showed that the coefficients of central bank rate are positive while that of reserve ratio is negative. This implies that there is a negative relationship between inflation rate and reserve ratio requirement while that of central bank rate is positive. The relationship can be used to formulate a targeted policy towards attaining acceptable level of inflation set at 5% in Kenya[55].

2.3.2 Monetary Policy Effects on Economic Growth

Researchers have observed that despite the various monetary policy and fiscal policy regimes adopted in Nigeria since independence, the Nigerian economy in comparison with countries in Europe and America still face the challenges of weak economic activities as reflected in weakening financial indicators, inflation still remain a threat to Nigeria' economic prosperity, same with unemployment, inequality, poverty and socioeconomic stability. The study on money supply, liquidity ratio and economic growth in Nigeria focused on establishing the extent to which money supply and

liquidity ratio have actually impacted the economic growth of Nigeria. The study used annual data from 1986 to 2018 sourced from Central Bank of Nigeria and Ordinary Least Square estimation technique was adopted after confirmation from pre-estimation test. The result of the estimation showed that Narrow money (M1) has positive but statistically insignificant effect on the Real Gross Domestic Product in Nigeria, Broad money supply (M2) has positive but statistically insignificant effect on the Real Gross Domestic Product in Nigeria, while Liquidity Ratio (LR) has negative but statistically insignificant effect on the Real Gross Domestic Product in Nigeria[56].

The major objective of other researchers studying the effects of monetary policy on inflation was to review the framework for monetary policy decisions and the effectiveness of monetary policy implementation in the Nigerian economy by analyzing the impact of the policy on inflation, exchange rate and growth in Nigeria between 2009 and 2015. The review showed that monetary policy decision making process is complex and difficult. It requires inputs from a number of units of the CBN. This includes data and information on the global and domestic environment as well as the result of stress test for Domestic Money Banks (DMBs) which include CAR, LR, NPLs, ROE, and ROA and so on. For effective financial system stability the application of monetary tools/instruments requires trade off among the variables and it depends on the environmental challenges facing the economy for example, trade-offs between the stability of the exchange rate and maintenance of adequate foreign exchange rate[57].

Other scholars have also evaluated the effect of monetary policy on output and prices is symmetric or not in the short run and in the long run periods in Nigeria, by investigating whether the effect of positive and negative monetary policy shocks on

output and prices is asymmetric or not using data from 1986 and 2016. The Nonlinear Autoregressive Distributive lag (NARDL)method of estimation was used, while Wald coefficient test is used to confirm the asymmetry effect. The results showed that in the short run, negative shocks have more significant effects on output than positive shocks but the effects of positive and negative monetary policy shocks do not have significant effects on price level; while in the long run, positive shocks have more significant effects than the negative shocks on both output and and prices. It was concluded that positive and negative monetary policy shocks have different but significant effects on output and prices in Nigeria. The study recommended that given the significant effects of positive and negative monetary policy shocks on output and prices, there is need for the monetary authority in Nigeria to put in place the necessary policies with strict guidelines and monitoring in order to reduce the effects of any shocks that can impair the desired growth of output and prices in the economy[58].

Similarly, the Nigerian economy having witnessed times of expansion and contraction, but evidently, the reported growth has not been a sustainable one as there is evidence of growing poverty among the populace. As a result some scholars have also studied the effect of monetary policy on economic growth in Nigeria by examining the effects of monetary policy rate, money supply, exchange rate, interest rate and investment on GDP in Nigeria. The time series data is the market-controlled period covering 1986 to 2016. The study showed that long run relationship exists among the variables. In addition, the core finding of the study showed that monetary policy rate, interest rate, and investment have insignificant positive effect on economic growth in Nigeria. Money supply however has significant positive effect on growth in Nigeria. Exchange rate has significant negative effect on GDP in Nigeria[59].

Another researcher examining the effect of monetary policy on economic growth examined the extent to which the Central Bank of Nigeria Monetary Policies could effectively be used to promote economic growth. The study applied multiple regression model on data gathered between 1990-2011. The empirical findings from the study indicated that showed that Nigeria's economic growth is responsive to some of the macroeconomic variables such as average price and labour force. Furthermore, the result suggested that money supply which is the variable of interest may have been affected by change in economic activity, which influenced the desire to hold currency for unproductive purposes. Despite this, the result showed that the supply of money in particular has influence on the macroeconomic variables, which has proved it to be effective to control output in Nigeria economy within the period under study[60].

More on this, another study have examined the effect of interest rate fluctuations on economic growth of Nigeria and also to compare the growth of the Nigerian economy before and after interest rate deregulation and how it could influence the growth of Nigeria, and finally to make relevant recommendations that could assist policy makers in Nigeria to formulate sound policy thrust that would put the nation in the right direction. The study employed multiple regression statistical technique in analysing data from 1970 to 2010. The result of the findings revealed that there existed an inverse relationship between interest rate and economic growth in Nigeria, meaning that increase in interest rate will decrease GDP of the country, thus retarding growth of the real sector. The result specifically leads to the conclusion that a direct relationship existed between interest rate and the growth of the economy (GDP), meaning that increase in interest rate will certainly increase savers are encouraged to save thereby inducing growth in the economy. Also, the economic growth of Nigeria

after interest rate deregulation is greater than the economic growth after interest rate deregulations[61].

The study on monetary policy innovation and growth of output in Nigeria was examined with the aim of investigating the extent to which monetary policy affects the growth rate of output in Nigeria between 1985 to 2012, using the Vector Autoregressive (VAR) method of analysis. The result showed that money supply exerts significant influence on growth of output in Nigeria while exchange rate and interest rate were insignificant. The study recommended that exchange rate and interest rate should be regulated. It also suggested the need for monetary authorities to implement policy that effectively enhanced money supply[62].

Further examination by some researchers was carried out to determine the relationship between inflation, interest and exchange rates on economic growth in Nigeria between 1990 and 2017 using the granger causality tests. The study observed that interest rate in Nigeria is growth-repressive. Therefore, there is absolute need for the interest rates to be market-driven in order to attract foreign investment and flows capable of stimulating economic growth in the long run. In addition, the seemingly high interest rate should be reviewed downward so that domestic and foreign investment can be stimulated. Inflation-targeting policies should be pursued with a view to maintaining a single digit inflation rate. The results of the analysis revealed that there is a long run relationship between interest rates, exchange rates, inflation rates and economic growth in Nigeria. By implication, the results of findings have demonstrated the effectiveness of monetary policy at stimulating desirable economic growth in Nigeria. In terms of causal link among the variables, the result of granger causality indicates

there is a uni-directional causal relationship between inflation rates, exchange rates and economic growth in Nigeria[63].

Further insights from the Gambia was provided from the study on the effects of interest rate on economic growth with the aim of providing answers to the questions; what are the consequences of rising interest rate on the performance of a country's economy and are there any policy implications of these effects? This was done by using the Vector Error Correction Model (VECM) to examine the long-run and the short-run causal relationships between gross domestic product on the one hand and real interest rate and real effective exchange rate on the other between 1993 to 2017. The results showed that there is a long run relationship between real interest rate and real exchange on the one hand and gross domestic product or economic growth on the other, since the coefficient on the error correction term or speed of adjustment is negative and the P-valve is significant. The study also showed that in the short run, there is no relationship between from real interest rate and gross domestic product or economic growth and that there is no link between real exchange rate and gross domestic product. It was concluded that interest rates have a negative impact on the performance of Gambian economy in the long run but in the short run there is no link between interest rates and economic growth in the context of Gambia[64].

These have also been examined among the emerging developing countries by some researchers with the aim of studying the output effect of a tightening monetary policy in 32 emerging and developing countries between 2001 and 2014. Meta-regression analysis (MRA) method of analysis was employed. The outcomes indicated that tightening of monetary policy has a negative real effect on output. Commodity price variable(s) tend to report stronger negative effects. Output effects are likely to be

more negative in an economy with a developed financial system and less effective in an economy with high inflation volatility[65].

While the inflation-targeting regime studies in developing countries focus on either the adoption or non-adoption of such a regime and its feasibility, this study evaluate the success of the regime in Turkey as an emerging economy by examining the effect of inflation uncertainty on inflation, economic growth and selected monetary-fiscal policy variables between the period of 1987 and 2015. The multivariate generalized autoregressive conditional heteroscedasticity (MGARCH) model was employed. The result of the study showed that as unexpected inflation increases with rising inflation uncertainty, the more inflation uncertainty increases inflation for the pre-2003 and post-2003. It is noteworthy that increases in the period after 2003 are less than the previous period. In the period before 2003, the more inflation uncertainty is an increasing effect on economic growth[66].

As a result of the global financial crisis, many developing countries have reported low economic growth rates and high inflation rates, which has raised many concerns has led some researchers to estimate the relationship between economic growth and inflation rate in the context of Southern African Customs Union (SACU) countries region between 2010 and 2018 with the aim of determining if increasing inflation will stimulate growth. The study used the Pooled Mean Group (PMG) estimators to examine the relationship between inflation, interest rate and economic growth in the SACU region. The results of the study show that inflation has a positive impact on economic growth while lending rate has a negative impact on growth in the long run. These results imply that policymakers should allow a high sustainable inflation rate in order to promote economic growth while interest rate can be used as a monetary

policy instrument to achieve the desired inflation rate that will affect economic growth positively[67].

2.3.3 Inflationary Effects on Economic Growth

Several studies on the effect of inflation on economic growth have been carried out and researchers have had divers results. This has been attributed to different macroeconomic conditions of the individual countries, different dataset and years of investigation, and different analysis techniques and model specifications. Unfortunately, despite the numerous studies aimed at providing solution to the problem of inflation, it has persisted. Among the recent studies include the study on inflation and economic growth in Nigeria: An ARDL approach. The objective of the study was to evaluate the impact of inflation on Nigeria's economic growth for the past four decades, beginning from 1980 to 2019 using Autoregressive Distribution Lag (ARDL) model and the Error Correction Model (ECM). Results indicated that inflation has negatively affected economic growth over the years as it reduces competitiveness as well as lowering the purchasing power of money. The study concluded that while inflation and exchange rate negatively impact the Nigerian economy's growth, interest rate maintains a positive relationship. Government consumption proved to be an insignificant factor in the growth of the economy. The study suggested that measures be put in place by the CBN through the Monetary Policy Committee to ensure that the rate of inflation is reduced to the barest minimum[68].

The relationship between inflation targeting and economic growth in Nigeria have also been studied with the aim of imbibing the useful lessons and avoiding the pitfalls from cross-country experiences. The study used annual data from 1970 to 2013 and

employed descriptive statistics approach involving tables and charts. The most salient observation from the study is the absence of Nigeria from the list of countries that have adopted inflation targeting as a prime monetary policy framework considering the harmful and suicidal effect of inflation on economic growth and investment. It was recommended that full implementation of inflation target should be a necessary part of monetary policy framework of the Central Bank of Nigeria (CBN) and that the Central Bank of Nigeria should aim at stabilizing fluctuations in money supply in Nigeria in order to reduce inflation and boost confidence and attract investors in the economy[69].

An examination of the impact of inflation on household consumption expenditure in Nigeria has been conducted with the aim of providing answer the question as to whether inflation has any significant effect on household consumption expenditure in Nigeria for the period of 1981 to 2018 using ordinary least square econometric method. The empirical findings of the study provide evidence that there exist a positive significant long run relationship between inflation and household consumption expenditure in Nigeria[70].

With regard to development, studies have also been carried out to examine the effect of inflation in the growth and development of the Nigerian economy between 1970-2010. The results revealed that inflation possessed a positive impact on economic growth through encouraging productivity and output level and on evolution of total factor productivity. A major policy implication of this result is that concerted effort should be made by policy makers to increase the level of output in Nigeria by improving productivity/supply in order to reduce the prices of goods and services

(inflation) so as to boost the growth of the economy. Inflation can only be reduced to the barest minimum by increasing output level (GDP)[71].

Similarly, in Vietnam, the nonlinear ARDL has been used to study the asymmetric effect of inflation and money supply on economic growth between 1990 and 2017. The empirical results provided evidence that the effects of inflation on economic growth are negative and asymmetric in the long run. The impact of money supply on growth is positive in both the short-run and long-run. Accordingly, the impact of the increase in the inflation rate is bigger than the decreasing in the long-run. This different impact is significant and high inflation will destruct economic activities. As a result, the study provides empirical evidence for the authorities to plan monetary policies and control the rate of inflation to achieve sustainable economic development in the long-run. It was concluded that the impact of inflation on economic growth is asymmetry in the long run. There is a negative impact of inflation on economic growth in the case of Vietnam and Money supply has a positive impact on growth in both the short-run and long run[72].

2.3.4 Monetary Policy Effects on Inflation and Economic Growth

Examining the monetary policy effectiveness, output growth and Inflation in Nigeria, scholars have investigated whether the reported growth attributable to appropriate monetary policy and if the periods of stable prices attributable to monetary policy effectiveness? The study in an attempt to provide answers to this questions, used time series data covering the period of 1970 to 2011 and using VAR model as the method of estimation. The result from the impulse response and variance decomposition showed that monetary policy variables may not have an instantaneous impact on output, but are key determinants of output growth in the long–run. Furthermore, in the

short–run the level of production is more important in controlling inflation, but it is monetary policy variables that matter in the long–run. Therefore, there is the need to differentiate between short and long run monetary policy targets. The conclusions drawn from this study is that in the short run, money supply and expected output are the key factors influencing the level of output but in the longrun, it is interest rate and consumer prices that matters while inflation in the short–run is the level of production (output level) that matters but in the long–run monetary policy is more important. It was recommended that to effectively control the level of inflation policy makers should concentrate on short-run output expansion policies and put measures in place to sustain the expanded growth in the longrun[73].

The study on the game of monetary policy, inflation and economic growth examined the effectiveness and impact of monetary policy tools on inflation and growth of the Ghanaian economy for the period of 1982-2017 using Autoregressive Distributed Lag (ARDL). It was revealed from the study that in the long run interest rate significantly influences economic growth but in a negative direction, implies that a higher interest rate has the tendency to restrained economic growth and inflationary pressures. In relation to exchange rate, the long run result indicates an insignificant negative effect on economic growth. The general results suggested that macroeconomic variable which influences economic growth is interest rate and exchange rate. This is evidence that macroeconomic instabilities have significant effect on economic growth[74].

Scholars in India have studied the impact of monetary policy on output and inflation in India using a frequency domain analysis. This was as a result of the several attempts by the RBI in the past to control inflation through tight monetary policy that have always ended up slowing the growth process, thereby provoking prolonged

discussion about the efficacy of monetary policy in India. The objectives if the study were to estimate the causal relationship between monetary policy and its final objectives -growth, and controlling inflation in India and to study the causal relationship between output gap and inflation. The study uses monthly data from January 2002 to December 2015. The study used the Granger Causality in the frequency domain approach to first test the impact of monetary policy on output and inflation, and to then analyse the relationship between output gap and inflation in India, regarding the prevailing output gap and inflation dynamics.The Structural Vector Auto- Regression (SVAR) model was used to estimate the structural relationship between monetary policy shock, inflation, and output growth in India. The study finds a bi-directional causality between policy rate and inflation. In the same way, the evidence shows bi-directional causality between policy rate and output. This implies that the Indian monetary authorities were equally concerned about inflation and growth when deciding policy. The impulse response function analysis from the estimated SVAR signifies that the negative impact of policy rate on output growth is of greater magnitude than its impact on inflation. Hence, the tight monetary policy pursued in the recent past to control inflation increasingly impacted output at the same time, thereby hurting the growth process. It was recommended that the monetary authorities striving to control inflation in the short-to-medium-run should see the current output gap as one of the determinants of expected future inflation and should shape policy accordingly in order to anchor inflation expectations[75].

Some other researchers have sought to complement existing literature by further examining effectiveness of monetary policy in Kenya using a Factor Augmented Vector Autoregressive Model (FAVAR) 1997 to 2015. The study on the effectiveness of monetary policy on inflation control and economic growth in Kenya: An

application of factor augmented vector autoregressive model examines the role of money supply, exchange rate and the repo rate in the inflation and real sector dynamics. The study found that repo rate has a negative effect on inflation. The response of inflation is instantaneous and the decrease in inflation only recover at seventh quarter. The study also found that money supply, price stability and GDP have a long run relationship. However, the study found that exchange rate fluctuations had insignificant effect on price stability and that the effect of exchange rate fluctuations on GDP was unstable, oscillating form negative to positive. The study concludes that repo rate is effective in controlling inflation but ineffective in stimulating economic growth. Therefore, the finding implies that Central Bank of Kenya (CBK) should use repo rate to control inflation. The study also shows that there exists a long run relationship between GDP, money supply and inflation implying that the Central Bank of Kenya should take into consideration the long run impact on GDP when designing tools to control inflation. The study findings also imply that exchange rate is not an effective monetary policy tools to control inflation and stimulate GDP growth. Hence, the CBK should not target exchange rate in the management of the economy[21].

2.4 Gaps in the Literature

There are several literature existing that have examined the effects of monetary policy in controlling inflation rate in Nigeria and the effect of monetary policy on economic growth. As a result of the relationship between inflation and economic growth such that, an attempt to control inflation also have an impact on growth is an issue that require extensive studies. Whereas in Nigeria, only very few studies have examined this. The major focus of these studies have been on the individual effects of the

different monetary policy tools using various methodology to determine the effects of these tools on inflation and economic growth. However, a comparative analysis of these monetary policy instruments might give a clearer insight to determine which tool is more effective in combating inflation as well as stimulating growth. Also, an understanding of the monetary policy threshold for inflation and growth calls for study in order to determine the rate at which each tools should be allowed to grow before it leads to inflation or impact growth negatively. Also, an examination of all the monetary policy tools that affect all sectors in the economy should be conducted with the aim of identifying the policies that needed to be eliminated or modified and also taking into consideration the relevance of creating new policies designed for growth of the economy as a whole.

2.5 Conceptual Framework

The models used in this study are based on a conceptual framework which shows the relationship between that dependent and independent variables. The Keynesian theory of monetary policy and the Quantity theory of money are used to establish the framework for this study. First, the quantity theory of money developed by Irving fisher in the inter-war years provides basic theoretical explanation for the link between money and the general price level[76]. The quantity equation is given as;

$$M \times V = P \times Y \qquad (2.6)$$

Where,

M is the stock of money in circulation, V is the velocity of circulation, P is the general price level, and Y is the total income.

Equation (2.6) is the quantity equation, linking the price level and the level of output to the money stock. The quantity equation transformed to classical quantity theory of money when it was argued that both V, the income velocity of money, and Y, the level of output, were fixed. Real output was taken to be fixed because the economy was at full employment, and changes in velocity were assumed to be negligible[77]. If both V and Y are fixed, it follows that the price level is proportional to the money stock. Making Price (P) the subject of the formula;

$$P = \frac{MV}{Y} \tag{2.7}$$

However, the notion that output and velocity of money are constant was countered by Keynesian theory of monetary policy. The Keynesian theory holds that there is an indirect relationship between the money supply and real GDP. They maintained that expansionary monetary policy increases the supply of loanable funds available through the banking system, causing interest rates to fall and with with lower interest rates, aggregate expenditures on investment and interest-sensitive consumption goods usually increase, causing real GDP to rise. The theory believed that monetary policy can affect real GDP indirectly[78]. This relationship can be expressed as;

$$Y = f(MP) \tag{2.8}$$

and

$$MP = f(int, ms) \tag{2.9}$$

Where, Y is the real GDP and MP is the monetary policy which is a function of interest rate (int) and money supply (ms).

This was supported by some monetarists who advocated that money influences output in the short-run, but only prices in the long-run and that in order to reduce or curtail

inflationary growth, money growth should be less than or equal to the growth in output[79].

Although, the quantity theory of money is a framework to understand price changes in relation to the supply of money in an economy. It argues that an increase in money supply creates inflation. It is also important to note that the assumption guiding the quantity theory is that output is constant. This is however based on the notion that factors affecting output are exogenous to the quantity theory itself[80]. Therefore, if this factors are integrated into the model as proposed by the Keynesian theory, the assumption of constant output will be void. Hence, a relationship between changes in prices (inflation), output growth, money supply and interest rate thus come to light. A combination of equation 2.7 and 2.8 can be used to define this relationship implicitly:

$$Z = f(MS, INT, INF, YG) \quad (2.10)$$

Where Z is a vector of output growth and inflation, MS, INT, INF, and YG represents, money supply, interest rate, inflation and output growth.

This functional relationship was also supported by past studies that have established that interest rate and money as a block do not cause output and prices, but output and price cause interest rate and money[81]. Others have also found a long run relationship between money, price level, output, and interest rates[82,83]. The interrelationship among the variables in equation 2.9 can further be explained with the figure 2.4 below.

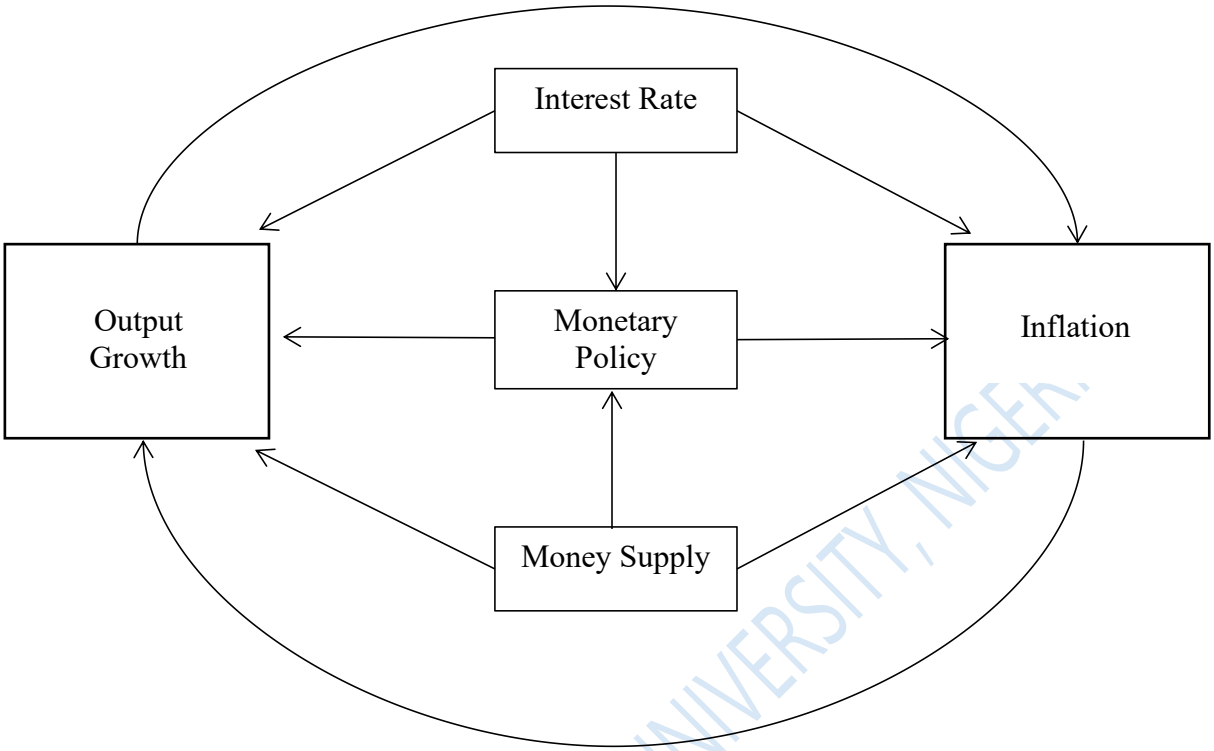

Figure 2.4: Framework of the Study
Source: Researcher (2022)

Figure 2.4 depict the conceptual framework for this study where inflation and output growth are dependent variable while, monetary policy captured by money supply and interest rate are the independent variables.

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Chapter Three

Methodology

In this section, the study presents the methodology that will be used to achieve the objectives of this study. The research design, model specification of the study are presented, the apriori expectation was stated, also the definition and sources of data, the measurement of variables as well as the estimation techniques.

3.1. Model Specification

The model for this study is based on the conceptual framework in the chapter above in order to study the relationship between inflation and monetary policy. The equation 2.5 which gives the functional relationship between inflation, interest rate, growth of money supply and output growth can be statistically as;

$$Z_t = \alpha_0 + \alpha_1 GMS_t + \alpha_2 INT_t + \alpha_3 YG_t + \alpha_4 INF_t + \mu_t \quad (3.1)$$

Where;

Z_t = vector of inflation (YG) and Output growth (YG)

INF_t = Inflation

GMS_t = Growth in money supply

YG_t = Growth in output

α_0 = Intercept

α_1 - α_4 = Coefficient of independent variables

μ = Error term

t = time

3.1.1 Model of investigating the effect of monetary policy on inflation rate in Nigeria.

In order to investigate the effect of monetary policy on inflation rate in Nigeria, the baseline model in equation 3.1 is modified to include other key macroeconomic

variables identified by some economist that affects the inflation such as monetary policy rate, liquidity ratio, exchange rate and treasury bill rate[1,2]. The model can therefore be restated as:

$$INF_t = \alpha_0 + \alpha_1 GMS_t + \alpha_2 INT_t + \alpha_3 MPR_t + \alpha_4 LR_t + \alpha_5 YG_t + \alpha_6 TBR_t + \alpha_7 EXR_t + \mu_t \quad (3.2)$$

Where;

INF_t = Inflation

GMS_t = Growth in money supply

MPR_t= Monetary Policy Rate

INT_t = Interest rate

YG_t = Growth in output

LR_t = Liquidity ratio

TBR_t = Treasury Bill Rate

EXR_t = Exchange Rate

α_0 = Intercept

α_1 - α_7 = Coefficient of independent variables

μ = Error term

t = time

3.1.2 Model of the examination of the effect of monetary policy on economic growth in Nigeria.

To examine the effect of monetary policy on economic growth, the model in equation 3.1 was modified to include other key macroeconomic variables identified by scholars that influence economic growth such as monetary policy rate, liquidity ratio, exchange rate and treasury bill rate[1,3]. The model can therefore be restated as:

$YG_t = \alpha_0 + \alpha_1 GMS_t + \alpha_2 INT_t + \alpha_3 MPR_t + \alpha_4 LR_t + \alpha_5 INF_t + \alpha_6 TBR_t + \alpha_7 EXR_t + \mu_t$ (3.3)

Where;

INF_t = Inflation

GMS_t = Growth in money supply

MPR_t= Monetary Policy Rate

INT_t = Interest rate

YG_t = Growth in output

LR_t = Liquidity ratio

TBR_t = Treasury Bill Rate

EXR_t = Exchange Rate

α_0 = Intercept

α_1 - α_7 = Coefficient of independent variables

μ = Error term

t = time

3.1.3 Model to ascertain the monetary policy threshold for growth-inflation relationship.

To estimate the monetary policy threshold for growth-inflation relationship for the third objective, the equation 3.3 can be re-expressed implicitly as;

YG = *f*(MP, INF, MP*INF, TBR, LR, GMS, EXR)

Where,

MP is a vector of interest rate (INT) and monetary policy rate (MPR)

MP*INF

The model can then be statistically expressed as;

$$YG_t = \alpha_0 + \alpha_1 MP_t + \alpha_2 INF_t + \alpha_3 MP * INF_t + \alpha_4 LR_t + \alpha_5 TBR_t + \alpha_6 EXR_t \alpha_5 + GMS_t + \mu_t \quad (3.4)$$

Where;

YG_t = Growth in output

MP_t is a vector of interest rate (INT) and monetary policy rate (MPR)

INF_t = Inflation

MP*INF is

GMS_t = Growth in money supply

MPR_t= Monetary Policy Rate

INT_t = Interest rate

LR_t = Liquidity ratio

TBR_t = Treasury Bill Rate

EXR_t = Exchange Rate

α_0 = Intercept

α_1 - α_7 = Coefficient of independent variables

μ = Error term

t = time

3.2. Description and Measurement of Variables

In this study, economic growth (YG) will be proxied by GDP growth rate, inflation (INF) was measured by consumer price index which reflects annual percentage change in the cost of an average consumption basket of goods and services while broad money supply (MS) will be taken as the sum of all currency outside banks and demand deposits excluding those of the central government.

3.3. Sources of Data

The analysis in this study will be carried out using quarterly data from 2009 to 2020 which will be sourced from the Central Bank Annual Statistical Bulletin and Annual Report.

3.4 Estimation Technique

This subsection entailed the presentation of the techniques that will be employed in order to achieve the objectives of this study. First, the description of the variables of this study, the pre-test of variables, then, the presentation of how objectives one, two and three will be achieved, respectively. Before estimating the specified model to achieve this study's first and second objectives using the stated models, the variables will be subjected to the test of stationarity using the Augmented Dickey-Fuller test which uses non-parametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms.

The co-integration test by Johansen will be then employed to test for the presence of a long-run relationship between the dependent variable and the independent variables. In this test type, the numbers of co-integrating relations will be ascertained via the trace statistics and maximum Eigen statistics. Once the long-term relationship has been established, an error correction model (ECM) that captures both the long-run and short-run dynamics will be estimated by the analysis. The ECM's option is to allow it accounts for both the short-run and long-run explanatory power of the regressors, as well as deciding the dynamics of achieving long-run equilibrium, a problem.

Further, in order to achieve the third objective, which is to obtain the threshold of monetary policy for growth-inflation relationship, the equation (3.4) will be estimated

using the appropriate econometric techniques and then partial differentiation of the equation will be taken with respect to inflation and equate it to zero.

$$\frac{\delta YG}{\delta INF} = \alpha_2 + \alpha_3 MP = 0 \quad (3.5)$$

$$-\alpha_2 = \alpha_3 MP \quad (3.6)$$

Make MP subject of the formula, the equation becomes;

$$MP = \frac{-\alpha_2}{\alpha_3} \quad (3.7)$$

3.5 Apriori Expectation

The theoretical expectation hypothesize that interest rate has a negative relationship with inflation and positive relationship with economic growth. Money supply is expected to have a positive relationship with inflation and positive relationship with economic growth as well. This is because increase in money supply raises the level of economic activities and thereby enhances the overall output growth. The study also expects monetary policy rate to have negative relationship as reduction in MPR may be inflationary while it is expected that there is a positive relationship between MPR and economic growth. The treasury bill rate is expected in this study to have a negative relationship with both inflation and economic growth. In the case of liquidity ratio, this study also expects a negative relationship with both inflation rate and positive with economic growth. Furthermore, there should be a negative relationship between inflation and economic growth.

Endnotes

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[2] Nguyen, Thi Mai Lan. "Output Effects of Monetary Policy in Emerging and Developing Countries: Evidence from a Meta-Analysis." *Emerging Markets Finance and Trade* 56, (1)2020, 68–85. https://doi.org/10.1080/1540496X.2019.1601081.

[3] Terzioğlu, Mehmet Kenan. "Effects of Inflation Uncertainty on Economic Policies: Inflation-Targeting Regime." Financial Management from an Emerging Market Perspective 2018.

Chapter Four

Results and Discussion of Findings

This presents the data collected which were subjected to empirical analysis with regards to the objectives of the study. The results of the analysis were interpreted and discussed in accordance with the three objectives of the study. The discussion in this chapter starts with the preliminary analysis consisting of descriptive statistics, trend and correlation analysis followed by the pre-estimation tests, where the unit root and co-integration tests were carried out. The chapter also provided some diagnostic tests using some test statistics in order to ensure that the estimated results are reliable for meaningful inferences.

4.1 Preliminary Analysis

4.1.1 Descriptive Statistics of Data

Table 4.1 Descriptive Statistics

	YG	INF	MPR	MPIF	INT	LR	TBR	GMS	EXR
Mean	10.3032	11.9934	11.5139	138.2940	16.5565	45.9398	8.7936	1.0252	223.0871
Median	10.5956	11.8635	12.0000	133.6394	16.6883	43.1050	10.0950	0.9518	183.7583
Maximum	17.8590	18.4509	14.0000	258.3130	19.4233	87.9266	14.7000	4.4611	381.0000
Minimum	-2.79608	7.8223	6.0000	65.0518	11.4200	18.5133	0.3066	-2.6891	148.3500
Std. Dev.	4.15503	2.7991	2.6605	50.2337	1.6294	15.4162	4.0482	1.4517	77.9985
Skewness	-0.58954	0.4150	-1.1216	0.7630	-1.3298	0.6757	-0.4843	0.1830	0.5620
Kurtosis	3.56101	2.5395	2.9054	2.8083	5.6567	3.1551	2.1425	3.2693	1.6850
Jarque-Bera	3.4099	1.8022	10.0834	4.7311	28.2656	3.7008	3.3469	0.4131	5.9856
Probability	0.1817	0.4061	0.0064	0.0938	0.0000	0.1571	0.1875	0.8133	0.0501
Sum	494.5544	575.6866	552.6667	6638.111	794.7133	2205.113	422.0933	49.2104	10708.18
Sum Sq. Dev.	811.4229	368.2580	332.6852	118601.3	124.7922	11170.00	770.2216	99.0591	285936.6
Observations	48	48	48	48	48	48	48	48	48

Source: Author's Computation Using Eviews 10

The table 4.1.1 shows the descriptive statistics of the variables considered in this study. From the result of the table, it was observed that output growth (yg) has a mean of 10.3 percent with its maximum and minimum values at 17.86 in April 2012 percent

and -2.79 percent in January 2020 respectively. This imply that the total output in Nigeria between first quarter of 2009 and fourth quarter of 2020 grew at an average rate of 10.3 percent. Within the same period, inflation rate grew at an average rate of 11.99 percent having its highest (18.45 percent) and lowest value (7.82 percent) in January 2017 and March 2014 respectively. The deviation from the mean of inflation is 2.80 percent while that of output growth is 4.16 percent.

The average of monetary policy rate (MPR), interest rate (INT), liquidity ratio (LR), growth of money supply (GMS), exchange rate (EXR) and treasury bill rate (TBR) are 11.51 percent, 16.56 percent,, 45.94 percent 1.03 percent, 83.64 percent and 223.08 percent respectively with GMS having the lowest deviation from the mean (1.45 percent). The maximum value of MPR is 14 percent, while that of INT is 19.42 percent, LR is 87.93, TBR is 14.7 percent, EXR is 381 and GMS is 4.46 percent. Their minimum values are 6 percent (MPR), 11.42 percent (INT), 18.51 percent (LR), 0.31 percent (TBR), 143.35 (EXR)and -2.69 percent (GMS) within the period under consideration.

It can further be observed that YG (-0.589), MPR (-1.122), INT (1.329) and TBR (0.484) are positively skewed while INF (0.415), LR (0.675), GMS (0.183) and EXR (0.562) are negatively skewed. Meanwhile, the Kurtosis identified 3.0 as a point for variables that are normally distributed. From the table 4.2.1, it can be observed that MPR, LR, GMS and INF shows the characteristics of mesokurtic as they are near the expected value of 3 which imply that they are normally distributed. However, INF, INT, TBR and EXR are leptokurtic which imply the presence of outliers in the distribution.

4.1.2 Graphical Trend Analysis

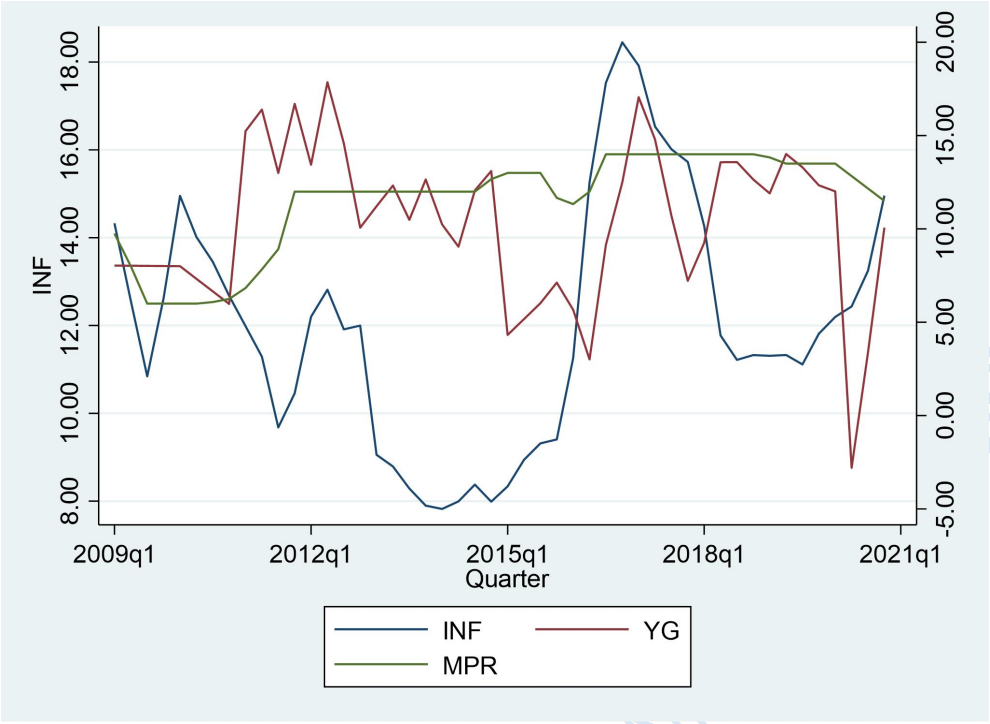

Figure 4.1 Inflation, Monetary Policy Rate and Output Growth Trend (2009Q1-2020Q4)

Source: Computation by the Researcher

The trend movement of inflation (INF), monetary policy rate (MPR) and output growth (YG) in Nigeria between 2009q1 to 2020q4 is presented graphically in figure 4.1. above. From the figure, the inverse relationship of output growth and inflation can be observed as the move in opposite direction from 2011to 2016 and then 2018 to 2020. From 2020q1 it can be seen that both INF and YG move in the same direction as they both continue to increase. The MPR appear to have more effect on inflation than output growth. In the wake of the global financial crisis, the CBN largely adopted the policy of monetary easing to address the problem of liquidity shortages in the banking system from September 2008 to September 2010 which involve reduction in MPR and liquidity ratio and injecting more money into the circulation. This explains the sudden drop in MPR from 2008to 2010 and the sharp rise in YG as economic activities are stimulated with more money. The sudden rise in MPR in 2014 leading to a sharp fall in output and subsequent rise in inflation could be as a result of

the dismissal of the CBN governor Sanusi Lamido after criticizing the current administration of misuse of funds and fighting for the total independence of CBN. The sharp increase in inflation rate from 2015 to 2017 could also be accounted for by the sudden drop in oil prices and persistent dollar shortages and rising pressure on the naira. This led to the government forcing up the crude oil sales and encouraging export which in turn account for a sharp rise in output growth. While MPR maintained a steady rate from 2016 to 2018, inflation and output growth also maintained a steady fall, although inflation falls at a higher rate. Meanwhile beyond this period, the CBN trying to achieve a single digit inflation began to reduce the MPR while the resulting effect was a rise in inflation rate from 2019 to 2020 which according to the monetary policy committee is caused majorly by increase in food prices and core. As a result, Output growth also experience a sharp increase in 2020.

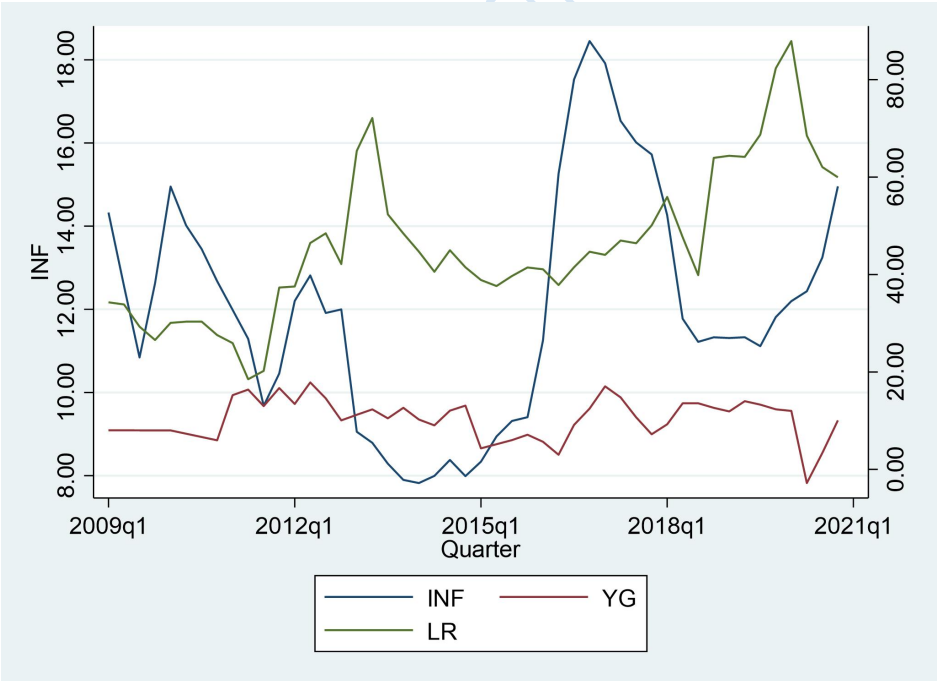

Figure 4.2 Inflation, Liquidity Ratio and Output Growth Trend (2009Q1-2020Q4)

Source: Computation by the Researcher

Figure 4.2 shows the trend movement of inflation (INF), output growth (YG) and liquidity ratio (LR) in Nigeria between 2009q1 and 2020q4. From the figure, it can be

observed that LR appear to also have more influence on inflation rate as an increase in LR led to a downward trend in INF between 2011 and 2016 and from 2018 to 2020 after which as LR falls INF begin to increase. Similar trend was also observed between LR and YG as they both move in opposite direction. This explains the negative impact on output growth experienced as a result of contractionary monetary policy.

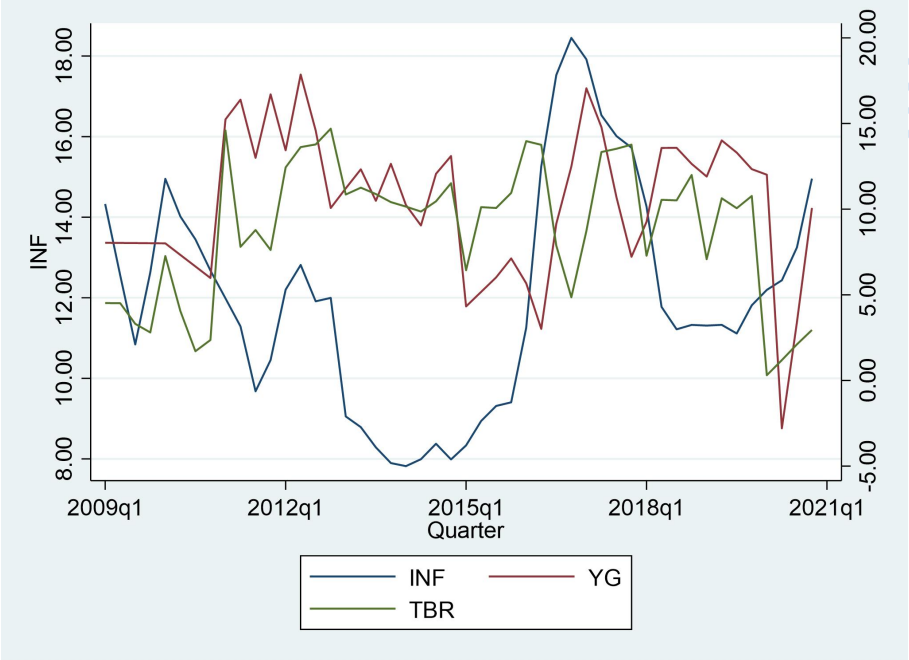

Figure 4.3 Inflation, Treasury Bill Rate and Output Growth Trend (2009Q1-2020Q4)

Source: Computation by the Researcher

The trend movement of inflation (INF), treasury bill rate (TBR) and output growth (YG) in Nigeria between 2009q1 and 2020q4. The figure revealed that the TBR tend to have more relationship with YG as they both have similar trend throughout the period under investigation. There is no clear trend relationship between TBR and INF.

4.2 Pre-Estimation Tests

4.2.1 Correlation Analysis

Table 4.2.1 presents the partial correlation coefficients of inflation rate (INF), output growth (YG), monetary policy rate (MPR), treasury bill rate (TBR), liquidity ratio

(LR) interest rate (INT), growth of money supply (GMS) and exchange rate (EXR) in Nigeria within the periods of January 2009 and 2020. The correlation matrix shows the level of association between the variables of interest for empirical analysis.

Table 4.2.1: Correlation Matrix

	YG	INF	MPR	MPIF	INT	LR	TBR	GMS	EXR
YG	1	-0.0104	0.1783	0.1364	0.1189	0.0439	0.4033	-0.1435	-0.0672
INF		1	0.0278	0.7212	0.0739	-0.0486	-0.1716	-0.0341	0.4668
MPR			1	0.7067	-0.3015	0.6355	0.3958	-0.0894	0.6352
MPIF				1	-0.1480	0.3833	0.16011	-0.0799	0.7578
INT					1	-0.5415	0.2288	-0.1702	-0.5427
LR						1	-0.8055	0.0284	0.6225
TBR							1	-0.1281	-0.1427
GMS								1	0.0597
EXR									1

Source: Author's Computation Using Eviews 10, (2022)

From the table 4.2.1 which shows the result of the correlations analysis, it can be observed that inflation have a negative but very weak relationship with output growth (-0.01). MPR shows a positive but very weak relationship with INF (0.02) and a weak linear relationship with YG (0.17), while similar relationship was found between INT, INF (0.07) and YG (0.12). There is also found a very weak and positive relationship between LR and YG (0.04) while a very weak and negative relationship was found between LR and INF(-0.05). Meanwhile, there exist strong and positive relationship between TBR and YG (0.40), while with INF (-0.17) negatively although with a weak relationship. GMS on the other hand, exhibits a negative relationship with both INF and YG, having a weak negative relationship with YG (-0.14) and a very weak relationship with INF (-0.03). EXR is found to have a strong and positive association with INF (0.47) and negative but very weak relationship with YG (-0.07).

4.2.2 Unit Root Test

The technique used to estimate the root test of the variables is the Augmented Dickey Fuller (ADF). This is employed to test for the stationary level of the variables of this study in order to suggest the appropriate technique to estimate the parameter

coefficients. The result of the test for the variables are presented in table 4.2.2 below. The t-statistics results for trend and intercept model was used to find the statistically significant level of the variables at 1%, 5% and 10% critical point at levels and first difference. It is also important to note that the lag length for determining the level of stationarity of the variables is automatic and optimally chosen by the Schwarz-Bayesian Information Criterion (SIC).

Table 4.2.2 Summary of the ADF Test

Variable Series	At Levels		At First Difference		Order of Integration
	ADF Test Statistics	Test Critical Values	ADF Test Statistics	Test Critical Values	
Inflation (INF)	-2.4387	-4.0244	-5.3997	-4.0244*	I(1)
Monetary Policy Rate (MPR)	-3.5496	-3.4416**	-	-	I(0)
Interest Rate (INT)	-0.3564	-4.0239	-18.4302	-4.0239*	I(1)
Treasury Bill Rate (TBR)	-3.9329	-3.4415**	-	-	I(0)
Output Growth (YG)	-2.6247	-4.0239	-9.6880	-4.0239*	I(1)
Exchange Rate (EXR)	-1.9793	-4.0235	-11.0586	-4.0239*	I(1)
Money Supply Growth (GMS)	-12.9892	-4.0235*	-	-	I(0)
Liquidity Ratio (LR)	-2.7896	-4.1657	-6.3355	-4.1756*	I(1)
Monetary policy and Inflation Interaction(MPIF)	-3.0418	-4.1705	-4.0196	-4.1705**	I(1)

Note that; * 1%, ** 5%, level of significance
Source: Author's Computation (2022)

The result as shown in the table 4.2.2 indicated that monetary policy rate (MPR), treasury bill rate (TBR) and growth of money supply (GMS) are stationary at levels I(0). However, MPR and TBR are significant at 5% level while GMS are significant at the 1% level. On the other hand, inflation rate (INF), interest rate (INT), output growth (YG), exchange rate (EXR), liquidity ratio (LR) and the interaction of monetary policy(MPR) and inflation (MPIF) were found to be non stationary at level at 1% and 5% level of significance. The variables were further tested at first difference I(1) and then were found to be significant at 1% level of significance.

4.2.3 ARDL Bound Test for Co-integration

As a result of the stationarity result of the variables which shows different order of integration, the autoregressive distributed lag (ARDL) model approach is adopted as the method of analysis. However, the existence of a long run relationship among the variables need to be estimated using the ARDL bound test.

The F-statistics estimates for testing the existence of long run relationship for the first and second model which estimate the the relationship between inflation and monetary

policy in Nigeria and between economic growth and monetary policy in Nigeria respectively using the ARDL (4,3) with restricted constant is presented in table 4.2.3 below.

Table 4.2.3 ARDL Bound Test

Test Statistic	**Value**	**k**	**Remarks**
F-statistics (inf| yg, tbr, mpr, lr, int, gme, exr) ARDL(1, 0, 2, 3, 3, 3, 0, 3)	7.5775	7	Cointegration
F-statistics (yg| tbr, mpr, lr, int, inf, gms, exr) ARDL(3, 3, 3, 1, 0, 1, 3, 1)	4.5726	7	Cointegration
Critical Value Bounds			
Significance	**I(0) Bound**	**I(1) Bound**	
10%	1.92	2.89	
5%	2.17	3.21	
2.5%	2.43	3.51	
1%	2.73	3.9	

Source: Author's computation (2022).

From the ARDL (4,3) bound test result in table 4.2.3, the computed F-statistics value for the first model is found to be 7.5575 which greater than the lower critical bound value of 2.73 and the upper critical bound value of 3.9 at the 1% level of significance. This indicates that there exist a cointegration relationship between inflation and monetary policy in Nigeria. The implication of this is that there is a long run co-movement, such that if there is a short run deviation in their relationship, the series would return to equilibrium in the long-run. The model have equilibrium condition that keeps the variables together in the long-run.

Similarly, the table 4.2.3 also reports the ARDL (4,3) bound test of cointegration result for the second model. The computed F-statistics value of the second model is found to be 4.572561 which greater than the lower critical bound value of 2.73 and the upper critical bound value of 3.9 at the 1% level of significance. This indicates that there exist a cointegration relationship between economic growth and monetary policy in Nigeria. The implication of this is that there is a long run co-movement, such that if there is a short run deviation in their relationship, the series would return to equilibrium in the long-run. The model have equilibrium condition that keeps the variables together in the long-run. Based on the findings of a long run relationship among the dependent and independent variables, the short-run and long-run model can therefore be estimated.

4.3 Result of the Effect of Monetary Policy on Inflation Rate in Nigeria

The first objective of this study is to examine the effect of monetary policy on inflation in Nigeria. To achieve this objective, the the autoregressive distributed lag (ARDL) model was adopted as the method of analysis having established a long run cointegration. Both the long run and the short run estimates of the effect of monetary policy on inflation was estimated using ARDL (4,3). The test automatically choose the lag length for all variables as the model was set at 4,3 to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The table 4.3.1 presents the ARDL estimate results for the long run and short run effect of output growth (YG), treasury bill rate (TBR), monetary policy rate (MPR), liquidity ratio (LR), interest rate (INT), growth of money supply (GMS) and exchange rate (EXR) on inflation rate in Nigeria.

Table 4.3.1 Result of the Estimates of the Effect of Monetary Policy on Inflation

Dependent Variable: Inflation (INF)
Selected Model: ARDL(1, 0, 2, 3, 3, 3, 0, 3)
Sample: 2009Q1 2020Q4 **Included observations:** 45

Short-Run Estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(TBR)	0.1795	0.0285	6.2942	0.0000
D(TBR(-1))	0.1941	0.0294	6.5957	0.0000
D(MPR)	0.1751	0.1700	1.0304	0.3140
D(MPR(-1))	0.3979	0.1768	2.2505	0.0347
D(MPR(-2))	-0.5889	0.1522	-3.8672	0.0008
D(LR)	0.0317	0.0120	2.6282	0.0154
D(LR(-1))	0.0624	0.0132	4.7231	0.0001
D(LR(-2))	0.0617	0.0143	4.2980	0.0003
D(INT)	-0.6548	0.2086	-3.1388	0.0048
D(INT(-1))	0.5699	0.1824	3.1246	0.0049
D(INT(-2))	1.1423	0.2045	5.5838	0.0000
D(EXR)	0.0520	0.0075	6.8620	0.0000
D(EXR(-1))	0.0302	0.0077	3.9277	0.0007
D(EXR(-2))	0.0465	0.0080	5.8140	0.0000
CointEq(-1)*	-0.3509	0.036	-9.6435	0.0000
Long-run Estimates				
YG	-0.1923	0.1278	-1.5039	0.1468
TBR	0.0659	0.2206	0.2987	0.7679
MPR	-0.7633	0.4086	-1.8678	0.0752
LR	-0.0400	0.0593	-0.6741	0.5073
INT	-0.1214	0.5234	-0.2320	0.8186
EXR	0.0342	0.0093	3.6593	0.0014
GMS	0.9857	0.3219	3.0614	0.0057
C	15.7959	10.2645	1.5388	0.1381

Adj. R-squared	0.9470	**F-stat**	36.7368
D-Watson	2.1818	**Prob.(F-Statistics)**	0.000000

Source: Author's Computation (2022)

The result, as depicted in the table 4.3.1 revealed that in the short run, all the variables have significant impact on inflation control except for the current MPR. The result shows that the current and the first lag of TBR have a positive and significantly influences inflation rate (INF) at 1 percent significance level. The coefficient of MPR at lag one and two are statistically significant at 5 percent and 1 percent respectively, however, the lag one shows a positive effect while the second lag shows a negative influence. LR and EXR both at the current, first and second lag all have a positive influence on inflation rate in Nigeria and are statistically significant at 1 percent level except LR at the current which is significant at 5 percent level. For interest rate, the

current level is negative and significant at 1 percent level while the lag one and two are positive and significant at 1 percent.

The CointEq(-1) which is the error correction coefficient and the speed of adjustment of any equilibrium towards a long run equilibrium state is observed to be negative and significant at 1 percent level of significance which imply that there is a presence of long run causality. Also that the speed of adjustment is 35 percent which is moderate.

The long run result presented in the table 4.3.1 shows that the growth of money supply (GMS) and exchange rate (EXR) are positive and significant at 1 percent level of significance. While monetary policy (MPR) is negative and significant at 10 percent level of significance. This imply that a percentage increase in MPR in the long run will decrease infation by 0.76 percent. The other variables, YG, LR, and INT exhibits negative relationships although insignificant in the long run. In the same way, TBR also shows a positive relationship with inflation in the long run but insignificant.

Furthermore, all the variable jointly explains 94.7 percent of the variations in inflation rate in Nigeria considering the degree of freedom. The Durbin-Watson statistics of 2.18 shows that there is no presence of first order serial correlation in the model. The overall test using the F-statistic (36.7369) is statistically significant at 1% level of significance showing that model is well specified and statistically significant.

In testing for the suitability of the model described above, four post estimation tests were carried out which are Normality test, Autocorrelation test, Heteroskedasticity test and Stability test.

Table 4.3.2 Post Estimation Test (Inflation Rate)

Tests	Obs*R-squared / Jarque-Bera	Probability
Normality	2.4575	0.2927
Autocorrelation	3.3435	0.4910
Heteroskedasticity	19.4493	0.8060

Source: Author's Computation (2022)

The result of the first three post estimation tests are summarized in the table 4.3.2 above. It revealed that the residuals are normally distributed as depicted by the Jarque-Bera statistics and its accompanied probability which accepts the null hypothesis that errors are normally distributed. The residuals are also tested for autocorrelation using the Breusch Godfrey LM test. The result shows that the null hypothesis of no autocorrelation can be accepted since the p-value for the test is greater than 0.05, and hence, there is the absence of autocorrelation. In order to ensure the consistency of the model, the heteroskedasticity test was carried out using the Breusch-Pagan-Godfrey heteroskedasticity test, and the result indicates that the null hypothesis of no heteroskedasticity is accepted, as the p-value of the test is 5 percent. This means that the mean and variance remains same all through the study period.

The fourth post estimation test checks the robustness of the results reported in this study. The stability tests was carried out using the Cumulative Sum of recursive residuals (CUSUM) and Cumulative Sum of recursive residual square (CUSUMSQ) tests. The graphical representation of the CUSUM and CUSUMSQ statistics is presented in figure 4.4 and 4.5 respectively. The tests depict the stability of the model built in analyzing the effect of monetary policy on inflation rate in Nigeria. If the plot of the CUSUM and CUSUMSQ remains within the 5 per cent critical bound the null hypothesis that all coefficients are stable cannot be rejected.

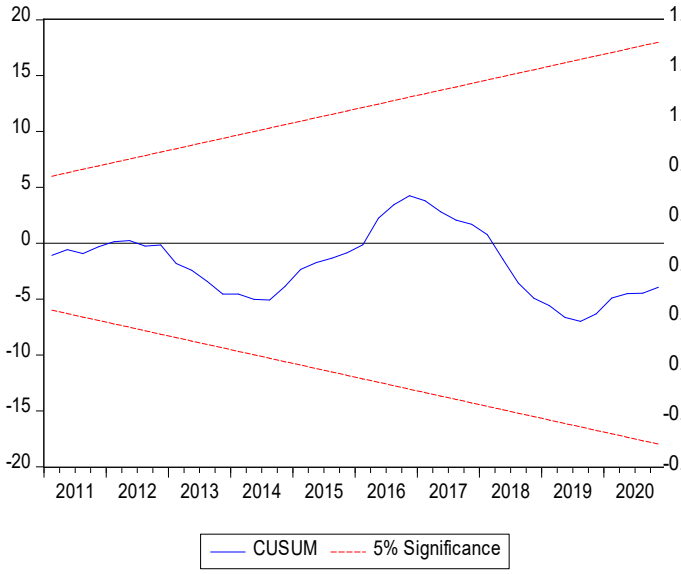

Figure 4.4 Cumulative Sum of recursive residuals (CUSUM)

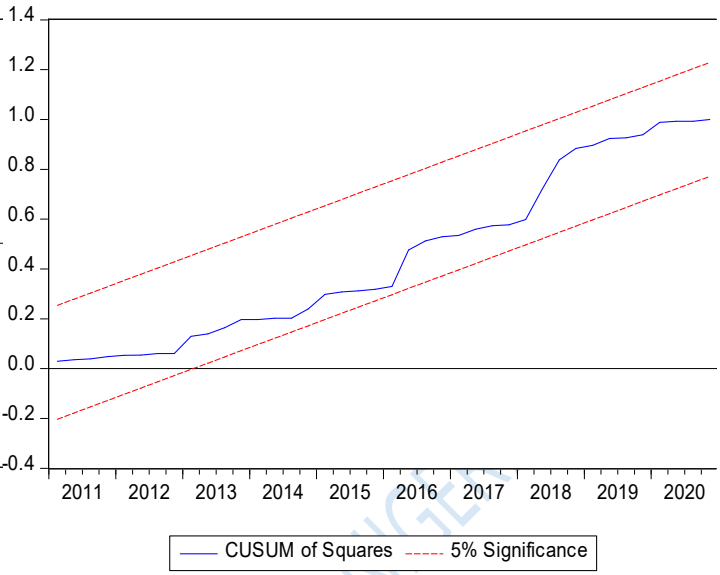

Figure 4.5 Cumulative Sum of recursive residuals Squared (CUSUMSQ)

Source: Author's Computation (2022)

As observed from the result shown in figure 4.3.1 and 4.3.2, both the CUSUM and CUSUMSQ are within the boundaries of the 5 percent level of significance which confirm the stability of the model.

4.4 Result of the Effect of Monetary Policy on Economic Growth in Nigeria.

The second objective is to examine the effect of monetary policy on economic growth in Nigeria. To achieve this, the autoregressive distributed lag (ARDL) model was adopted as the method of analysis having established a long run cointegration. Both the long run and the short run estimates of the effect of monetary policy on inflation was estimated using ARDL (4,3). The test automatically choose the lag length for all variables as the model was set at 4,3 to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The table 4.4.1 presents the ARDL estimate results for the long run and short run effect of inflation rate (INF), treasury bill rate (TBR), monetary policy rate (MPR), liquidity ratio (LR), interest rate (INT), growth of money supply (GMS) and exchange rate (EXR) on inflation rate in Nigeria.

Table 4.4.1 Result of the Estimates of the Effect of Monetary Policy on Economic Growth

Dependent Variable: Economic Growth (YG)
Selected Model: ARDL(3, 3, 3, 1, 0, 1, 3, 1)
Sample: 2009Q1 2020Q4 **Included observations:** 45

Short-Run Estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(YG(-1))	0.5582	0.1362	4.0961	0.0005
D(YG(-2))	0.3561	0.1418	2.5115	0.0199
D(TBR)	0.4812	0.1087	4.4233	0.0002
D(TBR(-1))	0.7084	0.1389	5.0991	0.0000
D(TBR(-2))	0.3304	0.1298	2.5440	0.0185
D(MPR)	4.9505	0.7705	6.4249	0.0000
D(MPR(-1))	0.8515	0.6549	1.3001	0.2070
D(MPR(-2))	2.1091	0.5767	3.6567	0.0014
D(LR)	0.1534	0.0473	3.2438	0.0037
D(INF)	-1.0299	0.3491	-2.9496	0.0074
D(GMS)	1.1183	0.2619	4.2696	0.0003
D(GMS(-1))	-1.3395	0.2436	-5.4978	0.0000
D(GMS(-2))	-0.8385	0.2108	-3.9770	0.0006
D(EXR)	-0.1283	0.0339	-3.7841	0.0010
CointEq(-1)*	-1.4654	0.1956	-7.4911	0.0000
Long-run Estimates				
TBR	-0.1665	0.2967	-0.5614	0.5801
MPR	0.1822	0.4884	0.3730	0.7127
LR	0.1923	0.0427	4.4998	0.0002
INT	0.8456	0.3701	2.2849	0.0323
INF	0.0483	0.1957	0.2469	0.8072
GMS	2.2260	0.7031	3.1659	0.0045
EXR	-0.0041	0.0152	-0.2725	0.7877
C	-14.8123	6.7739	-2.1866	0.0397

Adj. R-squared	0.6312	**F-stat**	4.4230
D-Watson	2.1818	**Prob.(F-Statistics)**	0.0005

Source: Author's Computation (2022)

The result, as depicted in the table 4.4.1 revealed that in the short run, all the variables have significant impact on economic growth in Nigeria except for the lag one of MPR. It was discovered that the lag one and two of output growth have a positive and significant effect on itself where lag one is significant at 1 percent and lag two at 5 percent. Similarly, the current level, with lag one and two of treasury bill rate exhibit a positive and significant influence on output growth such that the current level and lag one are significant at 1 percent while lag two is significant at 5 percent.

For MPR, the coefficients of the current level and lag two exhibits a positive and significant effect at 1 percent on output growth while the lag one shows a positive

effect but it is however not significant. Liquidity ratio at the current level is discovered to have a positive and significant effect at 1 percent level on output growth in Nigeria, while inflation and exchange rate at the current level shows a negative and significant impact on output growth both at 1 percent level of significant. With regards to the growth of money supply, the current level of GMS has a positive and significant effect on output growth while the lag one and lag two shows a negative and significant effect on output growth. The three coefficients are all significant at 1 percent level of significant.

The CointEq(-1) which is the error correction coefficient and the speed of adjustment of any equilibrium towards a long run equilibrium state is observed to be negative and significant at 1 percent level of significance which imply that there is a presence of long run causality. Also that the speed of adjustment is approximately 146.5 percent which implies an oscillatory convergence. This means that the disequilibrium over adjust back to the long run equilibrium in the current month.

In the long run as reported in the table 4.4.1 above, it can be observed that liquidity ratio (LR) and growth of money supply (GMS) both have a positive influence on economic growth at 1 percent level of significance. Interest rate in also found to have a positive impact on economic growth at 5 percent level of significance. The other controlling variables including TBR and EXR were found to have a negative and insignificant effect on economic growth. In the same way, MPR and INF were found to exhibit a positive and insignificant relationship with economic growth in the long run. This imply that only LR and GMS will be able to influence economic growth in the long run such that a percentage increase in LR and GMS will increase economic growth by 0.19 percent and 2.23 percent.

Furthermore, all the variable jointly explains approximately 63 percent of the variations in output growth in Nigeria 70.5 percent considering the degree of freedom. The Durbin-Watson statistics of 2.18 shows that there is no presence of first order serial correlation in the model. The overall test using the F-statistic (4.4230) is statistically significant at 1% level of significance showing that model is well specified and statistically significant.

In testing for the suitability of the model described above, four post estimation tests were carried out which are Normality test, Autocorrelation test, Heteroskedasticity test and Stability test.

Table 4.4.2 Post Estimation Test (Economic Growth)

Tests	**Obs*R-squared / Jarque-Bera**	**Probability**
Normality	1.3725	0.5035
Autocorrelation	5.9402	0.2428
Heteroskedasticity	23.3596	0.8252

Source: Author's Computation (2022)

The result of the first three post estimation tests are summarized in the table 4.42 above. It revealed that the residuals of the model are normally distributed as depicted by the Jarque-Bera statistics and its accompanied probability (p-value greater than 5 percent) which accepts the null hypothesis that errors are normally distributed. The residuals are also tested for autocorrelation using the Breusch Godfrey LM test. The result shows that the null hypothesis of no autocorrelation can be accepted since the p-value for the test is greater than 5 percent, and hence, there is the absence of autocorrelation. In order to ensure the consistency of the model, the heteroskedasticity test was carried out using the Breusch-Pagan-Godfrey heteroskedasticity test, and the result indicates that the null hypothesis of no heteroskedasticity is accepted, as the p-value of the test is 5 percent. This means that the mean and variance remains same all through the study period.

The stability test was also carried out using the Cumulative Sum of recursive residuals (CUSUM) and Cumulative Sum of recursive residual square (CUSUMSQ) tests. The CUSUM and CUSUMSQ statistics is presented in figure 4.6 and 4.7 respectively. The tests depict the stability of the model built in analyzing the effect of monetary policy on economic growth in Nigeria. If the plot of the CUSUM and CUSUMSQ remains within the 5 per cent critical bound the null hypothesis that all coefficients are stable cannot be rejected.

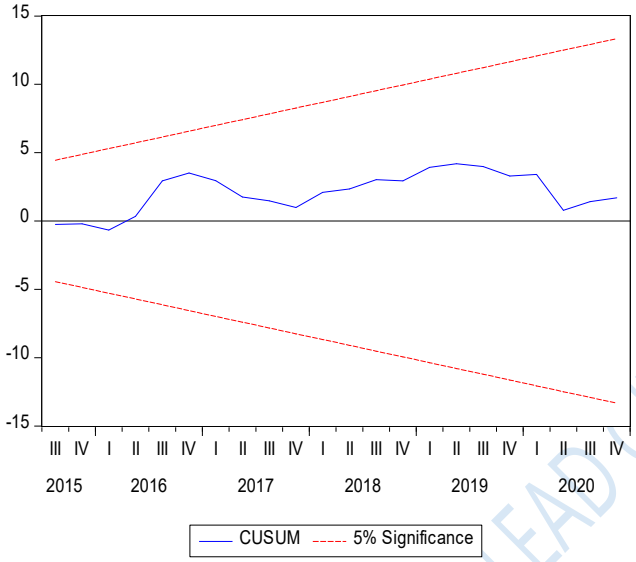

Figure 4.6 Cumulative Sum of recursive residuals (CUSUM)

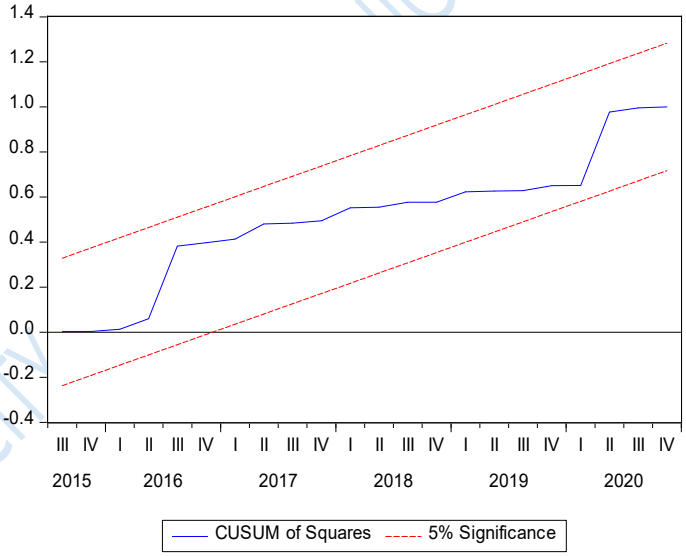

Figure 4.7 Cumulative Sum of recursive residuals Squared (CUSUMSQ)

Source: Author's Computation (2022)

From the graphical presentation in figure 4.6 and 4.7, the CUSUM and CUSUMSQ are found to move within the boundaries of the 5 percent level of significance which confirm the stability of the model.

4.5 Result of the Monetary Policy Threshold for Growth-Inflation Relationship

The third objective is to ascertain the monetary policy threshold for growth-inflation relationship. The autoregressive distributed lag (ARDL) model was adopted as the method of analysis to achieve this objective following the result of the stationarity level of the variables which shows different order of integration. The ARDL bound

test of cointegration will be carried out first in order to establish the long run relationship of the variables in the model.

4.5.1 ARDL Bound Co-integration Test

The F-statistics estimates for testing the existence of long run relationship between economic growth, inflation and monetary policy variables in Nigeria using ARDL (5,3) with restricted constant is presented in table 4.5.1 below.

Table 4.5.1 ARDL Bound Test

Test Statistic	**Value**	**k**	**Remarks**
F-statistics (yg| tbr, mpr, mpif, lr, int, inf, gms, exr) ARDL(5, 2, 3, 3, 3, 3, 3, 3, 3)	9.4819	8	Cointegration
Critical Value Bounds			
Significance	**I(0) Bound**	**I(1) Bound**	
10%	1.85	2.85	
5%	2.11	3.15	
2.5%	2.33	3.42	
1%	2.62	3.77	

Source: Author's computation (2022).

From the ARDL (5,3) bound test result in table 4.5.1, the computed F-statistics value for the first model is found to be 9.4819 which greater than the lower critical bound value of 2.62 and the upper critical bound value of 3.77 at the 1% level of significance. This indicates that there exist a cointegration relationship between economic growth, monetary policy and MPIF which measures the interaction of inflation and monetary policy in Nigeria. The implication of this is that there is a long run co-movement, such that if there is a short run deviation in their relationship, the series would return to equilibrium in the long-run. The model have equilibrium condition that keeps the variables together in the long-run.

Having established the long run relationship, the long run and the short run estimates of the effect of monetary policy threshold for growth-inflation relationship in Nigeria can be estimated using ARDL (5,3). The test automatically choose the lag length for all variables as the model was set at 5,3 to ensure sufficient degree of the freedom based on automatic selection of Akaike Information Criterion. The table 4.5.1 presents the ARDL estimate results for the long run and short run effect of inflation rate (INF), Interaction of Monetary policy and inflation (MPIF) treasury bill rate (TBR), monetary policy rate (MPR), liquidity ratio (LR), interest rate (INT), growth of money supply (GMS) and exchange rate (EXR) on inflation rate in Nigeria.

Table 4.5.2 Result of the Estimates of Monetary Policy Threshold for Growth-Inflation Relationship in Nigeria

Dependent Variable: Economic Growth (YG)
Selected Model: ARDL(5, 2, 3, 3, 3, 3, 3, 3, 3)
Sample: 2009Q1 2020Q4 **Included observations:** 45

Short-Run Estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(YG(-1))	0.3207	0.0688	4.6556	0.0035
D(MPR)	2.2827	0.9031	2.5275	0.0448
D(MPR(-1))	-3.5668	0.6478	-5.5059	0.0015
D(INF)	-6.9020	0.9044	-7.6311	0.0003
D(INF(-1))	-5.3477	0.7888	-6.7789	0.0005
D(MPIF)	0.6078	0.0775	7.8413	0.0002
D(MPIF(-1))	0.4474	0.0649	6.8940	0.0005
D(MPIF(-2))	0.4333	0.0383	11.3053	0.0000
D(EXR)	-0.4087	0.0273	-14.9385	0.0000
D(EXR(-1))	-0.1816	0.0204	-8.8856	0.0001
D(GMS)	0.9545	0.1162	8.2098	0.0002
D(GMS(-1))	-2.2493	0.1589	-14.147	0.0000
D(INT)	4.1175	0.4166	9.8819	0.0001
D(LR)	-0.0509	0.0224	-2.2686	0.0638
D(LR(-1))	-0.1380	0.0284	-4.8548	0.0028
D(TBR)	0.1226	0.0479	2.5572	0.0431
D(TBR(-1))	1.0091	0.0856	11.7893	0.0000
CointEq(-1)*	-1.6338	0.1061	-15.3963	0.0000
Long-run Estimates				
MPR	5.2209	1.5978	3.2675	0.0171
INF	4.1010	1.6114	2.5449	0.0438
MPIF	-0.2697	0.1179	-2.2874	0.0622
EXR	-0.0279	0.0102	-2.7285	0.0343
GMS	2.8969	0.6975	4.1528	0.0060
INT	1.1103	0.6378	1.7406	0.1324
LR	0.2643	0.0519	5.0875	0.0022
TBR	-0.6037	0.2934	-2.0575	0.0853
C	-82.2859	24.5062	-3.3577	0.0153

Adj. R-squared	0.9107	**F-stat**	12.9034
D-Watson	2.6861	**Prob.(F-Statistics)**	0.0021

Source: Author's Computation (2022)

The result of the error correction for the short run model reported in table 4.5.2 revealed that all the variables are statistically significant at 1 percent level with the exception of the current level of TBR and MPR which is significant at the 5 percent level and the current level of LR which is significant at the 10 percent level. The result shows that the current and the first lag of inflation rate (INF) and exchange rate (EXR) both have a negative impact on economic growth at 1 percent level of significance. Also, the current level of of interest rate (INT) and growth of money

supply (GMS) are found to have a positive impact on economic growth at 1 percent level of significance. The current level of treasury bill rate (TBR) and monetary policy rate (MPR) both have a positive and significant influence on economic growth at 5 percent level of significance. In addition, the first lag of liquidity ratio (LR), MPR, and GMS all have a negative and significant impact on economic growth at 1 percent level of significance.

The current, first and second lag of MPIF which measure the effect of the interaction of monetary policy (MPR) and inflation on output growth in the short run is found to be positive and statistically significant at 1 percent level, which imply that the effect of the interaction of monetary policy (MPR) and inflation on economic growth in the short run was positive and significant. However, to establish the short run monetary policy threshold for growth-inflation relationship in Nigeria, the partial derivative of the model (in equation 3.4) is taken with respect to inflation is taken and then equate to zero.

Inserting the coefficients (approximated to two decimal places) of the variables into the model using the current level of of the variables, it can be expressed as;

YG = 2.282728*MPR - 6.902037*INF + 0.607818*MPIF + 4.117553*INT + 2.255547*INT + 0.122693*TBR -0.050986*LR -0.408704*EXR + 0.954575*GMS (4.1)

Taking the partial derivative,

$$\frac{\delta YG}{\delta INF} = -6.902037 + 0.607818\ (MP) \quad (4.2)$$

Where the MP is the mean of the monetary policy rate. Injecting the mean of MPR into the model, the net effect (NE) of the interaction of monetary policy and inflation

on growth can therefore be estimated before proceeding to determine the threshold by equating to zero.

$$NE = -6.902037 + 0.607818\,(11.51) \quad (4.3)$$

$$NE = 0.0939$$

The net effect (NE) of the interaction of monetary policy and inflation on growth is found to be positive with a coefficient of 0.0939. This imply that the MPR as a monetary policy tool has has a moderating effect on inflation in the short run such that the outcome of its interaction with inflation have a positive impact of economic growth. However, proceeding to establish a monetary policy threshold, the equation 4.2 is equated to zero.

$$\frac{\delta YG}{\delta INF} = -6.902037 + 0.607818\,(MP) = 0 \quad (4.4)$$

Making MP the subject of the formula, the equation becomes;

$$MP = \frac{-(-6.902037)}{0.607818} \quad (4.5)$$

$$MP = 11.36$$

The result therefore show that the monetary policy threshold for growth-inflation relationship is 11.36 which falls within the range of the monetary policy rate implemented by the CBN within the period under consideration. This imply that in the short run, in order to control inflation and ensure economic growth, the monetary policy rate (MPR) should be set at 11.36. At this rate, inflation will be moderated and the economic growth will be achieved. Any reduction in this threshold value may result in a negative effect on economic growth.

Further results from the ECM shows that the CointEq(-1) which is the error correction coefficient and the speed of adjustment of any equilibrium towards a long run

equilibrium state is observed to be negative and significant at 1 percent level of significance which imply that there is a presence of long run causality. Also that the speed of adjustment is approximately 163.3 percent which implies an oscillatory convergence. This means that the disequilibrium over adjust back to the long run equilibrium in the current month.

In the long run however, the result presented in the table 4.5.2 shows that all the variables are significant with the exception of INT. It was observed that MPR and LR both have a positive and significant influence on economic growth in Nigeria at the 5 percent level while EXR have a negative and significant impact on growth at 5% level. LR and GMS both have a positive and significant influence on growth at 1 percent level of significance with TBR having a negative influence at 10 percent level of significance.

Meanwhile, MPIF which measure the effect of the interaction of monetary policy (MPR) and inflation on economic growth in the long run is found to be negative (-0.269758) and statistically significant at 10 percent level, which imply that the effect of the interaction of monetary policy (MPR) and inflation on output growth in the long run was negative and significant.

However, to establish the long run monetary policy threshold for growth-inflation relationship in Nigeria, the partial derivative of the model (in equation 3.4) is taken with respect to inflation is taken and then equate to zero.

Inserting the coefficients (approximated to two decimal places) of the variables into the model, it can be expressed as;

YG = 5.220951*MPR + 4.101036*INF -0.269758*MPIF -0.027934*EXR + 2.896901*GMS + 1.110303*INT + 0.264284*LR -0.60367*TBR (4.6)

Taking the partial derivative,

$$\frac{\delta YG}{\delta INF} = 4.101036 - 0.269758\ (\text{MP}) \quad (4.7)$$

Where the MP is the mean of the monetary policy rate. Injecting the mean of MPR into the model, the net effect (NE) of the interaction of monetary policy and inflation on growth can therefore be estimated before proceeding to determine the threshold by equating to zero.

$$\text{NE} = 4.101036 - 0.269758\ (11.51) \quad (4.8)$$

NE = 0.99

The net effect (NE) of the interaction of monetary policy and inflation on growth in the long run is found to be positive with a coefficient of 0.9956. This imply that the MPR as a monetary policy tool has has a moderating effect on inflation in the long run such that the outcome of its interaction with inflation have a positive impact of economic growth. However, proceeding to establish a monetary policy threshold, the equation 4.7 is equated to zero.

$$\frac{\delta YG}{\delta INF} = 4.101036 - 0.269758\ (\text{MP}) = 0 \quad (4.9)$$

Making MP the subject of the formula, the equation becomes;

$$\text{MP} = \frac{-(4.101036)}{-0.269758} \quad (4.10)$$

MP = 15.2

The result therefore show that the monetary policy threshold for growth-inflation relationship in the long run is 15.2 which is not far from the range of the monetary policy rate implemented by the CBN within the period under consideration. This imply that in the long run, in order to control inflation and ensure economic growth,

the monetary policy rate (MPR) should be set at 15.2. At this rate, inflation will be moderated and the output growth will be achieved. Any increase in this threshold value may result in a negative effect on output growth.

Furthermore, all the variable jointly explains approximately 91 considering the degree of freedom. The Durbin-Watson statistics of 2.68 which shows the presence of first order serial correlation in the model. The overall test using the F-statistic (12.9034) is statistically significant at 1% level of significance showing that model is well specified and statistically significant.

4.5.2 Diagnostic Test

In testing for the suitability of the model described above, four post estimation tests were carried out which are Normality test, Autocorrelation test, Heteroskedasticity test and Stability test.

Table 4.5.3 Post Estimation Test (Monetary Policy Threshold)

Tests	Obs*R-squared / Jarque-Bera	Probability
Normality	0.1684	0.9193
Autocorrelation	32.7532	0.1827
Heteroskedasticity	38.0001	0.4159

Source: Author's Computation (2022)

From the result of the post estimation tests reported in table 4.5.3, it revealed that the residuals of the model are normally distributed as the p-value is greater than 5 percent significant level. The serial correlation test also shows the absence of autocorrelation with the p-value greater than 0.05. The heteroskedasticity test was also carried out using the Breusch-Pagan-Godfrey heteroskedasticity test, and the result indicates that the null hypothesis of no heteroskedasticity is accepted, as the p-value of the test is 5 percent. This means that the mean and variance remains same all through the study period.

The stability test was also carried out using the Cumulative Sum of recursive residuals (CUSUM) and Cumulative Sum of recursive residual square (CUSUMSQ) tests. The CUSUM and CUSUMSQ statistics are presented in figure 4.8 and 4.9 respectively. The tests depict the stability of the model built in analyzing the monetary policy threshold for growth-inflation relationship in Nigeria. If the plot of the CUSUM and CUSUMSQ remains within the 5 per cent critical bound the null hypothesis that all coefficients are stable cannot be rejected.

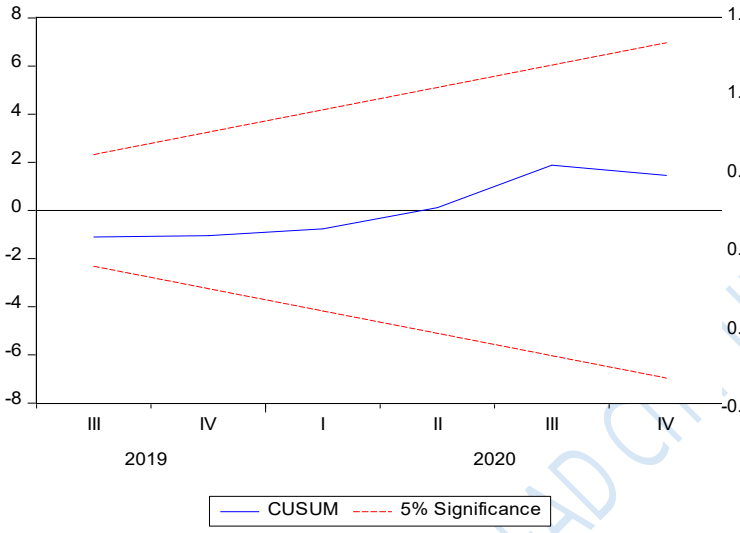

Figure 4.8 Cumulative Sum of recursive residuals (CUSUM)

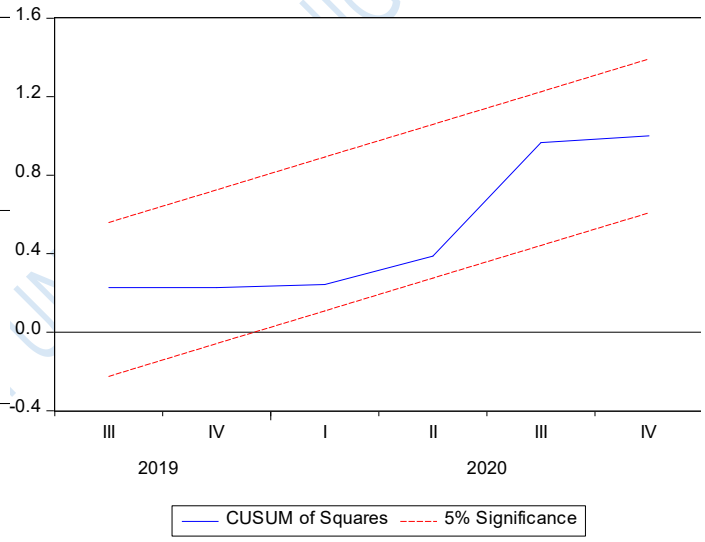

Figure 4.9 Cumulative Sum of recursive residuals Squared (CUSUMSQ)

Source: Author's Computation (2022)

From the graphical presentation in figure 4.8 and 4.9, the CUSUM and CUSUMSQ are found to move within the boundaries of the 5 percent level of significance which confirm the stability of the model.

4.6 Discussion of Findings

The focus of this study is on the effect of monetary policy on inflation and economic growth in Nigeria with the objective of investigating the effect of monetary policy on inflation rate and economic growth and also to establish the monetary policy threshold for growth inflation relationship.

The first objective was to investigate the effect of monetary policy on inflation rate in Nigeria. The result of the analysis shows that out of the four monetary policy tools used by the CBN namely, Monetary policy rate (MPR), Interest rate (INT), Liquidity ratio (LR) and Treasury bill rate (TBR), only MPR is have a significant impact (negative) on inflation rate in the long run. Other monetary variables such as the growth of money supply (GMS) and exchange rate (EXR) have a positive and significant at 1 percent level of significance. This imply that in the long term, only the MPR have significant influence on inflation rate in Nigeria. The monetary policy committee in their long term plan should include the use of MPR in controlling inflation in Nigeria.

In the short run however, all the variables have significant impact on inflation control except for the current MPR. The current and the first lag of TBR have a positive and significantly influences inflation rate at 1 percent significance level. The coefficient of MPR at lag one and two are statistically significant at 5 percent and 1 percent respectively, however, the lag one shows a positive effect while the second lag shows a negative influence. LR and EXR both at the current, first and second lag all have a positive influence on inflation rate in Nigeria and are statistically significant at 1 percent level except LR at the current which is significant at 5 percent level. Interest rate at the current level is negative and significant at 1 percent level while the lag one and two are positive and significant at 1 percent.

In summary, MPR is the only monetary policy tool found to have a significant influence on inflation in both the long run and short run, while LR, TBR and INT only have significant influence on inflation rate in the short run. Among the other macroeconomic variables, GMS and EXR was found to have a significant influence on inflation rate in both the short and long run while YG was found to influence the

rate of inflation in the short run alone. The implication of this is that MPR is a key policy tool in moderating the rate of inflation in Nigeria both in the immediate and long term.

The result of this study is inline with the findings of other scholars who examined similar topic. The work of some scholars on the effect of monetary policy on inflation rate also shows similar result, which confirm the relationship depicted in this study among monetary policy tools and inflation rate[1,2,3].

The second objective of this study is to examine the effect of monetary policy on economic growth in Nigeria. The findings from the analysis result shows that in the long run, only LR and INT are monetary policy tools found to have significant impact (positive) on economic growth, while among the other macroeconomic variables examined in the study, only GMS have a significant (positive) impact on economic growth.

However, in the short run, all the variables are found to have significant impact on economic growth in Nigeria except for the lag one of MPR. The current level and lag two of MPR exhibits a positive and significant effect at 1 percent on output growth while, the current level, with lag one and two of TBR exhibit a positive and significant influence on output growth such that the current level and lag one are significant at 1 percent while lag two is significant at 5 percent. LR at the current level is discovered to have a positive and significant effect at 1 percent level on output growth in Nigeria, INF and EXR at the current level shows a negative and significant impact on output growth both at 1 percent level of significant. With regards to the growth of money supply, the current level of GMS has a positive and significant effect on output growth while the lag one and lag two shows a negative and

significant effect on output growth. The three coefficients are all significant at 1 percent level of significant.

In summary, LR and INT are the monetary policy tools found to have a significant impact on economic growth in both the long run and short run, GMS is also a monetary variable found to have a significant influence on growth in both short run and long run. Meanwhile, all other variables in the model (MPR, EXR, INF) only have significant influence on economic growth in Nigeria in the short run. This imply that policy actions that are targeted towards influencing economic growth in both the short and long run should be based on the use of liquidity ratio and interest rate.

Similar studies have also explored the relationship among these variables with similar results. Studies have also confirmed this result of the relationship between monetary policy on economic growth as scholars have also established a significant relationship in the short run which implied that the tools of monetary policy are more effective in the immediate period[4,5,6].

The third objective was to ascertain the monetary policy threshold for growth-inflation relationship. The variable MPIF was used to measure the effect of the interaction of monetary policy and inflation on economic growth is found to be positive and significant at 10 percent in the long run. The implication of this is that the effect of the interaction of monetary policy (MPR) and inflation on output growth in the long run was negative and significant. The net effect (NE) of this interaction was estimated to be positive with a coefficient of 0.9956. This means that the MPR as a monetary policy tool has has a moderating effect on inflation in the long run such that the outcome of its interaction with inflation have a positive impact of economic growth.

The monetary policy threshold for growth-inflation relationship in the long run was found to be 15.2 which is not far from the range of the monetary policy rate implemented by the CBN within the period under consideration. This imply that in the long run, in order to control inflation and ensure economic growth, the monetary policy rate (MPR) should be set at 15.2. At this rate, inflation will be moderated and economic growth sustained. Any increase in this threshold value may result in a negative effect on output growth.

In the short run however, current, first and second lag of MPIF which measure the effect of the interaction of monetary policy (MPR) and inflation on output growth was found to be positive and statistically significant at 1 percent level, which imply that the effect of the interaction of monetary policy (MPR) and inflation on economic growth in the short run was positive and significant. The net effect of the interaction of monetary policy and inflation on growth is found to be positive with a coefficient of 0.0939. This means that the MPR as a monetary policy tool has has a moderating effect on inflation in the short run such that the outcome of its interaction with inflation have a positive impact of economic growth.

The monetary policy threshold for growth-inflation relationship in the short run was found to be 11.36 which falls within the range of the monetary policy rate implemented by the CBN within the period under consideration. This imply that in the short run, in order to control inflation and ensure economic growth, the monetary policy rate (MPR) should be set at 11.36. At this rate, inflation will be moderated and the economic growth will be sustained. Any reduction in this threshold value may result in a negative effect on economic growth.

In summary, the variable MPIF which measures the effect of the interaction of monetary policy (MPR) and inflation on economic growth is found to be significant in

both the long run and short run. The net effect of this interaction was also found to be positive both in the short run and long run which mean that the outcome of the interaction of monetary policy and inflation bring about a positive impact on economic growth in Nigeria. The implication of this is that attempts to control inflation using monetary policy rate influences economic growth positively thereby enhancing the growth process. However, in order for the economy to maintain positive growth while controlling inflation with MPR as a monetary policy tool, MPR should be set at 11.36 in the short run and at 15.2 in the long run. Decreasing the short run value and increasing the long run value may have a damaging effect on the growth of the economy in Nigeria.

Some studies have investigated a threshold value for economic growth, inflation and money supply and found threshold values for policy actions with respect to growth, inflation and money supply[7,8,9,10].

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Chapter Five

Conclusion

This chapter presents a summary of major findings of this study, sets out the relevant conclusions and makes recommendations for practice and suggestions for further research based on the findings of this study. The chapter draws conclusions on each key finding on specific objectives and subsequently makes recommendations to key stakeholders. In addition, it presents implications of the study; limitations encountered and make suggestions on areas for further research.

5.1 Summary of Findings

The alarming rate of inflation in Nigeria has been of serious concern to the government and monetary policy makers over the years with no meaningful achievement despite several efforts being made to caution the effects. The attending effect is also felt on the growth process as economic growth have experienced decline as a result of efforts to control inflation through the use of monetary policy tools which has failed to control inflation but affect growth negatively. As a result, this study seek to examine the effect of monetary policy on inflation and economic growth and to ascertain the monetary policy threshold of growth-inflation relationship. This will help determine the extent to which monetary policy should be increased or decreased so that inflation can be controlled and growth sustained.

In order to achieve this objective, secondary quarterly data from 2009 to 2020 sourced from CBN and subjected to econometric analysis. The data exhibits a combination of stationarity at level I(0) and I(1). As a result, the ARDL bound test for cointegration was estimated to establish the long run relationship. The three models showed the

presence of long run cointergation. The error correction model (ECM) was therefore estimated to test for the short run effect while the long run effect was also estimated.

Result of the first objective which examined the effect of monetary policy on inflation rate in Nigeria revealed that only monetary policy rate, as a monetary policy tool have a significant influence on inflation in both the long run and short run, while liquidity ratio, treasury bill rate and interest rate only have significant influence on inflation rate in the short run. Among the other macroeconomic variables,growth of money supply and exchange rate were found to have a significant influence on inflation rate in both the short and long run while output growth was found to influence the rate of inflation in the short run alone. The implication of this is that MPR is a key policy tool in moderating the rate of inflation in Nigeria.

The second objective which investigates the influence of monetary policy on economic growth in Nigeria, it was found that liquidity ratio and interest rate are the monetary policy tools found to have a significant impact on economic growth in both the long run and short run, growth of money supply also a monetary variable found to have a significant influence on growth in both short run and long run. Meanwhile, all other variables in the model (MPR, EXR, INF) only have significant influence on economic growth in Nigeria in the short run. This imply that policy actions that are targeted towards influencing economic growth in both the short and long run should be based on the use of liquidity ratio and interest rate.

The third objective intends to ascertain the monetary policy threshold for growth-inflation relationship. It was found that the variable MPIF which measures the effect of the interaction of monetary policy (MPR) and inflation on economic growth is found to be significant in both the long run and short run. The net effect of this interaction was also found to be positive both in the short run and long run which

mean that the outcome of the interaction of monetary policy and inflation bring about a positive impact on economic growth in Nigeria. The implication of this is that attempts to control inflation using monetary policy rate influences economic growth positively thereby enhancing the growth process. However, in order for the economy to maintain positive growth while controlling inflation with MPR as a monetary policy tool, MPR should be set at 11.36 in the short run and at 15.2 in the long run. Decreasing the short run value and increasing the long run value may have a damaging effect on the growth of the economy in Nigeria

5.2 Conclusion

This study investigated the the effect of monetary policy on inflation rate and economic growth and also determine the monetary policy threshold for growth-inflation relationship. Based on the findings of this study, it can be concluded that the four monetary policy tools (MPR,TBR, LR and INT) considered are effective in influencing inflation and economic growth in both the long run and short run. In the long run, only the monetary policy rate is effective in controlling inflation, while liquidity ratio and interest rate are most effective in in influencing economic growth. Whereas, in the short run, all the four stated monetary policy tools are effective in influencing both inflation and economic growth. With regards to other macroeconomic variables, growth of money supply and exchange rate, they are found to be most effective in influencing inflation and economic growth in the short run.

When the interaction of monetary policy and inflation was factored-in in the third objective, in order to measure the monetary policy threshold for growth-inflation relationship. The interaction of monetary policy and inflation was found to result in a positive and significant impact on growth. In the same way, when the net effect of the interaction was estimated for both long run and short run, a positive result was found.

The monetary policy threshold for growth-inflation relationship was found to be 11.36 in the short run and 15.2 in the long run, which means that in order for the economy to maintain positive growth while controlling inflation with MPR as a monetary policy tool should not be below 11.36 nor above 15.2.

5.3 Recommendations

In line with the findings of this study, the following policy recommendations were suggested.

1. The Nigerian monetary authority should implement necessary policies with strict monitoring and evaluation in order to caution the effects of changes from macroeconomic variables that can impact the desired level of growth and prices in the country.
2. Since the effects of the variables considered in this study are mostly immediate, the monetary policy committee should carefully evaluate policy alternatives before implementation.
3. There is also the need to increase the use of monetary policy rate, liquidity ratio and interest rate given their significant impact both in the immediate and long term and to influence growth in the short run.
4. Given the significant impact of monetary policy rate on both inflation and economic growth in the short run and the long run, the Central Bank of Nigeria should ensure that the monetary policy rate is fixed between 11.36 and 15.20 in order to produce a controlling effect on inflation and at the same time stimulate economic growth. This will also encourage the flow of credit to boost investment and economic activities in the economy.

5. The monetary authority should conduct a reassessment of the determinants of the monetary policy rate as a result of its ineffectiveness as a tool to sustain growth in the long run

6. Finally, the monetary policy authority should exercise caution in their combination of policy tools as evidence from the study suggest the existence of trade off in policy outcomes.

5.4 Contribution to Knowledge

This study focused on the impact of monetary policy on inflation and economic growth in Nigeria and the monetary policy threshold for growth-inflation relationship. This study contributes to the existing body of knowledge by confirming the monetary policy tools that are significant in controlling inflation both in the short run and in the long run which was found to be the monetary policy rate. The monetary policy tools that have significant influence on economic growth both in the short run and long run was also established to be liquidity ratio and interest rate. This provides policy makers with quality information that can help them in the choice of the combination of monetary policy instruments that can be targeted at achieving the macroeconomic objectives of low and stable price level and sustainable economic growth.

This study further added to the body of existing literature by establishing a monetary policy threshold level of growth-inflation relationship. The threshold level of the monetary policy that can sustain economic growth and control inflation at the same time in the short run was found to be 11.36 and 15.20 in the long run. At this threshold levels, the net effect of the interaction of inflation and monetary policy will bring about a positive and significant effect on economic growth in Nigeria. This findings will also be useful to policy makers in deciding the exact level of monetary

policy rate that needed to be set in order for the policy tool to moderate the effect of inflation rate and sustain economic growth.

5.5 Area of Further Research

This study examined the impact of monetary policy on inflation rate and economic growth in Nigeria and also established the monetary policy threshold for growth inflation relationship using monetary policy rate at policy tool. It is therefore suggested that further study should be carried out to establish a threshold level of other major monetary policy tool like liquidity ratio and treasury bill rate. Further studies can also look into the trade-off between inflation and economic growth and determine the role of monetary policy.

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Appendix

Appendix

Appendix I: Unit Root Test Results

UNIT ROOT TEST RESULTS TABLE (ADF)

Null Hypothesis: the variable has a unit root

At Level

		YG	TBR	MPR	LR	INT	GMS	INF	EXR	MPIF
With Constant	t-Statistic	-3.6405	-3.3257	-1.0885	-1.7902	0.9173	-6.8361	-2.4121	0.7416	-2.3927
	Prob.	***0.0085***	***0.0192***	***0.7128***	***0.3807***	***0.9949***	***0.0000***	***0.1441***	***0.9919***	***0.1493***
		***	**	n0	n0	n0	***	n0	n0	n0
With Constant & Trend	t-Statistic	-3.6216	-3.2224	-1.7396	-2.7896	-0.0125	-6.7682	-2.5023	-2.2038	-3.0418
	Prob.	***0.0386***	***0.0925***	***0.7172***	***0.2082***	***0.9949***	***0.0000***	***0.3257***	***0.4763***	***0.1325***
		**	*	n0	n0	n0	***	n0	n0	n0
Without Constant & Trend	t-Statistic	-1.1565	-1.3022	0.0960	-0.1183	-1.4316	-4.6721	-0.1422	2.5295	-0.2393
	Prob.	***0.2222***	***0.1755***	***0.7083***	***0.6377***	***0.1400***	***0.0000***	***0.6292***	***0.9967***	***0.5946***
		n0	n0	n0	n0	n0	***	n0	n0	n0

At First Difference

		d(YG)	d(TBR)	d(MPR)	d(LR)	d(INT)	d(GMS)	d(INF)	d(EXR)	d(MPIF)
With Constant	t-Statistic	-7.1722	-6.9813	-4.5584	-6.4217	-2.9323	-8.6928	-4.0282	-4.9771	-4.0825
	Prob.	***0.0000***	***0.0000***	***0.0006***	***0.0000***	***0.0495***	***0.0000***	***0.0029***	***0.0002***	***0.0025***
		***	***	***	***	**	***	***	***	***
With Constant & Trend	t-Statistic	-7.0860	-7.8046	-4.6484	-6.3355	-5.4246	-8.7300	-4.0146	-5.0945	-4.0196
	Prob.	***0.0000***	***0.0000***	***0.0027***	***0.0000***	***0.0003***	***0.0000***	***0.0150***	***0.0008***	***0.0148***
		***	***	***	***	***	***	**	***	**
Without Constant & Trend	t-Statistic	-7.2570	-7.0660	-4.5667	-6.4050	-2.6238	-8.8063	-4.0749	-4.5900	-4.1010
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0098***	***0.0000***	***0.0001***	***0.0000***	***0.0001***
		***	***	***	***	***	***	***	***	***

Notes:

a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

b: Lag Length based on SIC

c: Probability based on MacKinnon (1996) one-sided p-values.

Appendix II Result of ARDL Bound Test for the Effect of Inflation and Monetary Policy

ARDL Long Run Form and Bounds Test
Dependent Variable: D(INF)
Selected Model: ARDL(1, 0, 2, 3, 3, 3, 3, 0)
Case 2: Restricted Constant and No Trend
Date: 09/12/22 Time: 16:01
Sample: 2009Q1 2020Q4
Included observations: 45

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.543517	3.149887	1.759910	0.0923
INF(-1)*	-0.350946	0.075942	-4.621268	0.0001
YG**	-0.067504	0.041720	-1.618033	0.1199
TBR(-1)	0.023131	0.079501	0.290958	0.7738
MPR(-1)	-0.267894	0.166671	-1.607326	0.1222
LR(-1)	-0.014044	0.020538	-0.683807	0.5012
INT(-1)	-0.042633	0.179244	-0.237849	0.8142
EXR(-1)	0.012034	0.004847	2.483065	0.0211
GMS**	0.345928	0.086186	4.013743	0.0006
D(TBR)	0.179534	0.047269	3.798181	0.0010
D(TBR(-1))	0.194121	0.044789	4.334120	0.0003
D(MPR)	0.175193	0.289860	0.604407	0.5518
D(MPR(-1))	0.397997	0.221131	1.799821	0.0856
D(MPR(-2))	-0.588955	0.252767	-2.330033	0.0294
D(LR)	0.031711	0.015478	2.048827	0.0526
D(LR(-1))	0.062429	0.018016	3.465125	0.0022
D(LR(-2))	0.061786	0.019124	3.230773	0.0038
D(INT)	-0.654826	0.318271	-2.057445	0.0517
D(INT(-1))	0.569939	0.285413	1.996890	0.0584
D(INT(-2))	1.142339	0.299547	3.813557	0.0009
D(EXR)	0.052083	0.011306	4.606814	0.0001
D(EXR(-1))	0.030254	0.010224	2.959087	0.0072
D(EXR(-2))	0.046535	0.011218	4.148248	0.0004

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YG	-0.192348	0.127895	-1.503959	0.1468
TBR	0.065911	0.220638	0.298730	0.7679
MPR	-0.763349	0.408678	-1.867847	0.0752
LR	-0.040018	0.059364	-0.674110	0.5073
INT	-0.121480	0.523426	-0.232087	0.8186
EXR	0.034291	0.009371	3.659375	0.0014
GMS	0.985701	0.321968	3.061483	0.0057
C	15.79591	10.26453	1.538883	0.1381

EC = INF - (-0.1923*YG + 0.0659*TBR -0.7633*MPR -0.0400*LR -0.1215*INT
+ 0.0343*EXR + 0.9857*GMS + 15.7959)

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	7.577549	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9
Actual Sample Size	45		Finite Sample: n=45	
		10%	2.131	3.223
		5%	2.504	3.723
		1%	3.383	4.832

ARDL Result for the Effect of Inflation and Monetary Policy

Dependent Variable: INF
Method: ARDL
Date: 09/12/22 Time: 15:57
Sample (adjusted): 2009Q4 2020Q4
Included observations: 45 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): YG TBR MPR LR INT EXR GMS
Fixed regressors: C
Number of models evalulated: 65536
Selected Model: ARDL(1, 0, 2, 3, 3, 3, 3, 0)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INF(-1)	0.649054	0.075942	8.546755	0.0000
YG	-0.067504	0.041720	-1.618033	0.1199
TBR	0.179534	0.047269	3.798181	0.0010
TBR(-1)	0.037718	0.046506	0.811022	0.4260
TBR(-2)	-0.194121	0.044789	-4.334120	0.0003
MPR	0.175193	0.289860	0.604407	0.5518
MPR(-1)	-0.045091	0.355180	-0.126952	0.9001
MPR(-2)	-0.986952	0.350755	-2.813791	0.0101
MPR(-3)	0.588955	0.252767	2.330033	0.0294
LR	0.031711	0.015478	2.048827	0.0526
LR(-1)	0.016673	0.021734	0.767163	0.4511
LR(-2)	-0.000642	0.021044	-0.030530	0.9759
LR(-3)	-0.061786	0.019124	-3.230773	0.0038
INT	-0.654826	0.318271	-2.057445	0.0517
INT(-1)	1.182132	0.368944	3.204091	0.0041
INT(-2)	0.572400	0.375669	1.523680	0.1418
INT(-3)	-1.142339	0.299547	-3.813557	0.0009
EXR	0.052083	0.011306	4.606814	0.0001
EXR(-1)	-0.009795	0.015652	-0.625796	0.5379
EXR(-2)	0.016281	0.015200	1.071095	0.2957
EXR(-3)	-0.046535	0.011218	-4.148248	0.0004
GMS	0.345928	0.086186	4.013743	0.0006
C	5.543517	3.149887	1.759910	0.0923

R-squared	0.973501	Mean dependent var	11.95463
Adjusted R-squared	0.947001	S.D. dependent var	2.864730
S.E. of regression	0.659502	Akaike info criterion	2.311938
Sum squared resid	9.568734	Schwarz criterion	3.235343

Log likelihood	-29.01860	Hannan-Quinn criter.	2.656174
F-statistic	36.73685	Durbin-Watson stat	2.181775
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Short Run Estimates

ARDL Error Correction Regression
Dependent Variable: D(INF)
Selected Model: ARDL(1, 0, 2, 3, 3, 3, 3, 0)
Case 2: Restricted Constant and No Trend
Date: 09/12/22 Time: 15:47
Sample: 2009Q1 2020Q4
Included observations: 45

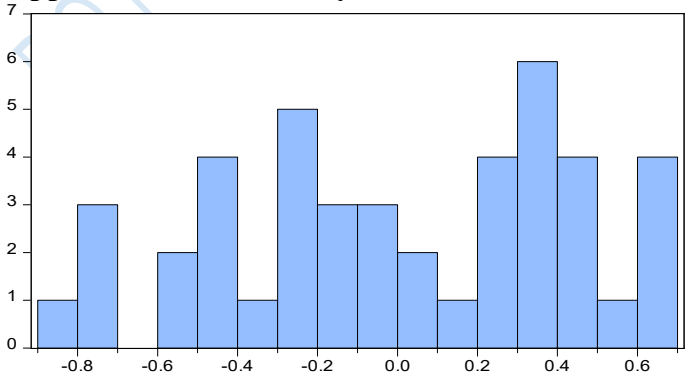
ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TBR)	0.179534	0.028523	6.294263	0.0000
D(TBR(-1))	0.194121	0.029431	6.595789	0.0000
D(MPR)	0.175193	0.170013	1.030468	0.3140
D(MPR(-1))	0.397997	0.176842	2.250573	0.0347
D(MPR(-2))	-0.588955	0.152293	-3.867255	0.0008
D(LR)	0.031711	0.012066	2.628206	0.0154
D(LR(-1))	0.062429	0.013217	4.723195	0.0001
D(LR(-2))	0.061786	0.014375	4.298060	0.0003
D(INT)	-0.654826	0.208617	-3.138895	0.0048
D(INT(-1))	0.569939	0.182404	3.124603	0.0049
D(INT(-2))	1.142339	0.204580	5.583836	0.0000
D(EXR)	0.052083	0.007590	6.862001	0.0000
D(EXR(-1))	0.030254	0.007703	3.927755	0.0007
D(EXR(-2))	0.046535	0.008004	5.814085	0.0000
CointEq(-1)*	-0.350946	0.036392	-9.643505	0.0000

R-squared	0.862337	Mean dependent var	0.091463
Adjusted R-squared	0.798094	S.D. dependent var	1.256876
S.E. of regression	0.564763	Akaike info criterion	1.956382
Sum squared resid	9.568734	Schwarz criterion	2.558603
Log likelihood	-29.01860	Hannan-Quinn criter.	2.180884
Durbin-Watson stat	2.181775		

* p-value incompatible with t-Bounds distribution.

Appendix 2.4a Normality Test



Series: Residuals
Sample 2010Q1 2020Q4
Observations 44

Mean	-1.91e-15
Median	0.001258
Maximum	0.693864
Minimum	-0.825163
Std. Dev.	0.438719
Skewness	-0.211544
Kurtosis	1.922288
Jarque-Bera	2.457519
Probability	0.292655

Appendix 2.4b Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

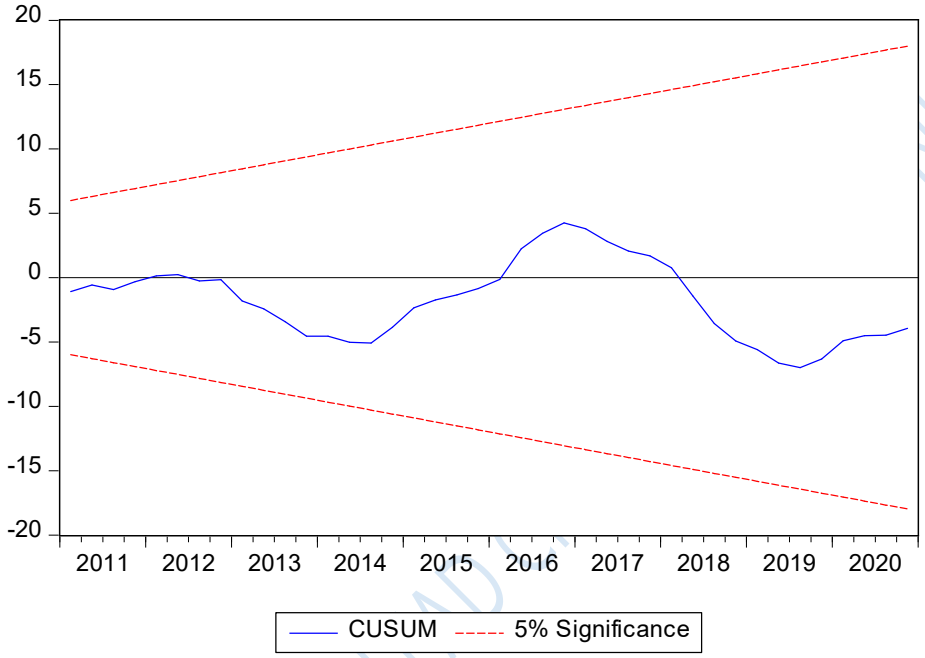
F-statistic	0.740129	Prob. F(2,18)	0.4910
Obs*R-squared	3.343453	Prob. Chi-Square(2)	0.1879

Appendix 2.4c. Heteroskedasticity

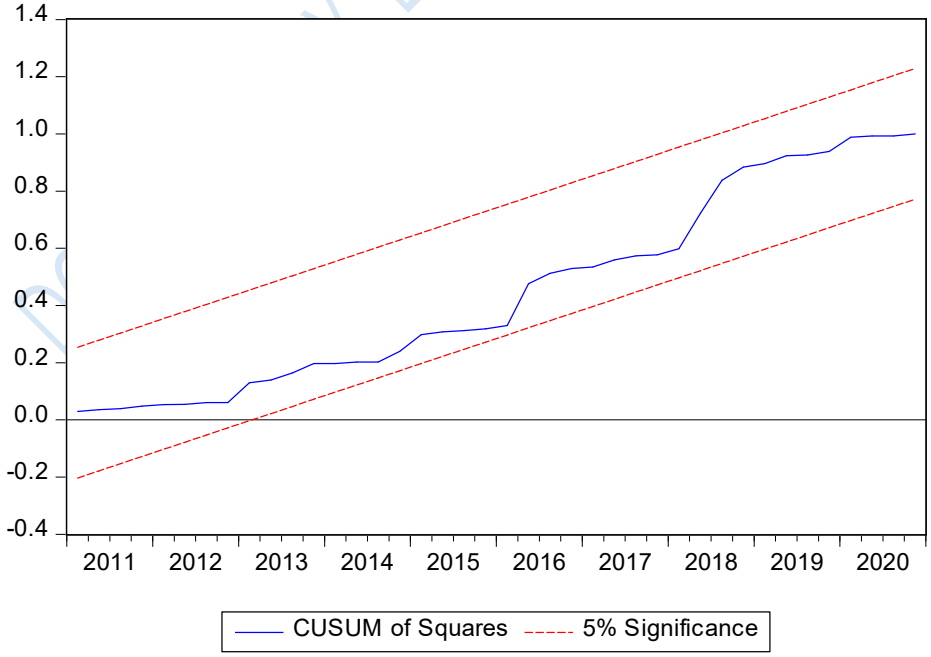
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.688880	Prob. F(23,20)	0.8060
Obs*R-squared	19.44934	Prob. Chi-Square(23)	0.6749
Scaled explained SS	1.853089	Prob. Chi-Square(23)	1.0000

Appendix 2.4d Stability Test (CUSUM)



Appendix 2.4e Stability Test (CUSUMSQ)



Appendix III: ARDL Result of the Impact of Monetary Policy on Output Growth in Nigeria.

Dependent Variable: YG
Method: ARDL
Date: 09/13/22 Time: 12:08
Sample (adjusted): 2009Q4 2020Q4
Included observations: 45 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): TBR MPR LR INT INF GMS EXR
Fixed regressors: C
Number of models evalulated: 65536
Selected Model: ARDL(3, 3, 3, 1, 0, 1, 3, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
YG(-1)	0.092779	0.194067	0.478074	0.6373
YG(-2)	-0.202037	0.156064	-1.294575	0.2089
YG(-3)	-0.356188	0.193741	-1.838482	0.0795
TBR	0.481202	0.166324	2.893154	0.0084
TBR(-1)	-0.016877	0.171216	-0.098571	0.9224
TBR(-2)	-0.378019	0.181770	-2.079655	0.0494
TBR(-3)	-0.330436	0.258972	-1.275952	0.2153
MPR	4.950516	1.574711	3.143762	0.0047
MPR(-1)	-3.831994	1.357142	-2.823575	0.0099
MPR(-2)	1.257607	1.207437	1.041551	0.3089
MPR(-3)	-2.109111	0.834992	-2.525907	0.0192
LR	0.153483	0.062150	2.469575	0.0218
LR(-1)	0.128441	0.097420	1.318426	0.2009
INT	1.239321	0.589451	2.102500	0.0472
INF	-1.029967	0.460959	-2.234400	0.0359
INF(-1)	1.100801	0.496583	2.216752	0.0373
GMS	1.118310	0.424920	2.631810	0.0152
GMS(-1)	0.804227	0.394763	2.037243	0.0538
GMS(-2)	0.501016	0.320373	1.563853	0.1321
GMS(-3)	0.838546	0.337895	2.481674	0.0212
EXR	-0.128324	0.056325	-2.278256	0.0328
EXR(-1)	0.122228	0.047727	2.560955	0.0178
C	-21.70664	11.00729	-1.972024	0.0613

R-squared	0.815603	Mean dependent var	10.45482
Adjusted R-squared	0.631207	S.D. dependent var	4.250331
S.E. of regression	2.581156	Akaike info criterion	5.040954
Sum squared resid	146.5721	Schwarz criterion	5.964359
Log likelihood	-90.42147	Hannan-Quinn criter.	5.385190
F-statistic	4.423091	Durbin-Watson stat	2.053108
Prob(F-statistic)	0.000471		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bound Test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(YG)
Selected Model: ARDL(3, 3, 3, 1, 0, 1, 3, 1)
Case 2: Restricted Constant and No Trend
Date: 11/07/22 Time: 14:52
Sample: 2009Q1 2020Q4
Included observations: 45

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-21.70664	11.00729	-1.972024	0.0613
YG(-1)*	-1.465447	0.277953	-5.272281	0.0000
TBR(-1)	-0.244130	0.452848	-0.539100	0.5952
MPR(-1)	0.267019	0.735273	0.363156	0.7200
LR(-1)	0.281924	0.093583	3.012547	0.0064
INT**	1.239321	0.589451	2.102500	0.0472
INF(-1)	0.070835	0.289185	0.244945	0.8088
GMS(-1)	3.262098	1.088219	2.997649	0.0066
EXR(-1)	-0.006096	0.022838	-0.266925	0.7920
D(YG(-1))	0.558225	0.179642	3.107426	0.0051
D(YG(-2))	0.356188	0.193741	1.838482	0.0795
D(TBR)	0.481202	0.166324	2.893154	0.0084
D(TBR(-1))	0.708455	0.342905	2.066041	0.0508
D(TBR(-2))	0.330436	0.258972	1.275952	0.2153
D(MPR)	4.950516	1.574711	3.143762	0.0047
D(MPR(-1))	0.851504	0.816051	1.043444	0.3081
D(MPR(-2))	2.109111	0.834992	2.525907	0.0192
D(LR)	0.153483	0.062150	2.469575	0.0218
D(INF)	-1.029967	0.460959	-2.234400	0.0359
D(GMS)	1.118310	0.424920	2.631810	0.0152
D(GMS(-1))	-1.339561	0.522047	-2.565981	0.0176
D(GMS(-2))	-0.838546	0.337895	-2.481674	0.0212
D(EXR)	-0.128324	0.056325	-2.278256	0.0328

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TBR	-0.166591	0.296694	-0.561492	0.5801
MPR	0.182210	0.488471	0.373021	0.7127
LR	0.192381	0.042753	4.499867	0.0002
INT	0.845695	0.370110	2.284985	0.0323
INF	0.048336	0.195734	0.246950	0.8072
GMS	2.226010	0.703100	3.165994	0.0045
EXR	-0.004160	0.015263	-0.272544	0.7877
C	-14.81230	6.773915	-2.186668	0.0397

EC = YG - (-0.1666*TBR + 0.1822*MPR + 0.1924*LR + 0.8457*INT + 0.0483
*INF + 2.2260*GMS -0.0042*EXR -14.8123)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.572561	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9
			Finite Sample: n=45	
Actual Sample Size	45	10%	2.131	3.223
		5%	2.504	3.723
		1%	3.383	4.832

Short Run (ECM)

ARDL Error Correction Regression
Dependent Variable: D(YG)
Selected Model: ARDL(3, 3, 3, 1, 0, 1, 3, 1)
Case 2: Restricted Constant and No Trend
Date: 09/13/22 Time: 12:32
Sample: 2009Q1 2020Q4
Included observations: 45

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(YG(-1))	0.558225	0.136281	4.096142	0.0005
D(YG(-2))	0.356188	0.141822	2.511515	0.0199
D(TBR)	0.481202	0.108787	4.423323	0.0002
D(TBR(-1))	0.708455	0.138935	5.099178	0.0000
D(TBR(-2))	0.330436	0.129886	2.544050	0.0185
D(MPR)	4.950516	0.770514	6.424953	0.0000
D(MPR(-1))	0.851504	0.654916	1.300172	0.2070
D(MPR(-2))	2.109111	0.576769	3.656767	0.0014
D(LR)	0.153483	0.047315	3.243861	0.0037
D(INF)	-1.029967	0.349178	-2.949686	0.0074
D(GMS)	1.118310	0.261921	4.269644	0.0003
D(GMS(-1))	-1.339561	0.243652	-5.497840	0.0000
D(GMS(-2))	-0.838546	0.210844	-3.977094	0.0006
D(EXR)	-0.128324	0.033911	-3.784119	0.0010
CointEq(-1)*	-1.465447	0.195623	-7.491181	0.0000

R-squared	0.798651	Mean dependent var	0.045596
Adjusted R-squared	0.704688	S.D. dependent var	4.067470
S.E. of regression	2.210370	Akaike info criterion	4.685399
Sum squared resid	146.5721	Schwarz criterion	5.287619
Log likelihood	-90.42147	Hannan-Quinn criter.	4.909900
Durbin-Watson stat	2.053108		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.572561	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Post Estimation

1 Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

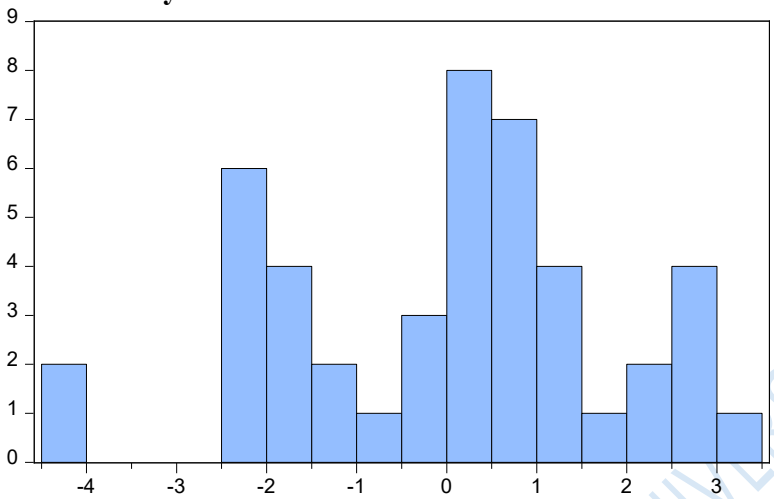
F-statistic	1.520794	Prob. F(2,20)	0.2428
Obs*R-squared	5.940193	Prob. Chi-Square(2)	0.0513

2. Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.670661	Prob. F(27,16)	0.8252
Obs*R-squared	23.35959	Prob. Chi-Square(27)	0.6656
Scaled explained SS	2.997374	Prob. Chi-Square(27)	1.0000

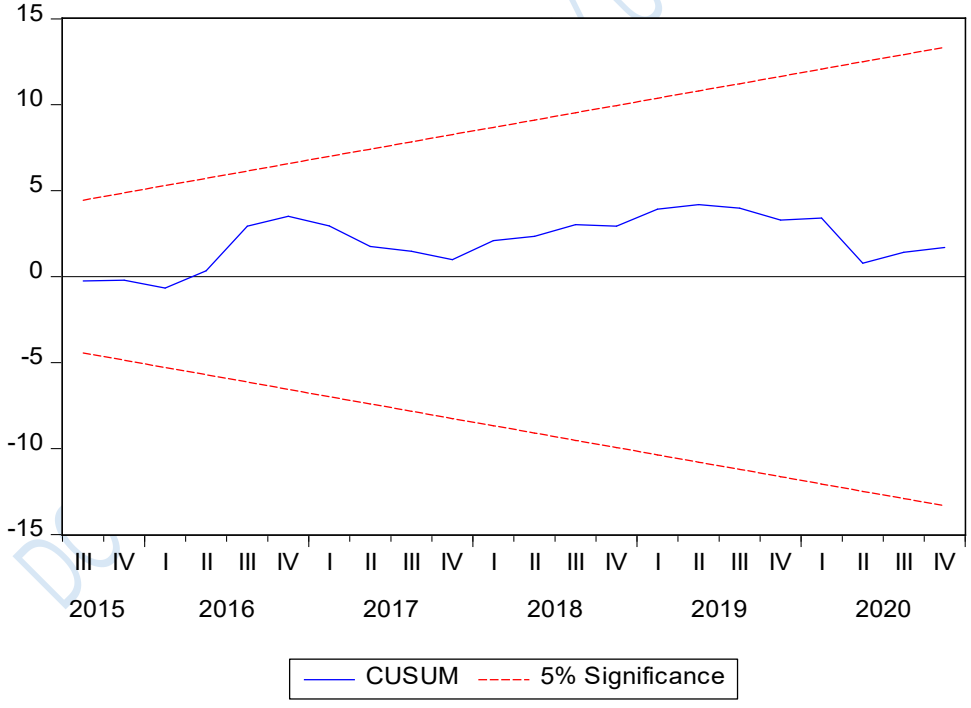
3. Normality Test



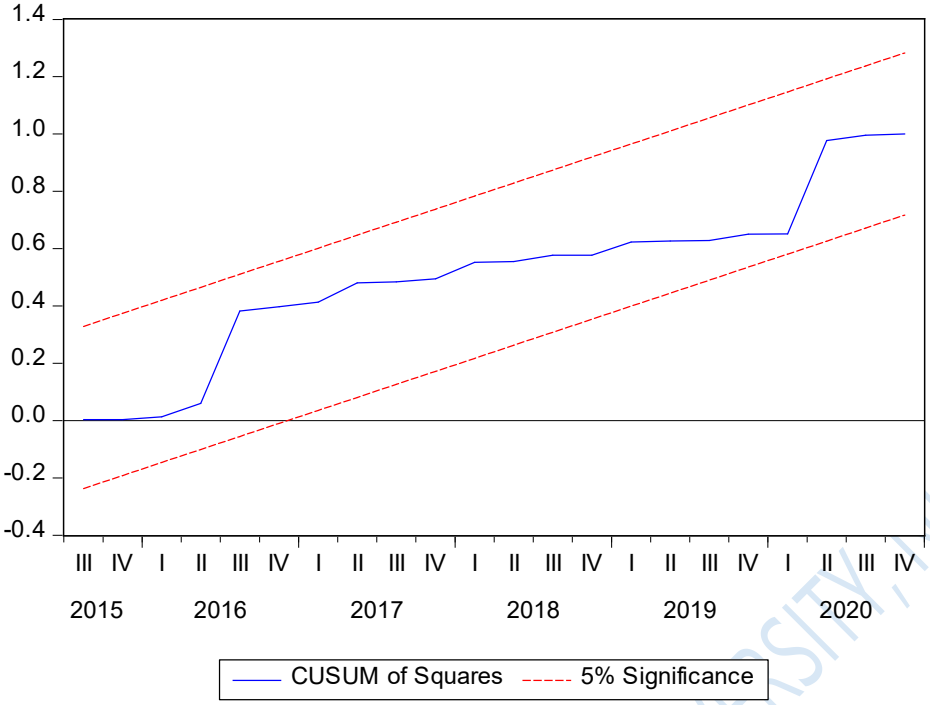
Series: Residuals
Sample 2009Q4 2020Q4
Observations 45

Mean	-2.15e-14
Median	0.355234
Maximum	3.005570
Minimum	-4.491165
Std. Dev.	1.825153
Skewness	-0.379026
Kurtosis	2.603303
Jarque-Bera	1.372521
Probability	0.503455

CUSUM Test



CUSUM of Squares Test



Appendix IV: ARDL Result of the Impact of Monetary Policy on Output Growth in Nigeria.

ARDL Result

Dependent Variable: YG
Method: ARDL
Date: 09/19/22 Time: 13:01
Sample (adjusted): 2009Q3 2020Q4
Included observations: 46 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): MPR INF MPIF EXR GMS INT LR TBR
Fixed regressors:
Number of models evalulated: 19683
Selected Model: ARDL(2, 0, 1, 1, 1, 0, 2, 0, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
YG(-1)	0.387592	0.136067	2.848527	0.0080
YG(-2)	-0.283188	0.136652	-2.072321	0.0472
MPR	0.085904	0.742564	0.115685	0.9087
INF	-4.403796	1.295296	-3.399836	0.0020
INF(-1)	4.465786	0.881866	5.064019	0.0000
MPIF	0.313117	0.102832	3.044949	0.0049
MPIF(-1)	-0.299761	0.068046	-4.405296	0.0001
EXR	-0.106847	0.043814	-2.438633	0.0211
EXR(-1)	0.097732	0.044367	2.202797	0.0357
GMS	0.285426	0.331300	0.861532	0.3960
INT	0.511014	0.986818	0.517840	0.6085
INT(-1)	1.998335	1.409504	1.417758	0.1669
INT(-2)	-2.255547	1.085753	-2.077403	0.0467
LR	0.148807	0.051652	2.880971	0.0074
TBR	0.314262	0.161581	1.944922	0.0615
TBR(-1)	-0.256115	0.179447	-1.427247	0.1642
TBR(-2)	-0.383628	0.185008	-2.073578	0.0471

R-squared	0.717253	Mean dependent var	10.40192
Adjusted R-squared	0.561255	S.D. dependent var	4.218128
S.E. of regression	2.793996	Akaike info criterion	5.170608
Sum squared resid	226.3860	Schwarz criterion	5.846410
Log likelihood	-101.9240	Hannan-Quinn criter.	5.423767
Durbin-Watson stat	1.899188		

*Note: p-values and any subsequent tests do not account for model selection.

Long Run Form and Bounds Test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(YG)
Selected Model: ARDL(2, 0, 1, 1, 1, 0, 2, 0, 2)
Case 1: No Constant and No Trend
Date: 11/07/22 Time: 16:31
Sample: 2009Q1 2020Q4
Included observations: 46

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YG(-1)*	-0.895596	0.147411	-6.075523	0.0000
MPR**	0.085904	0.742564	0.115685	0.9087
INF(-1)	0.061991	0.861055	0.071994	0.9431

MPIF(-1)	0.013356	0.062209	0.214696	0.8315
EXR(-1)	-0.009115	0.016534	-0.551300	0.5857
GMS**	0.285426	0.331300	0.861532	0.3960
INT(-1)	0.253802	0.544705	0.465944	0.6447
LR**	0.148807	0.051652	2.880971	0.0074
TBR(-1)	-0.325482	0.280885	-1.158773	0.2560
D(YG(-1))	0.283188	0.136652	2.072321	0.0472
D(INF)	-4.403796	1.295296	-3.399836	0.0020
D(MPIF)	0.313117	0.102832	3.044949	0.0049
D(EXR)	-0.106847	0.043814	-2.438633	0.0211
D(INT)	0.511014	0.986818	0.517840	0.6085
D(INT(-1))	2.255547	1.085753	2.077403	0.0467
D(TBR)	0.314262	0.161581	1.944922	0.0615
D(TBR(-1))	0.383628	0.185008	2.073578	0.0471

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 1: No Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MPR	0.095918	0.827983	0.115845	0.9086
INF	0.069217	0.961276	0.072006	0.9431
MPIF	0.014913	0.069482	0.214630	0.8316
EXR	-0.010178	0.018233	-0.558201	0.5810
GMS	0.318699	0.368326	0.865266	0.3940
INT	0.283389	0.607767	0.466278	0.6445
LR	0.166154	0.057429	2.893228	0.0072
TBR	-0.363425	0.323781	-1.122439	0.2709

EC = YG - (0.0959*MPR + 0.0692*INF + 0.0149*MPIF -0.0102*EXR + 0.3187 *GMS + 0.2834*INT + 0.1662*LR -0.3634*TBR)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.649462	10%	1.66	2.79
k	8	5%	1.91	3.11
		2.5%	2.15	3.4
		1%	2.45	3.79
			Finite Sample: n=50	
Actual Sample Size	46			
		10%	-1	-1
		5%	-1	-1
		1%	-1	-1
			Finite Sample: n=45	
		10%	-1	-1
		5%	-1	-1
		1%	-1	-1

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-6.075523	10%	-1.62	-4.09
		5%	-1.95	-4.43

2.5%	-2.24	-4.72
1%	-2.58	-5.07

Short Run (ECM)

ARDL Error Correction Regression
Dependent Variable: D(YG)
Selected Model: ARDL(2, 0, 1, 1, 0, 2, 2, 0, 1)
Case 1: No Constant and No Trend
Date: 09/13/22 Time: 23:55
Sample: 2009Q1 2020Q4
Included observations: 46

ECM Regression
Case 1: No Constant and No Trend

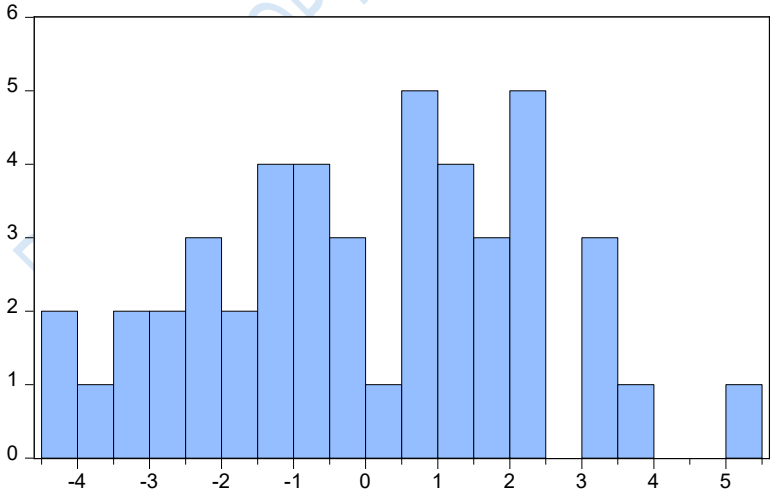
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(YG(-1))	0.283188	0.113003	2.506015	0.0181
D(INF)	-4.403796	0.725432	-6.070581	0.0000
D(MPIF)	0.313117	0.053837	5.816031	0.0000
D(INT)	0.511014	0.750528	0.680872	0.5014
D(INT(-1))	2.255547	0.750728	3.004480	0.0054
D(TBR)	0.314262	0.116300	2.702168	0.0114
D(TBR(-1))	0.383628	0.112042	3.423983	0.0019
D(EXR)	-0.106847	0.035282	-3.028375	0.0051
CointEq(-1)*	-0.895596	0.111195	-8.054279	0.0000

R-squared	0.689010	Mean dependent var	0.044435
Adjusted R-squared	0.621769	S.D. dependent var	4.022030
S.E. of regression	2.473568	Akaike info criterion	4.822782
Sum squared resid	226.3860	Schwarz criterion	5.180559
Log likelihood	-101.9240	Hannan-Quinn criter.	4.956807
Durbin-Watson stat	1.899188		

* p-value incompatible with t-Bounds distribution.

Diagnostic Test

1. Normality Test



Series: Residuals
Sample 2009Q3 2020Q4
Observations 46

Mean	0.002963
Median	0.067818
Maximum	5.175523
Minimum	-4.442568
Std. Dev.	2.242943
Skewness	-0.024051
Kurtosis	2.346658
Jarque-Bera	0.822576
Probability	0.662796

2. Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

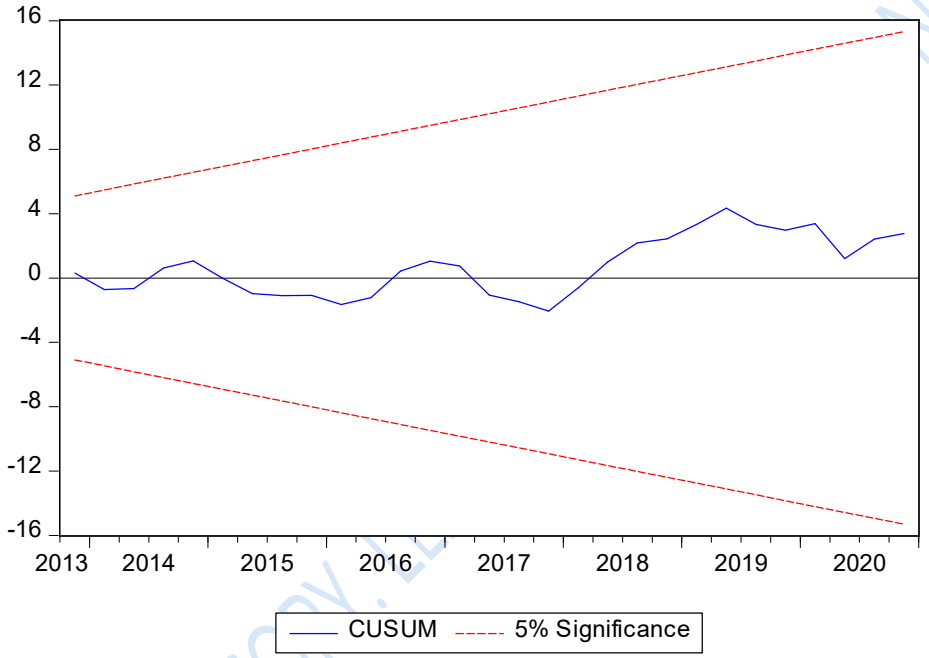
F-statistic	0.568099	Prob. F(17,28)	0.8876
Obs*R-squared	11.79715	Prob. Chi-Square(17)	0.8123
Scaled explained SS	3.156777	Prob. Chi-Square(17)	0.9999

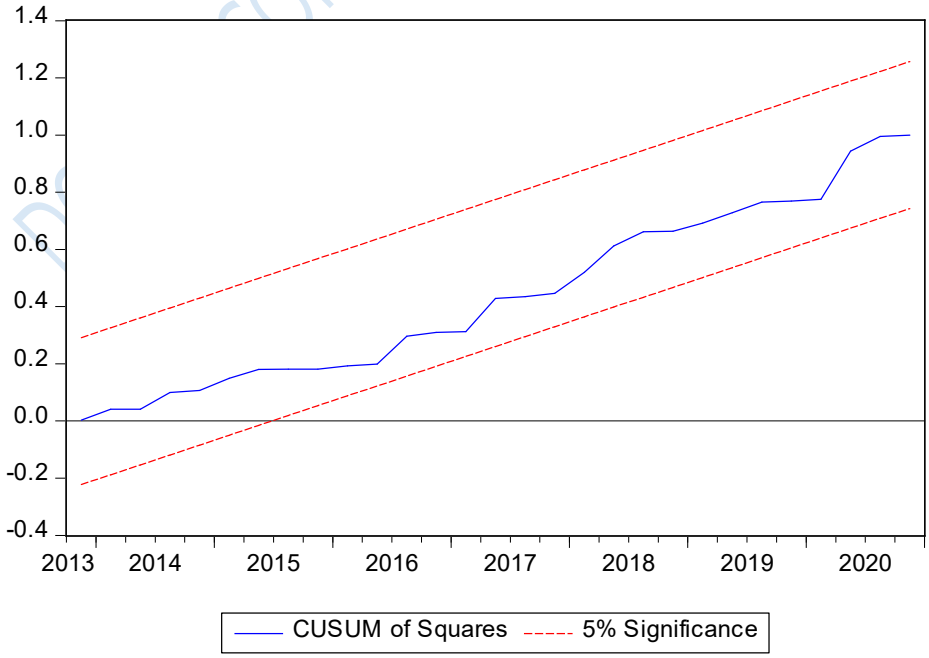
3. Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.296171	Prob. F(2,27)	0.7460
Obs*R-squared	0.987510	Prob. Chi-Square(2)	0.6103

4. CUSUM and CUSUM of Squares





Appendix IV: ARDL Result of the Estimates of Monetary Policy Threshold for Growth-Inflation Relationship in Nigeria

ARDL Model

Dependent Variable: YG
Method: ARDL
Date: 11/07/22 Time: 16:57
Sample (adjusted): 2010Q2 2020Q4
Included observations: 43 after adjustments
Maximum dependent lags: 5 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): MPR INF MPIF EXR GMS INT LR TBR
Fixed regressors: C
Number of models evalulated: 327680
Selected Model: ARDL(5, 2, 3, 3, 3, 3, 3, 3, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
YG(-1)	-0.313090	0.158255	-1.978390	0.0952
YG(-2)	-0.161991	0.158431	-1.022469	0.3460
YG(-3)	-0.333040	0.152965	-2.177224	0.0723
YG(-4)	-0.343122	0.160528	-2.137457	0.0764
YG(-5)	0.517414	0.183733	2.816122	0.0305
MPR	2.282728	2.430347	0.939260	0.3839
MPR(-1)	2.680608	2.552758	1.050083	0.3341
MPR(-2)	3.566806	2.137049	1.669034	0.1462
INF	-6.902037	2.740556	-2.518480	0.0454
INF(-1)	8.254642	3.094633	2.667406	0.0372
INF(-2)	0.708528	2.295630	0.308642	0.7680
INF(-3)	4.639259	1.006518	4.609218	0.0037
MPIF	0.607818	0.224137	2.711813	0.0350
MPIF(-1)	-0.601089	0.261522	-2.298425	0.0612
MPIF(-2)	-0.014164	0.208748	-0.067851	0.9481
MPIF(-3)	-0.433304	0.084324	-5.138568	0.0021
EXR	-0.408704	0.064794	-6.307695	0.0007
EXR(-1)	0.181393	0.058415	3.105221	0.0210
EXR(-2)	-0.009238	0.046991	-0.196579	0.8506
EXR(-3)	0.190909	0.050224	3.801172	0.0090
GMS	0.954575	0.391162	2.440355	0.0504
GMS(-1)	1.529091	0.348755	4.384431	0.0046
GMS(-2)	1.057909	0.268798	3.935698	0.0077
GMS(-3)	1.191465	0.240764	4.948686	0.0026
INT	4.117553	1.315111	3.130954	0.0203
INT(-1)	-2.431860	1.397563	-1.740071	0.1325
INT(-2)	-3.731285	0.980397	-3.805891	0.0089
INT(-3)	3.859636	1.232311	3.132032	0.0203
LR	-0.050986	0.054655	-0.932876	0.3869
LR(-1)	0.344761	0.084211	4.094019	0.0064
LR(-2)	-0.001146	0.092007	-0.012458	0.9905
LR(-3)	0.139167	0.091119	1.527301	0.1775
TBR	0.122693	0.143259	0.856446	0.4246
TBR(-1)	-0.099828	0.152689	-0.653794	0.5375
TBR(-2)	-0.150346	0.172543	-0.871356	0.4171
TBR(-3)	-0.858824	0.198580	-4.324828	0.0050
C	-134.4412	35.75372	-3.760202	0.0094

R-squared	0.987248	Mean dependent var	10.56856
Adjusted R-squared	0.910738	S.D. dependent var	4.315969
S.E. of regression	1.289473	Akaike info criterion	3.097833
Sum squared resid	9.976439	Schwarz criterion	4.613285

Log likelihood	-29.60342	Hannan-Quinn criter.	3.656685
F-statistic	12.90344	Durbin-Watson stat	2.686131
Prob(F-statistic)	0.002009		

*Note: p-values and any subsequent tests do not account for model selection.

Long Run Form and Bounds Test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(YG)
Selected Model: ARDL(5, 2, 3, 3, 3, 3, 3, 3, 3)
Case 2: Restricted Constant and No Trend
Date: 11/07/22 Time: 16:57
Sample: 2009Q1 2020Q4
Included observations: 43

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-134.4412	35.75372	-3.760202	0.0094
YG(-1)*	-1.633829	0.418169	-3.907106	0.0079
MPR(-1)	8.530142	3.071802	2.776918	0.0321
INF(-1)	6.700392	3.004221	2.230326	0.0672
MPIF(-1)	-0.440739	0.220834	-1.995797	0.0930
EXR(-1)	-0.045639	0.019917	-2.291487	0.0618
GMS(-1)	4.733040	0.951690	4.973300	0.0025
INT(-1)	1.814045	0.745149	2.434474	0.0509
LR(-1)	0.431795	0.072187	5.981604	0.0010
TBR(-1)	-0.986304	0.394767	-2.498448	0.0466
D(YG(-1))	0.320739	0.333619	0.961392	0.3735
D(YG(-2))	0.158748	0.259772	0.611105	0.5635
D(YG(-3))	-0.174292	0.233994	-0.744859	0.4845
D(YG(-4))	-0.517414	0.183733	-2.816122	0.0305
D(MPR)	2.282728	2.430347	0.939260	0.3839
D(MPR(-1))	-3.566806	2.137049	-1.669034	0.1462
D(INF)	-6.902037	2.740556	-2.518480	0.0454
D(INF(-1))	-5.347787	2.330167	-2.295023	0.0615
D(INF(-2))	-4.639259	1.006518	-4.609218	0.0037
D(MPIF)	0.607818	0.224137	2.711813	0.0350
D(MPIF(-1))	0.447468	0.198466	2.254630	0.0650
D(MPIF(-2))	0.433304	0.084324	5.138568	0.0021
D(EXR)	-0.408704	0.064794	-6.307695	0.0007
D(EXR(-1))	-0.181672	0.049079	-3.701632	0.0101
D(EXR(-2))	-0.190909	0.050224	-3.801172	0.0090
D(GMS)	0.954575	0.391162	2.440355	0.0504
D(GMS(-1))	-2.249374	0.416383	-5.402173	0.0017
D(GMS(-2))	-1.191465	0.240764	-4.948686	0.0026
D(INT)	4.117553	1.315111	3.130954	0.0203
D(INT(-1))	-0.128352	0.999679	-0.128393	0.9020
D(INT(-2))	-3.859636	1.232311	-3.132032	0.0203
D(LR)	-0.050986	0.054655	-0.932876	0.3869
D(LR(-1))	-0.138020	0.068759	-2.007314	0.0915
D(LR(-2))	-0.139167	0.091119	-1.527301	0.1775
D(TBR)	0.122693	0.143259	0.856446	0.4246
D(TBR(-1))	1.009170	0.271541	3.716461	0.0099
D(TBR(-2))	0.858824	0.198580	4.324828	0.0050

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.

MPR	5.220951	1.597830	3.267526	0.0171
INF	4.101036	1.611412	2.544995	0.0438
MPIF	-0.269758	0.117929	-2.287459	0.0622
EXR	-0.027934	0.010238	-2.728546	0.0343
GMS	2.896901	0.697572	4.152836	0.0060
INT	1.110303	0.637865	1.740654	0.1324
LR	0.264284	0.051947	5.087520	0.0022
TBR	-0.603677	0.293401	-2.057513	0.0853
C	-82.28596	24.50621	-3.357759	0.0153

EC = YG - (5.2210*MPR + 4.1010*INF -0.2698*MPIF -0.0279*EXR + 2.8969
*GMS + 1.1103*INT + 0.2643*LR -0.6037*TBR -82.2860)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	9.481958	10%	1.85	2.85
k	8	5%	2.11	3.15
		2.5%	2.33	3.42
		1%	2.62	3.77
			Finite Sample:	
Actual Sample Size	43		n=45	
		10%	-1	-1
		5%	-1	-1
		1%	-1	-1

Short Run (ECM)

ARDL Error Correction Regression
Dependent Variable: D(YG)
Selected Model: ARDL(5, 2, 3, 3, 3, 3, 3, 3, 3)
Case 2: Restricted Constant and No Trend
Date: 11/07/22 Time: 16:58
Sample: 2009Q1 2020Q4
Included observations: 43

ECM Regression
Case 2: Restricted Constant and No Trend

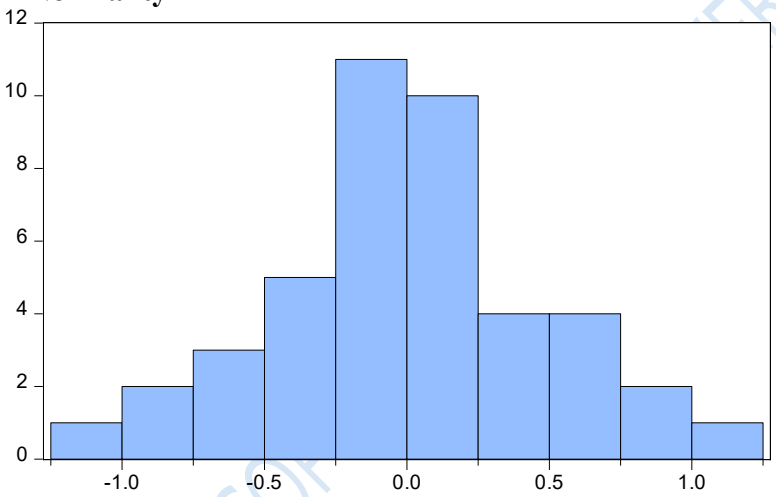
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(YG(-1))	0.320739	0.068892	4.655659	0.0035
D(YG(-2))	0.158748	0.060075	2.642510	0.0384
D(YG(-3))	-0.174292	0.061826	-2.819084	0.0304
D(YG(-4))	-0.517414	0.070105	-7.380529	0.0003
D(MPR)	2.282728	0.903125	2.527588	0.0448
D(MPR(-1))	-3.566806	0.647807	-5.505974	0.0015
D(INF)	-6.902037	0.904459	-7.631119	0.0003
D(INF(-1))	-5.347787	0.788887	-6.778901	0.0005
D(INF(-2))	-4.639259	0.448979	-10.33291	0.0000
D(MPIF)	0.607818	0.077515	7.841300	0.0002
D(MPIF(-1))	0.447468	0.064907	6.894020	0.0005
D(MPIF(-2))	0.433304	0.038328	11.30531	0.0000
D(EXR)	-0.408704	0.027359	-14.93857	0.0000
D(EXR(-1))	-0.181672	0.020446	-8.885619	0.0001
D(EXR(-2))	-0.190909	0.022011	-8.673199	0.0001
D(GMS)	0.954575	0.116272	8.209837	0.0002

D(GMS(-1))	-2.249374	0.158992	-14.14774	0.0000
D(GMS(-2))	-1.191465	0.114028	-10.44885	0.0000
D(INT)	4.117553	0.416673	9.881968	0.0001
D(INT(-1))	-0.128352	0.357158	-0.359370	0.7316
D(INT(-2))	-3.859636	0.391949	-9.847289	0.0001
D(LR)	-0.050986	0.022474	-2.268684	0.0638
D(LR(-1))	-0.138020	0.028430	-4.854801	0.0028
D(LR(-2))	-0.139167	0.025528	-5.451559	0.0016
D(TBR)	0.122693	0.047978	2.557286	0.0431
D(TBR(-1))	1.009170	0.085601	11.78925	0.0000
D(TBR(-2))	0.858824	0.084593	10.15241	0.0001
CointEq(-1)*	-1.633829	0.106118	-15.39639	0.0000

R-squared	0.986295	Mean dependent var	0.048080
Adjusted R-squared	0.961626	S.D. dependent var	4.163171
S.E. of regression	0.815534	Akaike info criterion	2.679229
Sum squared resid	9.976439	Schwarz criterion	3.826057
Log likelihood	-29.60342	Hannan-Quinn criter.	3.102143
Durbin-Watson stat	2.686131		

Diagnostics

1 Normality



Series: Residuals
Sample 2010Q2 2020Q4
Observations 43

Mean	-2.05e-14
Median	-0.033957
Maximum	1.094610
Minimum	-1.097936
Std. Dev.	0.487375
Skewness	-0.153143
Kurtosis	3.013095
Jarque-Bera	0.168387
Probability	0.919254

2 Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

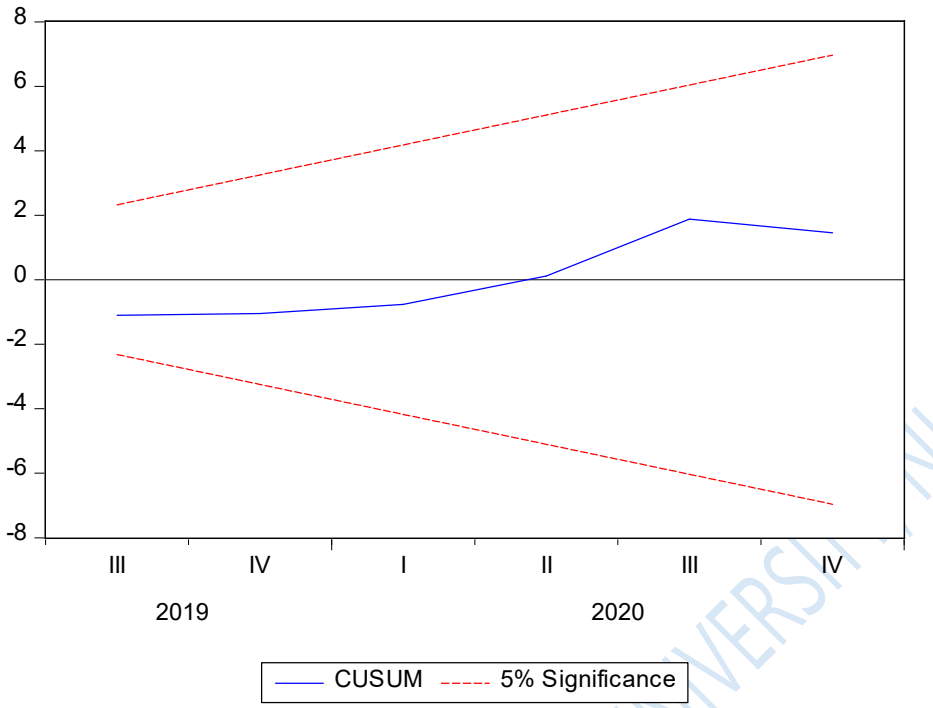
F-statistic	3.196469	Prob. F(3,3)	0.1827
Obs*R-squared	32.75329	Prob. Chi-Square(3)	0.0000

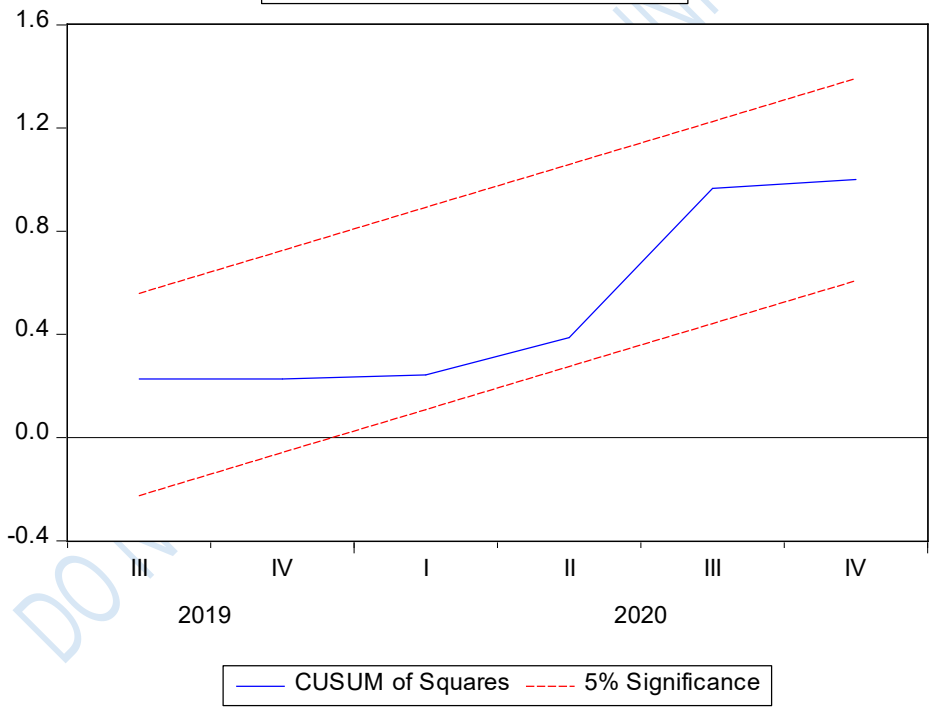
3 Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.266690	Prob. F(36,6)	0.4159
Obs*R-squared	38.00008	Prob. Chi-Square(36)	0.3784
Scaled explained SS	0.744705	Prob. Chi-Square(36)	1.0000

4 CUSUM and CUSUM of Squares





Biodata

A. Personal Data:

Name:	Fadare Kayode Olusegun
Email address:	kayodeofadare@gmail.com
Phone number:	08037987933
House address:	No. 2 Alhaja Aboladale House, Opposite Trendy Guest House, Onipepeye, Old Ife Road Ibadan
Date of birth:	20/02/1989
Place of birth:	Ibadan
Nationality:	Nigerian
Marital Status:	Single
Name of next of Kin:	Oludare Fadare
Address of next of Kin:	No. 2 Alhaja Aboladale House, Opposite Trendy Guest House, Onipepeye, Old Ife Road Ibadan

B. **Educational Background**

Educational Institution Attended With Dates

i. Primary Education: St. Rapheal Nur/Pry School Ibadan	1993-1999
ii. Secondary Education:Loyola College Ibadan	2000-2006
iii. Higher Educational Institution: Obafemi Awolowo University Ile-Ife	2013-2017

C. **Working Experience With Dates**

Date of assumption of duty in current establishment: 2020

Status of first appointment in current establishment: Self Employment

Present position: Owner

Date of commencement: 2020

D. Awards and Fellowships (if any) Nil

E. Membership of Academic Professional Bodies Nil

F. Publications (if any) Nil

1 Thesis/Dessertations

2 Books

3 Scholarly Articles

4 Notable Scholarly or Professional Accomplishments

Major Conferences/Workshop

Signature **Date**

University Compliance Certification

This is to certify that the thesis by **Kayode Olusegun FADARE** with the matric number LCU/PG/001774 in the Department of Economics, Faculty of Management and Social Sciences, Lead City University, Ibadan is in full compliance with the approved University Format and Style.

_____ _____

Signature Date