Testing the Effectiveness of Money Supply on Inflation in Nigeria

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Certification

This is to certify that Adeniyi Benjamin ADEDOYIN with matriculation number LCU/PG/001120 carried out this dissertation titled "Testing the Effectiveness of Monetary Policy on Inflation in Nigeria" in the Department of Economics, Faculty of Social Sciences, Lead City University, Ibadan, Oyo State Nigeria, for the award of Master Degree (MSc) in Economics and that this has not been previously presented.

…… ……

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Dedication

This thesis is dedicated to the Almighty God and my dear parents Mr and Mrs Adedoyin.

Acknowledgement

I am most grateful to God almighty who through His infinite mercy and love guided me throughout the duration of this programme.

I would like to appreciate the management of Lead City University Ibadan, for the opportunity to pursue my Post Graduate studies in this great university.

A project of this magnitude is certainly the product of the combined efforts of many individuals. It is therefore proper that such persons who contributed directly and indirectly to its success be dully acknowledged. I am grateful for the notable efforts of my amiable supervisor Prof. Campbell, a learned lecturer of high integrity who in spite of her tight schedule found time to painstakingly guide me through my thesis work and made corrections where necessary.

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May God continue to bless you all.

Even though the above mentioned institutions and persons have assisted in the process of the research work, I alone stand responsible for the errors, if any, found in the work.

Abstract

The effectiveness of monetary policy has been a long standing issue in developing countries like Nigeria, thus as a result of the recent upsurge in the inflationary rates leading to major economic distortions, it is therefore important to examine if monetary policy tools are effective in management of inflation in the country. The broad objective of this study is to evaluate the effect of monetary policy on inflation rate in Nigeria between 1986 and 2019. The specific objectives are to evaluate the thresholds at which money supply affect inflation rate in Nigeria and to investigate the asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria. Time series data were sourced from the Central Bank of Nigeria (CBN) statistical bulletin and the world development index (WDI). The two objectives were examined using the threshold regression model and the Non-linear Autoregressive Distributed Lag (NARDL). The result showed that the threshold level at which money supply affect inflation rate in Nigeria is 60% which imply that when money supply grows beyond 60% money supply have positive and significant effect on inflation, whereas, below this level, the effect of money supply is less significant though positive, on inflation rate in Nigeria. It was further discovered that in the short run, there is a positive and negative relationship between money supply and inflation rate for a positive and negative change in money supply respectively. Whereas, in the long run, there is a positive relationship between money supply and inflation rate for both positive and negative change in money supply. The study concluded that there exist a threshold level at which money supply affect inflation and that there is an asymmetric non-linear relationship between money supply and inflation rate in Nigeria. It was recommended that the monetary policy authorities institute policies targeted at controlling the level of money supply reasonably below the threshold level and set monetary policies that will ensure the stability of the macroeconomic environment for stabilizing economic activities in the economy.

Keywords: Money Supply, Threshold, Asymmetric Effect, Monetary Policy

Word Count: 298

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Chapter One

Introduction

1.1 Background to the Study

Inflation is the decrease in the buying force of a given money over the long haul. A quantitative gauge of the rate at which the decrease in buying power happens can be reflected in the increment of a typical value level of a market bin of chosen labor and products in an economy throughout some time frame. The ascent in the general degree of costs, frequently communicated as a rate implies that a unit of cash successfully purchases short of what it did earlier.

By definition, inflation means a consistent and notable increase in price level generally[1]. It should be noted that not every rise in the price level is termed inflation. Therefore, for a rise in the general price level to be considered inflation, such a rise must be constant, enduring and sustained. The rise in the price should affect virtually every commodity and should not be temporal. Be that as it may, all the more unequivocally inflation is alluded to as a tireless ascent in costs as estimated by a record, for example, the Consumer Price Index (CPI) or by the understood cost deflator for Gross National Product. In this way, a reasonable meaning of expansion would be constant inflation in the general cost level at a rate considered excessively high and consequently unsuitable.

In an inflationary economy, it is hard for the public cash to go about as vehicle of trade and a store of significant worth without unfavorably affecting pay dispersion, result and business . Inflation is described by a fall in the worth of the nation's cash and an ascent in her conversion standard with other country's monetary forms. This is very clear on account of the worth of the Naira (₦) which was ₦1 to $1 (US Dollar) in 1981, yet has now tumbled to ₦160 to $1 in 2013. The fall in the buying power in Nigeria concurs

with the time of inflationary development, and is an unwholesome improvement that has prompted a radical decrease in the expectation for everyday comforts of the typical Nigerian.

There are three ways to deal with estimating inflation. These are the Gross National Product (GNP) implied deflator, CPI and the Wholesale or Producer Price Index (WPI or PPI). The period-to-period changes in these two last options draws near (CPI and WPI) are viewed as immediate proportions of expansion. There is no single-one of the three methodologies that fairly interestingly best estimates expansion. The CPI approach, however the most uneffective of the three markers is utilized to gauge inflation rate in Nigeria as it is effectively and at present accessible on month to month, quarterly and yearly premise.

While it is not difficult to gauge the value changes of individual items after some time, human necessities broaden a lot of past a couple of such items. People need a major and differentiated set of items as well as a large group of administrations for carrying on with an agreeable life. They incorporate items like food grains, metal and fuel, utilities like power and transportation, and administrations like medical care, amusement, and work. Inflation means to quantify the general effect of cost changes for a broadened set of items and administrations, and considers a solitary worth portrayal of the expansion in the value level of labor and products in an economy throughout some stretch of time. As a cash loses esteem, costs rise and it purchases less labor and products. This deficiency of buying power influences the general cost for most everyday items for the normal public which at last prompts a deceleration in financial development.

The agreement view among financial specialists is that supported inflation happens when a country's cash supply development dominates monetary development. Nigeria, over the years, has been faced with economic problems emanating from inflation. Since

the late 1980s, inflation has become so serious and persistence problem in Nigeria. Although inflation is not a new phenomenon in Nigeria, the high growth rate in price level in recent time has remained a strong consideration for policy makers. During the period under study, 1988 – 2018, there has been an upsurge in inflationary rates prompting major financial bends. This is revealed in Table 1.1 appendices:

From Table 1.1, it is revealed that the inflation rate was high in late 1980s and the 1990s, but the rate started to decrease from 2000. There have been noticeable variations in the Nigerian inflation rates. Hence, it becomes necessary to examine factors responsible for such behaviour to guide policy formulation.

In every country, the monetary authority takes necessary measures in managing the supply of money and credit to keep inflation within permissible limits and keep the economy running smoothly. It is an utmost duty of the country's financial regulator to keep inflation in check. This is carried out by implementing measures through monetary policy, which refers to the actions of a central bank or other committees that determine the size and rate of growth of the money supply. As such, Nigerian monetary policy is a key factor to be considered in a bid to understand inflation and the problems associated with it in Nigeria.

Monetary policy refers to the combination of measures designed to regulate the value, supply and cost of money in an economy in consonance with the level of economic activities. It can be described as the act of controlling the direction and movement of monetary and credit facilities in pursuance of stable price and economic growth in the economy[2]. Monetary policy rests on the relationship between the price at which money can be borrowed and the total supply of money in the economy. It is generally referred to as being expansionary or contractionary, where an expansionary policy increases the

total supply of money in the economy rapidly, and contractionary policy decreases the total money supply, or increases it slowly.

Previous empirical studies have focused on monetary policy and economic activities of Nigeria. Such studies have revealed that the primary goal of monetary policy in Nigeria has been the maintenance of domestic price and exchange rate stability since it is critical for the attainment of sustainable economic growth and external sector viability[3]. Another study employed Johansen Maximum Likelihood Co-integration procedure to show that there is a long run relationship between economic growth, degree of openness, government expenditure and broad money supply (M_2)[4]. A similar study observed that that monetary policy exerts significant impact on economic activity in Nigeria[5]. Previous studies have also examined the relationship between financial innovations and monetary control and concludes that in a changing financial structure, central banks cannot realize efficient monetary policy without setting new procedures and instruments in the long-run, because profit seeking financial institutions change or create new instruments in order to evade regulations or respond to the economic conditions in the economy[6]. Examining the evolution of monetary policy in Nigeria in the past four decades, it was observed that although the monetary management has been relatively more successful during the period of financial sector reform which is characterized by the use of indirect rather than direct monetary policy tools, yet the effectiveness of monetary policy has been undermined by the effects of fiscal dominance, political interference and the legal environment in which the monetary authority operates[7].

Scholars have stated that monetary policy stabilizes the economy and stimulate economic growth better under a flexible exchange rate system than a fixed exchange rate system, but is accompanied by severe depreciation, which could in turn destabilize

the economy[8]. This implies that monetary policy would better stabilize the economy if it is used to target inflation rather than directly stimulate output growth. It has been argued that other policy measures and instruments are needed to complement monetary policy in macroeconomic stabilization. In the same stride, in the 1980s and 1990s, monetary policy was often constrained by fiscal indiscipline[9]. Monetary policies financed large fiscal deficit which averaged 5.6 percent of annual Gross Domestic Product (GDP). Although the situation moderated in the later part of 1990s, it was short lived as it was described the monetary policy subsequently as too loose which resulted to poor inflation and exchange rates record[10].

Previous empirical studies have also investigated how monetary policy objective of controlling inflation rate and intervention in the financing of fiscal deficits affect the variability of inflation and real exchange rates[11]. The analysis is done using a rational expectation framework that incorporates the fiscal role of exchange rate. The study reflects that the effort of the monetary authority to influence the finance of government fiscal deficit through the determination of the inflation-tax rate affects both the rate of inflation and the real exchange rate, thereby causing volatility in their rates. The study further reveals that inflation affects volatility of its own rate as well as real exchange rate. The policy implication of the study is that monetary policy should be set in such a way that the objective it is to achieve is well defined.

Scholars have said that the ability of the Central Bank of Nigeria (CBN) to pursue an effective monetary policy in a globalized and rapidly integrated financial market environment depends on several factors which include, instituting appropriate legal framework, institutional structure and conducive political environment which allows the bank to operate with reference to exercising its instrument and operational autonomy in decision- making[12]. The degree of coordination between monetary and

fiscal policies to ensure consistency and complementarity, the overall macroeconomic environment, including the stage of development, depth and stability of the financial markets as well as the efficiency of the payments and settlement systems, the level and adequacy of information and communication facilities and the availability of consistent, adequate, reliable, high quality and timely information to CBN[13].

From the foregoing, previous studies on Nigeria focused majorly on how monetary policy influenced economic activities in the country. This work therefore, focused on establishing the threshold at which money supply becomes inflationary.

1.2 Statement of the Problem

Over time, inflation has turned into a genuine and steadiness issue in Nigeria. During the period under survey, there has been an upsurge in the inflationary rates prompting major monetary mutilations. The went on over valuation of the naira in 1980, even after the breakdown of the oil blast caused critical financial bends underway and utilization as there was a high pace of reliance on import which prompted equilibrium of installments shortage. This came about to taking credits to fund such deficiencies. A model was the Paris Club credit, which was a simple five billion, 39 million bucks ($5.39 billion) in 1983 rose to 21 billion, 6,000,000 bucks ($21.6 billion) in 1999 (CBN, 2001). The oil overabundance from 1981, that came about into equilibrium of installments deficiency likewise prompted unfamiliar trade emergencies that required different proportions of import limitations. These limitations diminished unrefined components for homegrown creation and extra parts for apparatus activity. The resultant deficiency of labor and products for nearby utilization prodded the inflation rate to increase from 20% in 1981 to 39.1% in 1984. With the reception of the Structural Adjustment Program (SAP) in 1986, there was a fleeting decrease in financial shortfalls

as government eliminated endowments and diminished her contribution in the economy.

Yet, as the impacts of the Structural Adjustment Program (SAP) strategies built up speed, there was a fall in the development pace of Gross Domestic Product (GDP) in 1990 from 8.3% to 1.2% in 1994, with inflation ascending from 7.5% (1990) to 57.0% (1994). Once more, the downgrading of the naira by the CBN through the Second Tier Foreign Exchange Market (SFEM) prompted a fall in rural results as machines and unrefined components (generally imported) were far off. The downgrading discounted the total genuine pay and total interest and simultaneously raised the naira costs of merchandise whose creation relied intensely upon imported products. In this way, unsold inventories collected notwithstanding buyer revolt. In this situation, the public pay (NI) fell and the cost level rose.

In 1995, inflation rate increased to 72.8% because of expanded loaning rate, the arrangement of directed liberation and the slacked effect of monetary indiscipline. Notwithstanding her contemporary financial and money related arrangements, the Nigerian government had executed different strategies pointed toward checking inflation in the country. One of such approaches was the cost strategy (cost control) in 1971 intended to control the taking off costs of fundamental products however nullified in 1980 for its incapability coming about because of the serious deficiencies saw during the oil overabundance in Nigeria.

The Economic Recovery Emergency Fund of 1986 where one percent (1%) of laborers' pay rates was deducted month to month to construct the assets was intended to control inflationary patterns in Nigeria. They bit by bit and significantly diminished the buying force of the common laborers[14]. Yet, the arrangement estimates flopped as the costs of products and the benefits of corporate bodies were not controlled. Accordingly, as costs rose, the trade guilds disturbed for higher wages bringing about additional greater costs.

All the more thus, different farming projects like the "Activity Feed the Nation" and the "Green Revolution" were carried out to support result to decrease costs of food things however yielded negligible outcomes. Despite the different endeavors of the Nigerian government to control the inflationary pattern, inflation kept on causing mishap in the development pace of the expectation for everyday comforts of most Nigerians who are fixed pay workers or jobless. In addition, prices of staple foods are on the upward trend with increased risk of hunger, malnutrition and low productivity in adulthood. According to the National Bureau of Statistics (NBS), composite food index rose by 16.66 percent in September, 2020, as against 16 percent in August, 2020. Inflation continues to have adverse effects on savings, investment, productivity and balance of payments in the Nigerian economy[15].

Further, over the years, it has been difficult for the Nigerian purchasing power (Naira) to act as medium of exchange and a store of value without having an adverse effect on income distribution, output and employment, as a result of the negative effect of inflation. This is crystal clear when comparing the value of Naira (₦) which was 1₦ to $1 in 1981, but has now fallen to ₦460 to $1 in 2021[16]. This has led to many economic problems out of which are recession, poor standard of living, recurring balance of payments deficit, et cetera. While many empirical studies have focused on how monetary policy influence the level of economic activities and inflation rate in Nigeria with much attention given to linearity, only a few studies have directed efforts towards assessing the differential effects (as captured by different thresholds) of monetary policy on inflation rate in Nigeria.

1.3 Objectives of the Study

The broad objective of this study is to evaluate the effect of monetary policy on inflation rate in Nigeria between 1986 and 2019. The specific objectives are to;

i. evaluate the thresholds at which money supply affect inflation rate in Nigeria.

ii. Investigate the asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria.

1.4 Research Questions

The study seeks to answer the following questions:

i. What is the threshold at which money supply affect inflation rate?

ii. What is the asymmetric (non-linear) relationship that exist between money supply and inflation rate in Nigeria between 1986 and 2019?

1.5 Hypotheses

The study seeks to test the hypotheses below:

Ho1: There is no threshold at which money supply affect inflation rate in Nigeria.

Ho2: There is no asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria.

1.6 Significance of the Study

This study will provide information on the differential effects of monetary policy (money supply) on inflation rate in Nigeria to policy makers and guide policy formulation. In addition, it will provide an insight on monetary policy and inflation rate nexus within the framework of the study period, set a new path for further research and contribute to academic discourse.

1.7 Scope of the Study

This study focuses on Nigeria and covers the period between 1986 and 2019. The year 1986 has been selected because this marks the period when the CBN began the second

phase of monetary policy targeting which relied on market mechanisms moving away from direct monetary controls in the first phase.

1.8 Limitation of the study

This study is limited by time constraint as the as researcher has limited time to meet deadline.

1.9 Operational Definitions of Terms

Asymmetric Relationship: relates to change in one variable (independent variable) causing changes in another variable (dependent variable). Asymmetrical distribution is a situation in which the values of variables occur at irregular frequencies and the mean, median, and mode occur at different points. An asymmetric distribution exhibits skewness.

Inflation: Inflation is a consistent and notable increase in the total price level of goods and services.

Nigerian Inflation Rate: In this study, the Nigerian inflation rate is the consistent and notable increase in the total prices of goods and services.

Monetary Policy: This is an act of controlling the direction and movement of monetary and credit facilities in pursuance of stable price and economic growth in the economy.

Nigerian Monetary Policy: As used in this study, this is a document statement of the Nigerian government on how to control the direction and movement of monetary and credit facilities in pursuance of stable price and economic growth in the economy, between 1988 and 2018.

Money Supply: The money supply is all the currency and other liquid instruments in a country's economy on the date measured. The money supply roughly includes both cash and deposits that can be used almost as easily as cash.

Threshold of Money Supply: this refers to a limit or a turning point at which money supply causes inflation. Any point beyond the threshold value causes inflation.

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Chapter Two

Literature Review

This chapter presents the review of related literature on the links between money supply and inflation rate in Nigeria. The discussion focuses on the following areas: conceptual review, theoretical review, empirical review, and gaps identified in the reviewed empirical literature. Also, relevant theories and empirics were discussed as well as the gaps in literature were identified.

2.1 Conceptual Review

This subsection provides a detailed explanation of concepts within the framework of the study such as inflation, money and monetary policy.

2.1.1 Inflation: Meaning, Argument for and Argument against

Inflation happens when there is a persevering expansion in the general cost level. Generally high inflation rates are considered to unfavorably affect an economy. High inflation makes vulnerability and can wipe away the worth of reserve funds. Notwithstanding, most Central Banks focus on an inflation pace of 2%, proposing that low inflation can enjoy different benefits to the economy. A few financial specialists even contend we ought to focus on a higher inflation rate during times of monetary stagnation[1]. This readily shows that inflation has both advantages and disadvantages[2].

Few of the arguments for inflation are:

Deflation (a persistent decrease in price level – negative inflation) is extremely destructive. At the point when costs are falling, individuals find it hard to burn through cash since they accept that the costs of products will fall further from now on; subsequently they continue to defer buys. Similarly, there is an exchange of genuine profit from borrowers to loan bosses and diminishes the discretionary cashflow of

people who are battling to take care of their obligation. At the point when individuals assume an obligation like a home loan, they for the most part expect an inflation pace of 2% to assist with disintegrating the worth of obligation over the long run. Assuming this inflation pace of 2% neglects to emerge, their obligation weight will be surprisingly perfect. Times of flattening led to major issues for the UK in 1920s, Japan in 1990s and 2000s and Eurozone in 2010s. Moderate inflation empowers change of wages. It is contended a moderate pace of inflation makes it more straightforward to change relative wages. For instance, it very well might be challenging to cut ostensible wages (laborers detest and oppose an ostensible pay cut). Yet, in the event that typical wages are ascending because of moderate inflation, it is more straightforward to build the wages of useful specialists; useless laborers can have their wages frozen - which is successfully a genuine compensation cut. Assuming we had zero inflation, we could wind up with all the more genuine compensation joblessness, with firms unfit to slice wages to draw in laborers.

Inflation empowers change of relative costs. Like the last point, moderate inflation makes it more straightforward to change relative costs. This is especially significant for a solitary cash like the Eurozone. Southern European nations like Italy, Spain and Greece became uncompetitive, prompting huge current record shortage. Since Spain and Greece can't degrade in the Single Currency, they need to reduce relative costs to recapture seriousness. With exceptionally low inflation in Europe, this implies they need to reduce costs and cut compensation which cause lower development (because of the impacts of collapse). In the event that the Eurozone had moderate inflation, it would be simpler for southern Europe to change and recapture serious without falling back on flattening.

Inflation can support development. On occasion of exceptionally low inflation, the economy might be caught in a downturn. Seemingly focusing on a higher pace of inflation can empower a lift in monetary development. This view is questionable. Not all financial experts would uphold focusing on a higher inflation rate. Nonetheless, some would target higher inflation, on the off chance that the economy was caught in a delayed downturn. For instance, the Eurozone has had an extremely low inflation rate in 2013−14, and this has related to exceptionally powerless financial development and exceptionally high joblessness. On the off chance that the ECB had been willing to target higher inflation, we might have seen an ascent in Eurozone GDP.

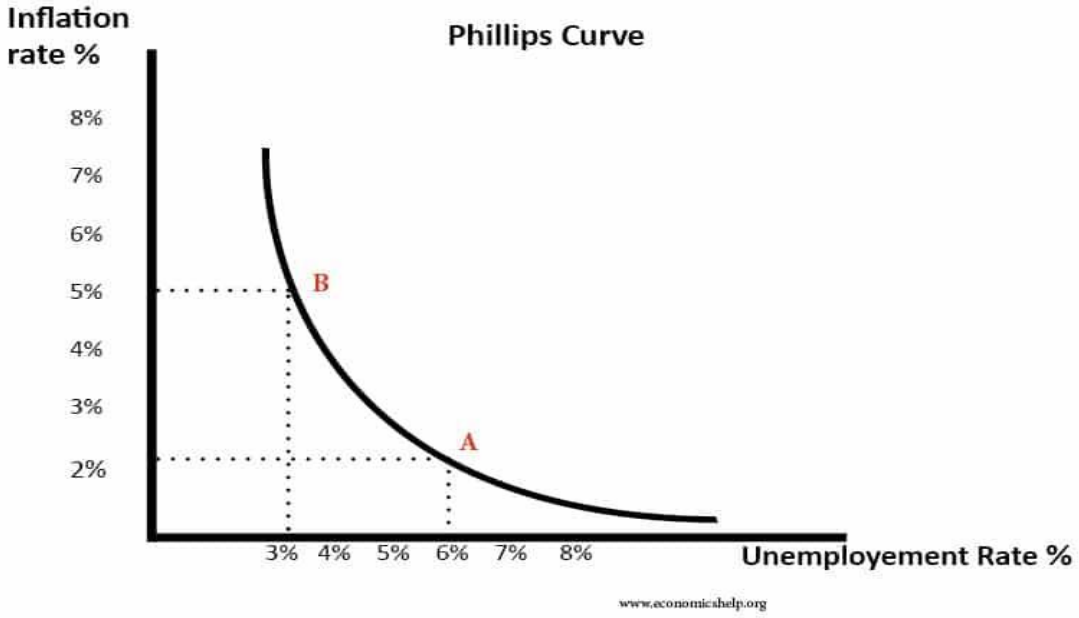


Figure 2.1: The Phillips curve

Source: www.economicshelp.org

The Phillips Curve proposes there is a compromise among expansion and joblessness. Higher expansion prompts lower joblessness (in some measure for the time being) there is a discussion about how significant this compromise is[3]. Expansion is superior to emptying. The main thing more regrettable than expansion, joke financial analysts, is

flattening. A fall in costs can cause an expansion in the genuine obligation trouble and put spending and venture down. Flattening was to calculate the Great Depression of the 1930s. However, the arguments against inflation would outweigh its arguments for if put side by side. Few of the arguments against of inflation include:

Inflation is typically viewed as an issue when the inflation rate increases above 2%. The higher the inflation, the more genuine the issue is. In outrageous conditions, out of control inflation can wipe away individuals' reserve funds and cause extraordinary flimsiness, for example Germany 1920s, Hungary 1940s, Zimbabwe 2000s. Notwithstanding, in a cutting-edge economy, this sort of out-of-control inflation is uncommon[3].

There is typically a higher loan fees related with inflation, so savers don't see their investment funds eradicated away[4]. Notwithstanding, inflation can in any case create some issues. Inflationary development will in general be unreasonable prompting a harming time of win and fail financial cycles.

Inflation tends not to spur venture and long-haul monetary development. This is a direct result of the vulnerability and disarray that is bound to happen during times of high inflation. Low inflation is said to support more prominent steadiness and urge firms to face challenges and contribute.

Inflation can make an economy uncompetitive. For instance, a generally higher pace of inflation in Italy can make Italian products uncompetitive, prompting lower AD, an ongoing record shortfall and lower monetary development. This is especially significant for nations in the Euro-zone since they can't downgrade to reestablish seriousness.

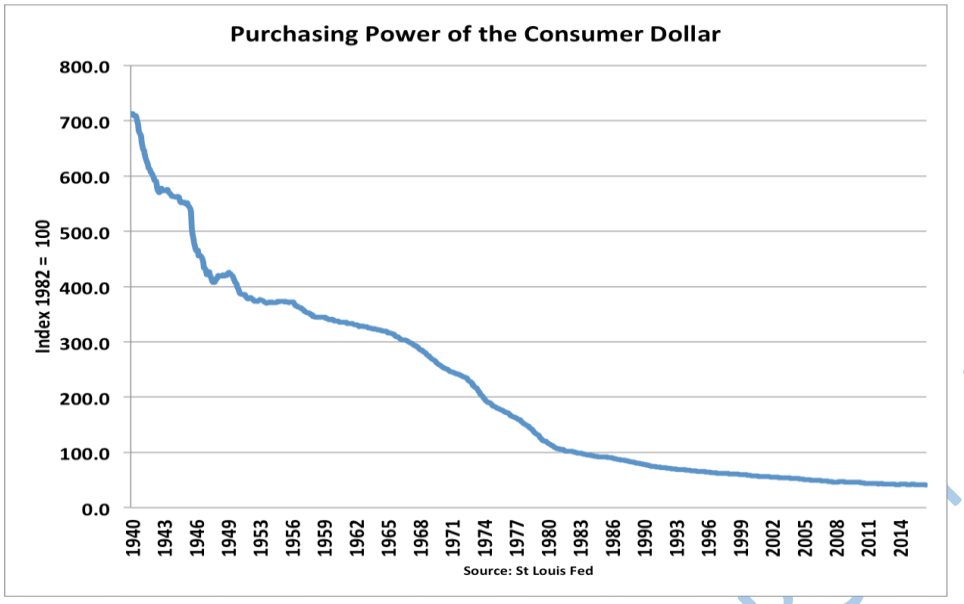


Figure: 2.2 The purchasing power of the consumer Dollar

Source: ST. Louis Fed

Inflation additionally decreases the benefit of saving. Inflation prompts a fall in the buying influence of cash, this exacerbates savers off - on the off chance that the rate inflation is higher than loan fees. High inflation can prompt a rearrangement of pay in the public eye. Frequently the proper pay workers miss out most from inflation. This is especially an issue in the event that inflation is high and loan costs low. Essentially, the expense of changing costs records turns out to be more incessant during high inflation. Not so huge with present day innovation. Fall in genuine wages. In certain conditions, high inflation can prompt a fall in genuine wages. On the off chance that inflation is higher than ostensible wages, genuine livelihoods fall.

2.1.2 Types of Inflation

As it has been elucidated above, inflation implies a supported inflation in the general cost level. The really two kinds of inflation are Demand-pull inflation and Cost-push inflation. Inflation can likewise be ordered by how quick the cost increments, for example,

Disinflation - a falling pace of inflation

Crawling inflation - low, however reliably crawling up.

Moderate inflation - (2 - 10%)

Running inflation (10 - 20%)

Kinds of inflation include:

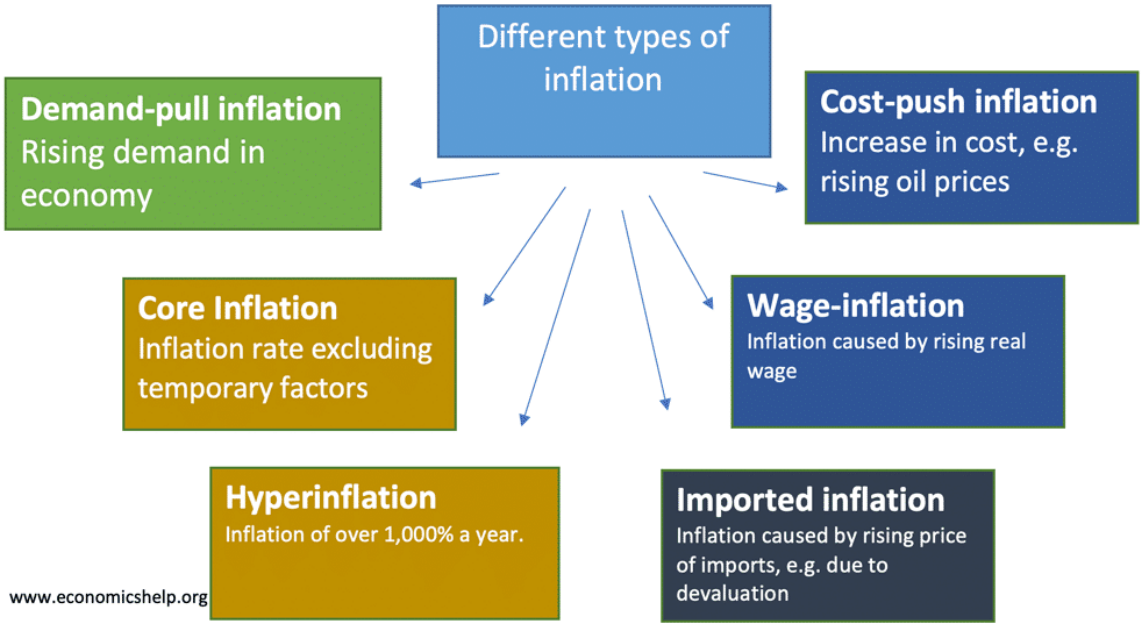


Figure: 2.3 Types of Inflation

Source: www.economicshelp.org[3]

Types of Inflation

Demand-pull inflation

This occurs when AD increases at a faster rate than AS. Demand-pull inflation will most of the time happen when the economy is becoming quicker than the long-run pattern pace of development. Assuming that request surpasses supply, firms will answer by pushing up costs[4].

A chart showing request pull expansion:

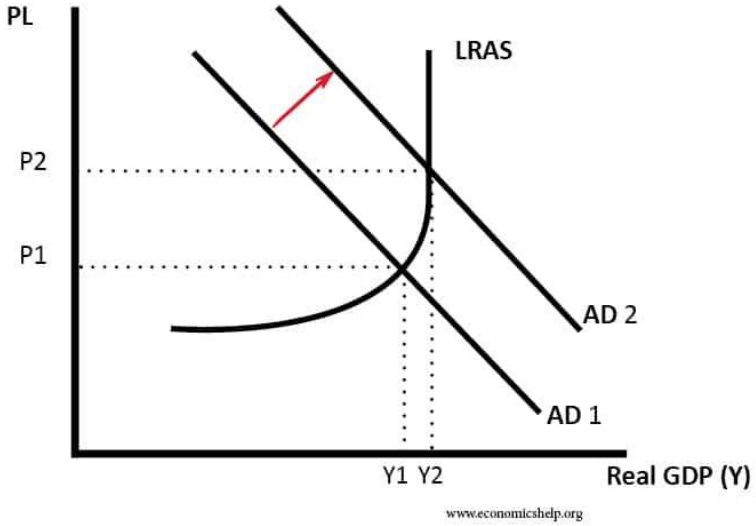
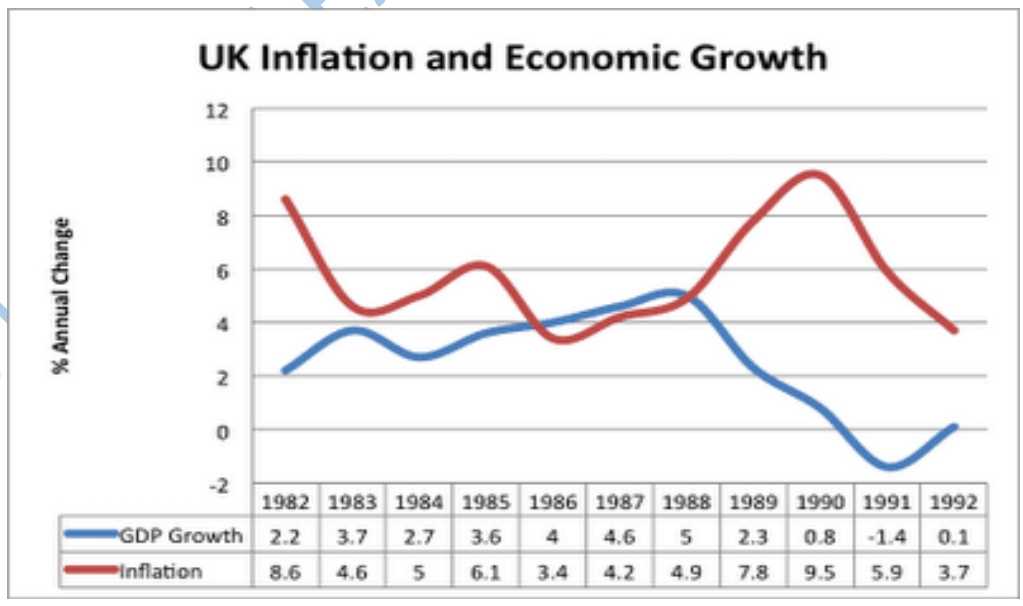


Figure: 2.4 Demand pull

Source: www.economicshelp.org

The UK experienced request pull expansion during the Lawson blast of the last part of the 1980s. Fuelled by rising house costs, high purchaser certainty and tax breaks, the economy was developing by 5% per year, however this caused supply bottlenecks and firms answered by setting up costs. In this manner, the expansion rate crawled up.



	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GDP Growth	2.2	3.7	2.7	3.6	4	4.6	5	2.3	0.8	-1.4	0.1
Inflation	8.6	4.6	5	6.1	3.4	4.2	4.9	7.8	9.5	5.9	3.7

Figure: 2.5 UK Inflation and Economic Growth
Source: www.wconomicshelp.org

This chart shows expansion and monetary development in the UK during the 1980s. High development in 1987, 1988 of 4-5% caused an expansion in the expansion rate. It was just when the economy went into downturn in 1990 and 1991 that we saw a fall in the expansion rate.

Cost-push Inflation

A group of scholars opined that this occurs when there is an increase in the cost of production for firms causing aggregate supply to shift to the left[4]. Cost-push inflation could be caused by rising energy and commodity prices.

Diagram showing cost-push inflation.

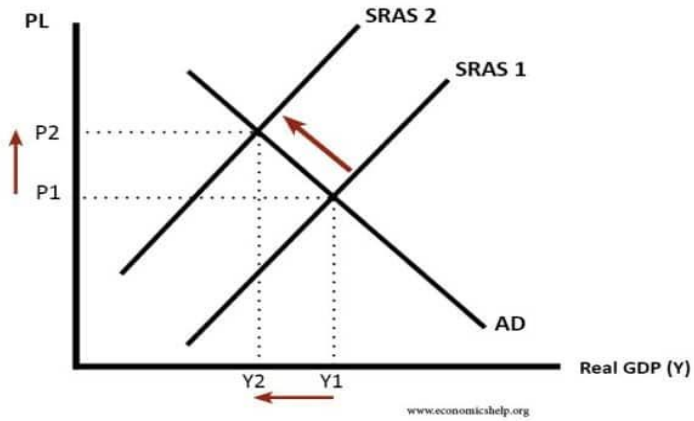


Figure: 2.6 Cost push Inflation

Source: www.economicshelp.org

In some cases, cost-push expansion is known as 'some unacceptable kind of expansion' since this expansion is related with falling expectations for everyday comforts. It is hard for the pinnacle bank to manage cost push expansion since they face both expansion and falling result.

Wage Push Inflation

Another examination increment compensation will generally cause expansion[11]. Basically, this is when there is both interest pull and cost-push expansion. Rising wages inflate costs for firms, thus these are gone to purchasers as greater costs. Likewise increment compensation give shoppers more prominent discretionary cashflow and in this manner cause expanded utilization and AD. During the 1970s, exchanges associations were strong in the UK. This aided reason rising ostensible wages; this was a huge figure causing expansion of the 1970s.

Imported Inflation

A deterioration in the conversion scale will make imports more costly. Thusly, the costs will increment exclusively because of this swapping scale impact. A devaluation will likewise make sends out more serious so will increment demand[5].

Temporary Factors

The expansion rate can likewise expand because of impermanent factors like expanding circuitous assessments. In the event that you increment VAT rate from 17.5% to 20%, all merchandise which are VAT appropriate will be 2.5% more costly. Notwithstanding, this value rise will just most recent a year. It's anything but a super durable impact.

Core Inflation

One proportion of expansion is known as 'center expansion'. This is the expansion rate that prohibits brief 'unpredictable' factors, for example, energy and food costs. The diagram beneath shows expansion in the EU. The title expansion rate (HICP) is more unstable ascending to 4% in 2008 and afterward tumbling to - 0.5% in 2009. Notwithstanding, the center expansion (HCIP - energy, food, liquor and tobacco) is more another researcher expressed a kind of expansion by pace of increment[6].

Figure: 2.7 Eurozone Inflation rate

Source: Eurostat

Crawling expansion (1-4%)

At the point when the pace of expansion gradually increments over the long haul. For instance, the expansion rate increases from 2% to 3%, to 4% per year. Crawling expansion may not be promptly perceptible, however assuming the crawling pace of expansion proceeds, it can turn into a rising issue.

Walking expansion (2-10%)

At the point when expansion is in single digits - under 10%. Going on like this - expansion is certainly not a significant issue, yet when it ascends more than 4%, Central Banks will be progressively concerned. Strolling expansion may essentially be alluded to as direct expansion.

Running expansion (10-20%)

At the point when expansion begins to increase at a critical rate. It is generally characterized as a rate somewhere in the range of 10% and 20% every year. Going on like this, expansion is forcing massive costs on the economy and could undoubtedly begin to crawl higher.

Galloping inflation (20%-1000%)

This is an expansion pace of between 20% up to 1000%. At this quick pace of cost expands, expansion is a not kidding issue and will be trying to manage. A few meanings of dashing expansion might be somewhere in the range of 20% and 100 percent. There is no generally concurred definition, however excessive inflation as a rule suggests more than 1,000% every year.

Hyperinflation (> 1000%)

This is held for outrageous types of expansion - ordinarily more than 1,000% however there is no particular definition. Excessive inflation generally includes costs changing so quick, that it turns into an everyday event, and under excessive inflation, the worth of cash will quickly decline.

2.1.3 Policies Implemented in the Control of Inflation

This section seeks to review the set of policies that have been implemented in the course of controlling inflation in Nigeria, over the years. Some of these policies are exchangerate policy, trade liberalization, fiscal policy – all of which are policies under the Structural Adjustment Program (SAP).

Trade/Exchange Rate policy

Under the drifting conversion scale framework, the Second-level Foreign Exchange Market (SFEM) - which incorporated a sale for true unfamiliar trade receipts and an interbank market in view of independent inflows of unfamiliar trade to the confidential area - covered all exchange exchanges, while the authority (first-level) swapping scale was saved for unfamiliar obligation administration commitments. A huge devaluation of the swapping scale went with the introduction of SFEM, trailed by moderate descending change of the authority rate. The two rates were brought together in July, 1987, supplanting SFEM with Foreign Exchange Market (FEM). Unfamiliar trade arrived at the useful areas, with modern unrefined components and capital merchandise engrossing north of 70% of pre-closeout reserves, contrasted and exactly 60% of true designations in the pre-SFEM period. The FEM functioned admirably for some time. Nonetheless, descending tension on the swapping scale forcefully expanded the differential between the trade rates on the closeout, where the deterioration was stifled, and the interbank market where the rate was allowed to answer market pressures.

Trade Liberalization

Practically all value controls and import permitting prerequisite were taken out toward the beginning of SFEM, and the import restriction list was decreased. The public authority likewise eliminated the 30% import overcharge and embraced an in-between time import obligation and extract plan, which diminished the scattering of security and normal ostensible rates, from 33% to 23 percent. Following the finishing of a levy study, another tax system was reported

in the 1988 spending plan. Import obligations were determined for a long term period, in this manner furnishing the two customers and makers with a more extended strategy

time skyline inside which to simply decide. The new timetables gave higher ostensible rate assurance than the break tax. However, as contrasted and the pre-SFEM circumstance, the new levy gave less security, both in light of the fact that the obligation rates were lower, and in light of the fact that much of the time it was the confined accessibility of imports under the permitting framework that decided the level of security in the pre-change period.

Fiscal Policy

The significant degrading of the naira in the last part of the 1980s pointedly expanded the worth of oil receipts in naira terms, and government incomes from custom obligations likewise rose. These impacts on incomes were, in any case, offset by higher naira expenses of obligation administration installments and uses with high import content and enormous monetary overwhelms, generally on capital consumptions and move to parastatals. In 1987, the government spending plan shortfall on a board premise added up to 10 percent of GDP, of which homegrown funding gave 4 rate focuses. The push of the 1988 spending plan was inflationary, with arrangements for a reflation store and an expansion in government pay scales. Be that as it may, despite proceeding with shortcoming in world oil markets and tensions on the swapping scale, the specialists took on a more controlled monetary position. Toward the beginning of April, the public authority expanded homegrown costs for oil-based commodities, as an initial phase in the program to align them extensively with global costs.

2.1.4 The Meaning and Function of Money

Money is anything filling in as a vehicle of trade. Most meanings of cash accept 'elements of cash' as their beginning stage. 'Cash is what cash does.' According to Prof. Walker, 'Cash is as cash does.' This implies that the term cash ought to be utilized to incorporate anything which fills the roles of cash, viz., mechanism of trade, proportion of significant worth, unit of record, and so forth. Since general worthiness is the crucial trait of cash, hence, cash might be characterized as 'anything which is for the most part OK by individuals in return of labor and products or in reimbursement of obligations.'

Overall terms, the fundamental capacity of cash in a monetary framework is "to work with the trading of labor and products and help in completing exchange without a hitch"[12]. Its essential trademark is general agreeableness. Elements of cash are reflected in the accompanying notable couplet:

"Cash involves capacities four a medium, an action, a norm, a store." Thus routinely cash plays out the accompanying four fundamental capacities, every one of which beats either trouble of deal. Mode of trade and proportion of significant worth are essential capacities since they are of prime Importance while standard of conceded installment and store of significant worth are called optional capacities since they are gotten from essential capacities.

Money as the Medium of Exchange:

Cash came into utilization to eliminate the bothers of trade as cash has isolated the demonstration of procurement from deal. Mode of trade is the fundamental or essential capacity of cash. Individuals trade labor and products with the help of cash. Cash goes about as a mode of trade or as a vehicle of installments. Cash without anyone else has no utility (aside from maybe to the misanthrope). It is just a mediator. The utilization

of cash works with trade, trade advances specialization Increases efficiency and effectiveness a decent money related framework is, subsequently, of monstrous utility to human culture. Cash is likewise called a carrier of choices or summed up buying power since it gives opportunity of decision to purchase things he needs most from the people who proposition best deal.

Money as a Unit of Account or Measure of Value

Cash fills in as a unit of record or a proportion of significant worth. Cash is the estimating bar, i.e., it is the units as far as which the upsides of different labor and products are estimated in cash terms and communicated as needs be Different merchandise delivered in the nation are estimated in various units like fabric in meters, milk in liters and sugar in kilograms. Without a typical unit, trade of merchandise turns out to be extremely challenging, values of all labor and products can be communicated effectively in a solitary unit called cash. Again without a proportion of significant worth, there can be no estimating cycle[13]. Without an evaluating interaction coordinated showcasing and creation is preposterous. In this way, the utilization of cash as a proportion of significant worth is the premise of particular creation.

The estimating pole of cash is additionally essential to all types of financial preparation. Buyers think about the upsides of elective buys m terms of cash Producers likewise look at the upsides of elective buys m terms of cash. Makers look at the general expense of the variables of creation concerning cash and furthermore plan their result based on the cash yield. It is, hence, exceptionally critical that the worth of cash ought to be steady.

Money as the Standard of Deferred Payments

Conceded installments are installments which are made sooner or later. Obligations are typically communicated concerning the cash of record. Advances are taken and reimbursed regarding cash. The utilization of cash as the norm of deflected or deferred installments massively improves on getting and loaning tasks since cash by and large keeps a steady worth through time. Subsequently, cash works with the development of capital business sectors and crafted by monetary mediators like Stock Exchange, Investment Trust and Banks. Cash is the connection which associates the upsides of today with those representing things to come.

Money as a Store of Value

Abundance can be put away with regards to cash for future. It fills in as a store worth of products in fluid structure. By spending it, we can get any product in future. Keynes puts incredible accentuation on this capacity of cash. Holding cash is identical to keeping a save of fluid resources since it tends to be effectively changed over into different things. Individuals hence typically wish to keep a piece of their abundance as cash since reserve funds as far as merchandise is extremely challenging. This want is known as liquidity inclination. Obviously cash is the best type of store of significant worth. Wheat or whatever other item which will order a worth can't be put away for a significant stretch.

Another Function - 'Liquidity of Money' is added nowadays. Cash is completely fluid. Liquidity implies convertibility into cash. Accordingly, the capacity to change over a resource into cash rapidly and without loss of significant worth is called liquidity of resource. Present day business analysts are laying weight on liquidity of cash. Since, by definition, cash is the most by and large acknowledged product, it is additionally the

most fluid, everything being equal. Ownership of cash empowers one to get hold of practically any ware in any spot and cash never locks a purchaser. It is this idiosyncrasy which recognizes cash from any remaining products. An inclination for liquidity is inclination for cash.

Cash, in this way, goes about as normal mode of trade, a typical proportion of significant worth, as standard of conceded installments and a store of significant worth.

2.1.5 Monetary Policy

Monetary policy is an economic policy that manages the size and growth rate of the money supply in an economy. A scholar opined that monetary policy is a powerful tool to regulate macroeconomic variables such as inflation and unemployment[7]. These policies are implemented through different tools, including the adjustment of the interest rates, purchase or sale of government securities, and changing the amount of cash circulating in the economy. The central bank or a similar regulatory organization is responsible for formulating these policies.

Financial Policy includes changes in the base pace important to impact the pace of development of total interest, the cash supply and eventually cost expansion. Monetarist financial specialists accept that money related strategy is a more remarkable weapon than monetary arrangement in controlling expansion.

Financial approach likewise includes changes in the worth of the swapping scale since vacillations in the money additionally influence on macroeconomic action (livelihoods, result and costs) Changes in momentary loan fees influence the spending and reserve funds conduct of families and organizations after some time and accordingly feed through the roundabout progression of pay and spending. The transmission instrument of money related approach works with variable delays relying upon the premium

versatility of interest for various labor and products - for instance, the interest for revenue touchy buyer labor and products purchased using a credit card or the interest for capital speculation from private area organizations. In light of the delays engaged with setting a suitable degree of transient financing costs, the Bank of England sets ostensible loan fees based on stirring things up around town focus more than a two-year gauging skyline.

The essential goals of money related strategies are the administration of expansion or joblessness, and upkeep of cash trade rates.

Financial strategies can target expansion levels. A low degree of expansion is viewed as good for the economy. In the event that expansion is high, a contractionary strategy can resolve this issue. Financial strategies can likewise impact the degree of joblessness in the economy. For instance, an expansionary financial arrangement for the most part diminishes joblessness in light of the fact that the higher cash supply animates business exercises that lead to the extension of the gig market. Essentially, utilizing its financial power, a national bank can direct the trade rates among homegrown and unfamiliar monetary standards. For instance, the national bank might build the cash supply by giving more money. In such a case, the homegrown cash becomes less expensive comparative with its unfamiliar partners.[14]

National banks utilize different devices to execute financial strategies. The generally used approach apparatuses include:

Interest Rate Adjustment

A national bank can impact loan costs by changing the markdown rate. The markdown rate (base rate) is a financing cost charged by a national bank to banks for momentary credits[15]. For instance, on the off chance that a national bank expands the rebate rate,

the expense of getting for the banks increments. Consequently, the banks will expand the loan cost they charge their clients. Consequently, the expense of getting in the economy will increment, and the cash supply will diminish.

Change Reserve Requirements

Central banks typically set up the base measure of stores that should be held by a business bank. By changing the expected sum, the national bank can impact the cash supply in the economy. On the off chance that financial specialists increment the expected hold sum, business banks find less cash accessible to loan to their clients and accordingly[16], cash supply diminishes. Business banks can't utilize the stores to make credits or asset interests into new organizations. Since it comprises a lost an open door for the business banks, national banks pay them premium on the stores. The interest is known as IOR or IORR (interest on stores or interest on required saves).

Open Market Operations

The central bank can either buy or offer protections gave by the public authority to supply influence the cash. For instance, national banks can buy government bonds. Subsequently, banks will get more cash to build the loaning and cash supply in the economy. Contingent upon its targets, money related arrangements can be expansionary or contractionary. Expansionary Monetary Policy is a financial strategy that expects to build the cash supply in the economy by diminishing loan costs, buying government protections by national banks, and bringing down the hold prerequisites for banks. An expansionary strategy brings down joblessness and invigorates business exercises and customer spending. The general objective of the expansionary money related strategy is to fuel financial development. Nonetheless, it can likewise prompt higher expansion.

The objective of a contractionary financial strategy is to diminish the cash supply in the economy. It very well may be accomplished by raising loan fees, selling government bonds, and expanding the save prerequisites for banks. The contractionary strategy is used when the public authority needs to control expansion levels.

2.1.6 Institutional Development

This section contains the evolution, performance, characteristics, and problems of someof the institutions managing the control of the financial system. Some of these financial institutions are the Central Bank of Nigeria (CBN), the Nigerian money market as well as the capital market.

The Central Bank of Nigeria (CBN)

The period 1892-1952, there was an inquiry by the then colonial administrative banking practice in Nigeria. The G.D Paton Report which emanated from the inquiry was thebasis for the first Banking Ordinance of 1952. The Ordinance was designed to ensure orderly commercial banking to prevent the establishment of unviable banks. A draft legislation for the establishment of CBN was presented to the House of Representativesin March, 1958. The Act was fully implemented on 1 July, 1959 when the CBN cameinto full operations.

The wide range of economic liberalization and deregulation measures following the adoption, in 1986, of a Structural Adjustment Programme (SAP) resulted in the emergence of more banks and other financial intermediaries. The Bank and Other Financial Institutions (BOFI) Decrees 24 and 25 of 1991, which repealed the Banking Decree 1969 and all its amendments, were, therefore, enacted to strengthen and extend the powers of the CBN to cover the new institutions in order to enhance the

effectiveness of monetary policy, regulation and supervision of banks as well as non-banking financial institutions.

The 1997 amendments brought the CBN back under the supervision of the ministry of finance. The Decree made the CBN directly responsible to the Minister of Finance with respect to the supervision and control of bank and other financial institutions, while extending the supervisory role of the bank to other specialized Banks and Financial Institutions. The amendment placed enormous powers on the Ministry of Finance while leaving the CBN with a subjugated role in the monitoring of the financial institutionswith little room for the Bank to exercise discretionary powers.

The current legal framework within which the CBN operates is the CBN Act of 2007 which repealed the CBN Act of 1991 and all its amendments. The Act provides that the CBN shall be a fully autonomous body in the discharge of its functions under the Act the Banks and Other Financial Institutions act with the objective of promoting stability and continuity in economic management. In line with this, the Act widened the objects of the CBN to include ensuring monetary and price stability as well as rendering economic advice to the Federal Government.[17]

The Nigerian Money Market

Nigeria, at pre-freedom, had no organized homegrown business sectors as the monetary framework was to a great extent possessed by outsiders. What existed constantly was a market connected to the London currency market, which before the coming of banking exercises showed a few components of momentary loaning and getting. The market was a contemporary piece of the London currency market. It worked by moving assets from London to Nigeria during the cultivating season to back the product of homestead

produce and when the season was done with no requirement for cash, the assets were localized back to London.

The foundation of a Nigerian currency market expected on the CBN, the domiciling of the making a trip assets to Nigeria for conceivable venture and financial improvement in the country. The Nigerian currency market was formally settled in April, 1960 with issuance of the main CBN Treasury Bill. The call cash plan, which had existed between banks, was authoritatively organized by the CBN in1962 and assigned the Call Money Fund Market.

In 1968, to assist with overcoming any barrier in government's monetary activities, Treasury Certificates were interestingly given as short-to-medium term government protections. The market was additionally supplemented with other market instruments like Bankers Unit store (BUF), Certificate of Deposits (CDs), among others.

The currency market today includes the interbank reserves market and transient protections market with the Debt the board Office (DMO), the CBN, the Nigerian Deposit Insurance Corporation (NDIC), the Federal Ministry of Finance (FMF), Deposit Money Banks (DMBs), Discount Houses and the financial planning public as dynamic members. The CBN and NDIC structure the primary administrative and administrative bodies.

The currency market advanced to assist with accomplishing macroeconomic development and dependability by helping the transmission of money related strategy, working on monetary delegate and advancing the effective assignment of capital.

The Nigerian Capital Market

The history of the Nigerian capital market can be traced back to 1946, with the floatation of 300,000 pounds bind by the then colonial government to implement its 10-year development plan. In 1959, the Lagos Stock Exchange was established as a private company Limited by guarantee, and commenced operations in 1961. A year later, the Capital Issues Committee (CIC) was set up by the CBN as an ad-hoc non-statutory committee, charged with the primary responsibility of regulating the timing of public issues. The Capital Issues Committee transformed into the Capital Issues Commission, following the promulgation of the Capital Issues Commission Decree 1973.

In 1976, the Federal Government set up the Financial Systems Review Committee to study the structure and operations of the financial system and make recommendations to improve the market. A major recommendation made by the panel was that the Securities and Exchange Commission (SEC) be established to replace the Capital Issues Commission. Consequently, the SEC was established in 1979 by the SEC Act 1979. The SEC Act 1979 was later repealed and replaced by the SEC Decree 1988.

Similarly, the Dennis Odife Panel was set up in 1996. Its recommendations to the Federal Government resulted in the promulgation of the Investments and Securities Act (ISA) No.45, 1999. The ISA 1999 repealed and replaced the SEC Decree 1988. The ISA expanded the regulatory and developmental responsibilities of the SEC to include oversight on venture capital activities, commodity and future exchanges as well as collective investment schemes[2]. The SEC is the apex regulatory body in the Nigerian Capital Market, empowered under the No. 45, 1999, to regulate and develop the market under the supervision of the Federal Ministry of Finance. The regulatory oversight of the Commission covers all corporate bodies and individuals authorized to

perform designated functions in the market. These include SROs like Exchanges, the CSCS and other capital market Trade Associations.

2.2 Theoretical Review

This subsection examines various theories explaining the growth in price level (inflation) in the literature. The theories are purchasing power parity theory, the monetary theory, the structuralist theory, and the structuralist-monetary theory.

2.2.1 The Purchasing Power Parity Theory

The theory makes sense of the progressions in return rates regarding differentials between nations. The term "purchasing power parity" was originated by Cassel in 1918, but he presented his PPP theory nearly three years earlier using the equivalent term "theoretical rate of exchange". The theory assumes that the actions of importers and exporters (motivated by cross-country price differences) induce changes in the spot exchange rate. In another vein, PPP suggests that transactions on a country's current account affect the value of the exchange rate on the foreign exchange (Forex) market. Defenders of this theory are of the view that for nations rehearsing adaptable conversion scale systems, changes in swapping scale influences on expansion, particularly in little and open creating economies. Swapping scale devaluation straightforwardly influences the costs (in homegrown cash units) of tradable products, however may likewise by implication influence the general cost level on the off chance that valuing choices are impacted by the expense of imported input . In any case, the proof of the legitimacy of the theory is blended for less created nations.

2.2.2 The Monetary Theory

As per the monetarists, expansion is a homegrown financial peculiarity that emerges when the national bank builds the cash supply in overabundance of the interest for cash.

It is declared that the cash supply is exogenous and heavily influenced by the specialists. Led by Milton Friedman, the monetarist model of the determinants of expansion is gotten from the cash request work and depends on the speculation that expansion shifts decidedly with the pace of progress of cash supply and adversely with the pace of progress of genuine pay, ceteris paribus. Practically speaking, funding monetary deficiencies through cash creation by the national bank might raise costs and dissolve unfamiliar store[18]. Monetarists see the transient answer for expansion as the execution of a contractionary or prohibitive financial strategy.

2.2.3 The Structuralist Theory

Advocates of the structuralist theory refer to the presence of underlying bottlenecks, particularly in emerging nations as key reasons for expansion. This theory was originated with the work of the Economic Commission for Latin America (ECLA or CEPAL) and is primarily associated with its director Raúl Prebisch and Brazilian economist Celso Furtado. Basically, structuralists recognize fundamental or underlying inflationary tensions and instruments that communicate or engender such tensions. A normal assumption within this approach is that the price mechanism fails as an equilibrating mechanism, to deliver steady growth and to produce a "desired" income distribution. Major primary bottlenecks recognized in structuralist examinations incorporate misshaping government strategies, the contention among financial backers and laborers over the dispersion of pay among benefits and wages, inelastic food supply, the unfamiliar trade and government spending plan requirements. In this view, the bottlenecks lead to cost builds, which are communicated into the inflationary cycle. Structuralists hence contend that the variables that the standard view sees as the reasons for expansion ought to rather be viewed as side effects of the basic underlying rigidities in emerging nations.

2.2.4 The Structuralist-Monetarist Theory

Essential exclusions from the monetarist theory of expansion are primary or cost-push components that cause expansion. The monetarists make sense of cost expansions as far as changes in the cash supply, particularly assuming the financial specialists embrace a convenience strategy that tries to keep genuine result from falling. Campos was the first person to adopt Albert O. Hirschman and the StructuralistMonetarist Debate 109 the terminology "structuralist" and "monetarist," summarizes the structuralist approach in three propositions:

(i) inflation naturally accompanies economic growth;

(ii) due to supply rigidities such efforts to curb inflation through monetary and fiscal mechanisms will lead to unemployment and stagnation; and

(iii) low import capacity and supply inelasticities in the growth process render it impossible to control inflation in the short run; a gradual confrontation is thus desirable (in pace with the availability of foreign capital), creating the necessary conditions to overcome the import capacity bottleneck[16].

The structuralists monetary theory diverged from monetarists by assuming that growth was more important for economic development than price stability. Cost-push expansion, which is missing in monetarist models, is a possibly major issue in little open emerging nations, where expansions in unfamiliar costs might be a significant reason for homegrown expansion. Lately, a few creators have created models with monetarist and structuralist highlights by straightforwardly increasing the monetarist approach with cost-push factors[19]. A portion of the methodologies have been to show the monetary deficiency as the first power and the engendering system in the

inflationary cycle to incorporate structuralist contemplations into monetarist models and to represent cash supply elements in structuralist models , .

2.2.5 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[3].

The theory explains the relationship between national income assessed at market price and the velocity of money circulation can be said to be equal relationship. The equation shows a positive relationship between price level and money supply, and can be represented using the quantity equation MV=PY"[8].

M = the stock of money in circulation

V = velocity of circulation

P = the general price level

Y = the total income

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

The quantity theory of money was chosen as the theoretical basis for this study because it provide basic explanation for the link between inflation and money supply.

2.2.6 The Relationship of Structuralist-Monetarist Theory to This Study

The choice of structural-monetarist in this study is being informed is the inclusion of cost-push elements that cause inflation. Inflation in Nigeria is most times caused by the increase in the foreign price, hence, only the principle of the monetarist theory will not suffice in explaining how monetary policy affect inflation in Nigeria. The structural theory must then be blended with it. Therefore, this theory gives structuralist considerations into monetarist models and also account for money supply dynamics in structuralist models. With this, the present study will be able to explain the effect of monetary policy on inflation in Nigeria based on the principles of structural and monetary theories.

2.3 Review of Empirical Studies

2.3.1 Studies on Monetary Policy and Inflation Rate in Nigeria

A review examined the topsy-turvy impact of positive and negative money related strategy shocks on result and costs in Nigeria utilizing loan fee shocks . This was with the view to learning the effect of financial strategy on maintainable result development and cost solidness in Nigeria from 1986 to 2016. Quarterly auxiliary information from 1986Q1 to 2016Q4 on yield (GDP), loan fee, cash supply, expansion rate, venture and genuine compelling conversion standard were obtained from Central Bank of Nigeria (CBN) Statistical Bulletin, 2016 and World Development Indicator (WDI), 2018. Information gathered were broke down utilizing Non-direct Autoregressive Distributive Lag (NARDL) econometric strategies. The outcomes showed that in the short run, negative shocks make more huge impacts (2.7%) on yield than positive

shocks (1.2%) however the impacts of positive and negative money related approach shocks don't fundamentally affect cost level; while over the long haul, positive shocks have more massive impacts than the negative shocks on both result (3.1% and 1.9%) and costs (- 51.1%and 45.1%). The review reasoned that financial arrangement shocks lopsidedly affect result and costs in Nigeria both in the short and long run period.

Another review examined the impact of money related arrangement on financial development in Nigeria. The normal log of the GDP was utilized as the reliant factors against the illustrative financial strategy factors: financial approach rate, cash supply, swapping scale, and loaning rate. The time series information is the market-controlled period covering 1986 to 2016. The review took on an Ordinary Least Squares (OLS) strategy and furthermore directed the unit root and co-reconciliation tests. The review showed that long run relationship exists among the factors[20]. Also, the center finding of this study showed that money related strategy rate, loan cost, and speculation meaningfully affect monetary development in Nigeria. Cash supply anyway meaningfully affects development in Nigeria. Swapping scale affects GDP in Nigeria. Cash supply and speculation granger cause financial development, while monetary development causes loan fee in Nigeria. On the in general, financial arrangement makes sense of 98% of the progressions in monetary development in Nigeria. Hence, the review presumed that financial strategy can be really used to control Nigerian economy and in this way a genuine device for cost dependability and work on yield.

The ID of the customary and institutional expansion factors answerable for expansion peculiarity and the extent of the commitment of the recognized factors to the ascent overall cost level have been tracked down in writing. Optional information on key macroeconomic factors in the economy from 1974 to 2013 were utilized. The information gathered were investigated utilizing the Autoregressive Distributed Lag

(ARDL) limits test. The outcomes showed that there existed a long run co-development among the factors. Likewise, the normal least squares gauge showed that Real Effective Exchange Rate, Lagged Consumer Price Index, Real Broad Money and Real Profits were genuinely critical in affecting Consumer Price Index. The short-run relationship shows that 60% of disequilibrium mistakes from the earlier year's shock merge back to the long-run harmony in the flow year. The concentrate consequently presumed that expansion in Nigeria, during the concentrated on period, was driven by the pass-through of import costs to homegrown costs by means of markup estimating by firms. This was helped by homegrown expansion steadiness. It is in this manner suggested that locally delivered results of good quality and sufficient amount should be fill in for imported ones and a money related strategy position that doesn't handily stray from the set financial objective ought to be taken on by the Nigerian money related specialists assuming tenacious expansion is to be controlled in the country.

A group of scholars investigates the effect of structural change by identifying three structural breakpoints and incorporating them into the Vector Autoregressive (VAR) Model as dummy variables[9]. The results show that a positive shock to policy rate raises unemployment over a 10 quarter period. In addition, all the variables used as proxy in the model jointly Granger cause unemployment, implying the existence of a dynamic relationship between monetary policy and unemployment in Nigeria.

Some researchers examined the efficacy of monetary policy in curbing inflation in Nigeria[10]. Time series data between 1986 and 2015 were used and the Vector Error Correction Model (VECM) was employed to give empirical content to the stated objectives. The study found out that monetary policy is significant in curbing inflation threshold in Nigeria, however the effect of monetary policy variables are weak in controlling inflation. This is as a result of the large proportion of informal sector which

culminates into a high currency outside bank economy that is largely not affected by monetary policy tools. Also, non-popularity of monetary policy tools as a result of financial illiteracy accounts for its ineffectiveness. The Monetary Policy Rate (MPR) is not statistically significant which has also affected its transmission mechanism to commercial banks interest rate. This is as a result of commercial banks' excess reserves which downplay the efficacy of the MPR in affecting interest rate and money supply. The study recommends amongst others that; first, the CBN should narrow the asymmetric corridor around the MPR to check commercial banks excess reserves. Required cash ratio and liquidity ratios should be adjusted regularly to curtail banks excess reserves; second, the CBN should embark on enlightenment campaigns in financial literacy to buttress popularity of monetary policy tools. Finally, commercial banks should expand their coverage to reduce the number of un-banked and under banked persons in the economy in order to reduce the dominance of the informal sector.

Another scholar studied the use of monetary policy to check inflation in Nigeria[11]. The study was based on time series data from 1970 to 2010. The method employed OLS to estimate the model parameters. According to the author, the study found that bank rate, deposit with the central bank, liquidity ratio, and broad money supply are statistically significant in explaining changes in inflation. However, exchange rate was found not to account for significant changes in inflation in Nigeria.

Further in 2014, a researcher examined the Effectiveness of Monetary Policy in reducing inflation in Nigeria for the period 1970 − 2012, employing the co integration and Error Correction Technique of econometric analysis[12]. The data were sourced from the Central Bank of Nigeria statistical bulletin of various years. The test of both the Unit root and co-integration revealed that there is a long relationship between the variables while the Granger Causality test revealed an un-directional relation between

Monetary Policy and inflation. However, the VECM test revealed that inflation, GDP and exchange rate are negatively related and positively related to broad money supply (M2) and domestic credit. The study is of the recommendation that Central Bank of Nigeria should balance its control instruments to achieve macroeconomic stabilization and development, money supply should be controlled to ensure high employment, interest rates should be liberalized to control price and output movement, the society needs to be sanitized of corruption and in all. Monetary policy measures should be designed in a way that enhances the attainment of the macro-economic objectives while checking inflationary trend.

Furthermore, a study examines the impact of monetary policy on the Nigerian economy[13]. In doing this, the OLS was used to analyse data between 1981 and 2008. The result of the analysis shows that monetary policy presented by money supply exerts a positive impact on GDP growth and Balance of Payment but negative impact on rate of inflation. The recommendations are that monetary policy should facilitate a favourable investment climate through appropriate interest rates, exchange rate and liquidity management mechanism and the money market should provide more financial instruments that satisfy the requirement of the ever-growing sophistication of operators.

One more review rethinks the issue of the presence and the degree of expansion edge in the connection among expansion and development in Nigeria, utilizing three distinct methodologies that give fitting strategies to assessing the limit level and surmising. While a scholar approach gives a limit point gauge of 9.9 percent that was not very much distinguished by the information, the strategy of a review recognizes a 10.5 percent expansion edge as measurably important to make sense of the expansion development nexus in Nigeria[21]. Likewise, the methodology of a gathering of researchers recommends a two limit point model with 11.2 and 12.0 percent as the

fitting expansion edge focuses. These outcomes propose that the limit level of expansion above which expansion is antagonistic to development is assessed at 10.5 to 12 percent for Nigeria. Utilizing the assessed two limit point model, this paper didn't track down an adequate number of motivations to acknowledge the invalid speculation of the super impartiality of cash, and thusly, propose that there is an edge level of expansion above which cash isn't super-nonpartisan.

A study examined the impact of exchange rate depreciation on inflation in Nigeria for the period 1986–2008 using Auto Regressive Distributed Lag model[14]. The research found that exchange rate depreciation, money supply and real gross domestic product are the main determinants of inflation in Nigeria, and that Naira depreciation is positive, and has significant long-run effect on inflation in Nigeria. This implies that exchange rate depreciation can bring about an increase in inflation rate in Nigeria. The study also found that inflationary rate in Nigeria has a lagged cumulative effect. The research therefore concludes that although Naira depreciation is relevant in ensuring an improvement in the production of exportable commodities, it must not be relied upon as a potent measure for controlling inflation in Nigeria.

A review analyzed the fundamental determinants of expansion in Nigeria utilizing information from 1970 to 2003 with the guide of mistake remedy system. Proof from the review showed that normal expansion, oil based good costs and genuine conversion scale, apply tremendous consequences for the pattern of expansion in Nigeria[22]. Further, another review researched the impact of swapping scale devaluation on Nigeria's inflationary cycle. The review utilized information from 1986 to 2008 utilizing the autoregressive circulated slack model. The review recognized expansion latency, conversion scale deterioration, cash supply and genuine GDP as the significant determinants of expansion in Nigeria. Besides, a researcher dissected the primary

drivers of expansion in Nigeria from 1981 to 2003 utilizing the standard least squares approach[11]. The review uncovered that financial variables, cash supply, premium and trade rates essentially influence on expansion in Nigeria. A gathering of researchers concentrated on the wellsprings of expansion in Nigeria utilizing the cointegration and blunder rectification displaying approach. The review showed that products, imports, food costs, premium and swapping scale were critical in deciding the development of expansion in Nigeria. In ongoing past, an examination dissected Nigeria's inflationary pattern from 1981 to 2015 utilizing the limits testing (way to deal with cointegration examination). Results from the review demonstrated that expansion idleness, precipitation and cash supply altogether impact the inflationary cycle in Nigeria. Additionally, a few guaging approaches of expansion exist.

A gathering of researchers analyzed the expansion cycle in Nigeria utilizing the Autoregressive Integrated Moving Average (ARIMA) displaying procedure[23]. They tracked down ARIMA (3, 1, 0) to be the best fit for Nigerian expansion. The out-of-test gauge uncovers the nonstop ascent in expansion all through the period considered. Specialists applied Box-Jenkins ARIMA model on month to month metropolitan and provincial CPI from January 2001 to December 2015 to give 29 months ahead expansion conjecture for Nigeria. The review chosen ARIMA (0, 1, 0) and ARIMA (0, 1, 3) as the most ideal model for determining Nigeria's expansion. John and Patrick (2016) Modeled month to month expansion rate for Nigeria utilizing information from January 2000 to June 2015. The review recognized ARIMA (0, 1, 0) x (0, 1, 1) for Nigeria's inflationary cycle in light of the fact that the in-example figure got was exceptionally near the first series.

A review investigated Nigeria's expansion utilizing VAR model[24]. The review utilized information on expansion rate, cash supply, financial deficiency, genuine swapping

scale, loan fee, changes in import costs and genuine result over the period 1990 to 2012. The outcome showed that prompt slack worth of expansion generally drives current and future expansion in Nigeria.

The study by found interest rate, exchange rate, money supply and oil price as the major causes of inflation in Nigeria[15]. It was also discoveredthat proper utilization of growth (increase in income) would reduce inflation, although in the short-run increased income encourages inflation. The money supply variable showed a significant positive impact on inflation both in the short-run and long-run. The implication of this result is that the Nigerian inflationary situation is driven by monetary impulses and as the government pumps more currency into the economy, so will the general price level increase, causing money to lose its value and hence, a rise in inflation. This emphasizes that inflation is a monetary phenomenon. In studying the factors that cause inflation and their extent of impact on the level of inflation rate in the economy, as well as examining to what extent inflation drives the monetary decision-making and to what extent the changes in interest rate influence growth and price stability or the level of trade-off between the two. A group of scholars found that there is a positive relationship between inflation (Wholesale Price Index, WPI) and the economic variables taken into consideration (which include money supply, exchange rate, interest rate, one year lagged WPI)[16]. They also performed the Granger causality test whose results confirmed that out of all, it is only the interest rate which is affected due to the inflation. The regression results showed a positive relationship between inflation and money supply and this is compatiblewith the Monetarist's theory they used, which states that inflation is always and everywhere a monetary phenomenon.

Similarly, related study, found out that money supply has a significant effect on inflation rate in Nigeria which implies that money supply serves as one of the major

tool of controlling inflation rate[17]. Also, their result showed that exchange rate had an insignificant effect on inflation rate while interest rate proved to be significant in explaining variation in inflation rate in Nigeria. They therefore concluded that monetary policy has been partially effective in controlling inflation rate in Nigeria. They suggested that a robust and effective exchange rate regime be adopted by regulatory authorities in order to ensure exchange rate stability objective of controlling inflationary pressure in the economy. This finding is similar to the work of a scholar that examined the extent to which policy target of macroeconomic variables lead to changes in inflation in developing countries, Nigeria in particular[18]. The result of the study showed that money supply and past level of inflation have the potentials of causing significant changes in inflation in Nigeria.

Some scholars investigated the impact of monetary policy rate on inflation in Nigeria and its policy implication[19]. Their result showed that expected inflation, money supply and exchange rate had influence on inflation within the period considered. However, the monetary policy rate used for macroeconomic stability had no statistical relationship with inflation. Monetary policy rate, when used in place of minimum rediscount rate, showed more sign of effectiveness than minimum rediscount rate and this was same for annual Treasury Bills rate. They concluded that at any rate, combining monetary policy rate with other macroeconomic monetary policy tools is effective in determining the behaviors of inflation during the period. A group of researchers investigated empirically the impact of monetary on Nigeria's macroeconomic stability between 1970 and 2009[20]. Time series data, for the period 1970 to 2009, on inflation rate, money supply, minimum rediscount rate and Treasury Bills were fetched and used in the study. Their findings revealed that only 47% of the total variations in the model are caused by the monetary policy variables examined. The current and past money supply was not

impacting on inflation. Past monetary policy rate impacted on inflation while current and past Treasury Bills rates did not. The policy implication arising from the findings is that the monetary policy tools showed a mixed result in terms of their impact on inflation in Nigeria. The study, therefore, suggested that Nigeria should adopt macroeconomic mix of monetary, fiscal and exchange rate policies in managing inflation in order to promote price stability which would unavoidably lead to macroeconomic stability. In essence, the study could not find a significant relationship between monetary policy and inflation. This result supports the findings of the scholars where it was concluded that monetary policy does not have significant impact on the economy[21]. They argued that this was due to the fact that broad money supply was not properly regulated and the bank lending rate to the private sector was so high that the economy had been adversely affected. A related research found money innovations as weak and statistically insignificant variables in determining prices when compared with price shocks themselves[22]. They argued that in the short-run, innovations in prices are mostly explained by their own shocks, and that monetary policy instruments have little or no effect on prices.

In a study conducted by a scholar, it was found that Inflationary pressure on the South African economy was lower than that of Nigeria, even when both countries faced high inflation episodes during the early decades of 1990s[23]. They advocated that factors beyond the purview of monetary policy constrained the realization of single digit inflation. They described these factors as including the existence of various and uncontrolled sources of liquidity in the country, government fiscal operation, which includes financing of deficit budget and monetization of deficits, the existence of large informal credit markets, etc. similar results were found in a study which examined the trend of monetary policy instruments and inflation in Nigeria, evaluated the empirical

relationship between monetary policy instruments and inflation in Nigeria, as well as investigated the effectiveness of monetary policy tools in controlling inflation in Nigeria; between 1986 and 2015[24]. The study revealed that monetary policy is significant in curbing inflation threshold in Nigeria. However, the effectiveness of these policy variables is weak in controlling inflation in Nigeria as a result of large portion of informal sector and non-popularity of monetary policy tools.

Scholars carried out a study to examine the effectiveness of the monetary policy on the Nigerian economy by studying the relationship that exists between Consumer Price Index (CPI) and other macroeconomic indicators[25]. Data on inflation rate, gross domestic product, credits to private sector, broad money, and net- credit to government and consumer price index from 1981 to 2010 were obtained for the analysis. Their findings showed that as CPI increases, inflation rate, GDP and credit to private sector increase. Broad money and net credit to government was also shown to have a negative relationship with CPI indicating that an inverse relationship with CPI exists. In conclusion, the result proved that monetary policy is not totally influential on inflation (CPI). A scholar did a study to examine the effectiveness of monetary policy in controlling inflation in Nigeria[26]. Control variables such as monetary policy rate (MPR), treasury bill rate (TBR), savings rate (SR), prime lending rate (PLR), maximum lending rate (MLR), growth in M1 (M1g), growth in M2 (M2g), net domestic credit (NDC), net credit to the government (NCG), credit to private sector (CPS); were regressed against inflation rate (INFr). The results showed that MPR, TBR, PLR, MLR, and NDC are not statistically significant, while SR, M1g, M2g, NCG and CPS are statistically significant in explaining the changes in Inflation rate in Nigeria. The implication of this finding is that some monetary policy instruments are effective in managing inflation while others are not. They recommended that contractionary

monetary policy aimed at curtailing excess money in circulation should be used to moderate inflation in Nigeria.

The findings of some researchers have it that monetary policy variables may not have an instantaneous impact on output, but are key determinant of output growth in the long-run[27]. They argued that in the short-run, it is the output and inflation that drives monetary growth, while output growth is affected by inflation only. They maintained that 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. This is similar to the finding of A scholar whose study confirmed that monetary policy affects its ultimate target after a lag, which is both long and variable[28]. The results of the study carried out by other scholars suggested that Treasury bill rate is an effective tool in controlling inflation both in the short-run and long-run; exchange rate and money supply are very effective in the control of inflation in the short-run; and money supply is very effective in the long-run[29]. This partially supports a similar study which was conducted to investigate the extent to which exchange rate impact on inflation in Nigeria in the face of other macroeconomic indicators[30]. Secondary data on inflation rate, exchange rate, money supply, Real Gross Domestic Product and import prices; spanning from 1970 to 2014were sourced from the Statistical Bulletin of the Central Bank of Nigeria (CBN), 2014.The finding of this study revealed that exchange rate has a direct effect on inflation in Nigeria. The implication is that government can use exchange rate targeting as means of managing inflation since the study shows a direct effect of exchange rate on inflation.

Scholars have examined the level of relationship between monetary policy and inflation as well as causal linkage between monetary policy and inflation in Nigeria[31]. Their result confirmed that Broad Money Supply and Interest rate had negative impact on

inflation rate, while exchange rate had positive impact on inflation rate in Nigeria during the periods reviewed. They concluded that monetary policy plays a significant role in determining the height or level of inflation in Nigeria. This is unlike the results of the study carried out to examine the role of interest rate, minimum rediscount rate, liquidity ratio, and cash reserve ratio in inflation management or control in Nigeria, which showed that inflationary trend and growth was not significantly related to the combined monetary policy instruments adopted in the study[32]. It further showed that changes in the monetary policy instruments (which include interest rate, minimum rediscount rate, liquidity ratio, cash reserve ratio) adopted in the study were also not measures in determining changes in the rate of inflation in Nigeria within the period studied.

According to the study conducted to investigate the role of monetary policy in attaining the objective of price stability in Nigeria, as well as determine the relationship between money supply and the price level in Nigeria; money does not significantly impact on the price level in Nigeria[33]. Similar result was found in the study which investigated the impact of money supply on inflation in Nigeria and also re-examined the immediate cause of the alarming rate of inflation in Nigeria[34]. Their result showed that money supply does not considerably influence on inflation both in the long-run and short-run. According to them, this may be due to the fact that the country was in recession during the period observed.

2.4 Gaps in the Literature Reviewed

There exist a relatively large number of empirical studies examining the effect of monetary policy on inflation rate in Nigeria. However, most previous studies adopted A Nonliniear Autoregressive Distributed Lag (NARDL), Ordinary Least Squares (OLS), Autoregressive Distributed Lag (ARDL), Vector Autoregression (VAR),

Vector Error Correction Model (VECM) and Autoregression integrated Moving Average (ARIMA) techniques to examine monetary policy – inflation rate nexus. Only a handful of empirical studies have adopted the threshold regression technique. The threshold regression technique separates a system into regimes and evaluates the differential effects of the threshold variable across regimes. This study employs threshold regression technique to fill the methodological gap in the literature

2.5 Theoretical Framework

The theoretical framework of this study is based on the Quantity Theory of money which holds that the relationship between national income evaluated at market price and the velocity of money circulation can said to be equal relationship. The equation shows a positive relationship between price level and money supply, and this can be represented using the quantity equation;

$$MV = PY \qquad (2.1)$$

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.

Making Price (P) the subject of the formular;

$$P = \frac{MV}{Y} \qquad (2.2)$$

The theory assumes a constant velocity (V) and constant output (Y). Real output were taken to be constant because the factors that affect output are exogenous to the model. However, Friedman in his modern theory of the quantity theory of money further

explores the variables that could affect the velocity of money to include human/nonhuman wealth, interest rate, and expected inflation thereby nullifying the constant velocity[35]. Also, the integration of factors that affect real output such as interest rate into the model counter the assumption of a constant output as posited by the Keynesian[36]. Meanwhile, scholars have argued that 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. Hence, the equation 2.2 can therefore be transformed into

$$INF = f(MS, INT, YG) \quad (2.3)$$

Where INF represent inflation which is the growth on prices, MS represent money supply and YG as output growth.

Scholars have also confirmed this relationship showing that in a given economy, based on this theory there will be a proportionate relationship between the money supply and the price level. This imply that a rise in money supply by a certain percentage is expected to increase price level by the same percentage[37]. This ordinarily means that expansion in money supply causes inflation[38].

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Chapter Three

Methodology

This chapter presents the sources and data required for the study. It shows the type and scope of the data utilized. The variable description provides conceptual clarification while the theoretical expectation provides a theoretical knowledge on the direction of the relationship between inflation rate and the explanatory variables in the model. The specified model shows both the direction of relationships and the effects of the explanatory variables on inflation rate.

3.1 Model Specification

To build the model for the study, the baseline model is gotten from equation 2.3 which shows a functional relationship between inflation, money supply, interest rate, and output growth. However, since there are other factors affecting price level such as liquidity ratio, cash reserve, exchange rate. Thus incorporating these factors into equations 2.3 and expressing it statistically, the model becomes:

$$INF_t = \alpha_0 + \alpha_1 MSG_t + \alpha_2 YG_t + \alpha_3 INT_t + \alpha_4 EXR_t + \alpha_5 LR_t + \alpha_6 CRR_t + \mu_t \quad (3.1)$$

Where;

INF = Inflation

MSG = Growth in money supply

YG = Growth in output

INT = Interest rate

EXR = Exchange rate

α_0 = Intercept

α_1 - α_6 = Coefficient of independent variables

μ = Error term

t = time

3..1.1 Model of the threshold at which money supply affect inflation

To estimate the threshold at which money supply affect inflation for objective one, the study adapts the methodology in the work of Khan and Senhadji[1]. Thus the estimation model is of the form:

$$inf_t = \alpha_0 + \alpha_1 msg_t + \alpha_2\, d_t^{msg^*}\,[msg_t - msg^*_t] + \alpha_3 int_t + \alpha_4 exr_t + \alpha_5 lr_t + \alpha_6 crr_t + \mu_t \quad (3.2)$$

$$d_t^{msg^*} = \begin{cases} 1 : msgt > msg^* \\ 0 : msgt < msg^* \end{cases} \quad (3.3)$$

where msg^* is the threshold level of money supply $d_t^{msg^*}$ is a dummy variable defined as value one for money supply greater that the threshold level of inflation and zero otherwise. Continuity of the relationship given by equation (3.3) is necessary in order that small changes in the money supply around the threshold level will not yield different impacts on inflation depending on whether money supply is increasing or decreasing. The term $msg_t - msg^*_t$ in equation (3.2) makes the relationship between inflation described by the equation continuous at the threshold level msg^*. Parameter msg^* has the property that the effect of money supply on inflation is given by α_1 when money supply is less or equal to msg^* and (α_1+ α_2) when money supply is higher than msg^*. For estimation, the value of msg^* is given arbitrarily for the estimation, the optimal k is obtained by finding that value which minimizes the residual sum of squares

(RSS). Stacking the observations in equation (3.2) in vectors yields the compact notation:

$inf_t = X\,\alpha_{msg} + \mu \qquad msg = msg_{1\ldots\ldots} msg^h \qquad (3.4)$

where α_{msg}= (α_0, α_1, α_2, α_3, α_4, α_5, α_6) is the vector of parameters and X is the corresponding matrix of observations on the explanatory variables. The coefficient vector α is indexed by *msg* to show its' dependence on the threshold level of inflation, the range of which is given by msg_1 *and* msg^h. Given that S_1 *(msg)* is the residual sum of squares with the threshold level of money supply fixed at *msg*. The optimal threshold level msg^* is chosen so as to minimize S_1 *(msg)*.

3.1.2 Model of the Asymmetric Effects of Monetary policy on Inflation

To capture the asymmetric effect of money supply on inflation rate in Nigeria, the study adapts the asymmetric ARDL of Shin, Yu and Greenwood which was derived from the expansion of the linear ARDL[2]. Following the works of these scholars, the non-linear long run equation is specified as

$$inf_t = \propto_0 + \propto_1 msg_t^+ + \propto_2 msg_t^- + \propto_3 yg_t + \propto_4 int_t + \propto_5 exr_t + \propto_6 lr_t + \propto_7 crr_t + \mu_t \qquad (3.5)$$

Where $\mathrm{msg_t}$ is a k x 1 vector of regressors.

Given that $\mathrm{msg_t}$ is defined to be a random walk, such that:

$$\mathrm{msg_t} = \mathrm{msg_{t-1}} + \mu_t, \qquad \mu_t \sim N(0, \sigma_e^2) \qquad (3.6)$$

The above data generating process may be re-written as follows after recursive substitution;

$$msg_t = msg_0 + \sum_{j=1}^{t} \mu_j, \qquad t=1,\ldots, \tag{3.7}$$

Assuming zero threshold, the error term can be partitioned as;

$$\mu_t = \mu_t^+ + \mu_t^- \tag{3.8}$$

Taking partial sum yield;

$$\sum_{j=1}^{t} \mu_j = \sum_{j=1}^{t} \mu_j^+ - \sum_{j=1}^{t} \mu_j^- \tag{3.9}$$

From the foregoing, the following expression follows:

$$\mu_j^+ = \Delta msg_j^+ and \mu_j^- = \Delta\mu_j^- \tag{3.10}$$

μ_t^+ and μ_t^- are partial sums of the positive and negative changes in msg_t.

Thus, μ_t which is a kx1 vector of regressors is defined as;

$$msg_t = msg_t + msg_t^+ + msg_t^- \tag{3.11}$$

When equation 3.2 is linked to the symmetric ARDL of Shin, Yu, and Greenwood, the following non-linear variant of the unrestricted ECM is obtained;

$$\Delta inf_t = \alpha_0 + \rho inf_{t-1} + \alpha_1 msg_{t-1}^+ + \alpha_2 msg_{t-1}^- + \sum_{j=1}^{\rho-1} \theta_j \Delta inf_{t-1} +$$

$$\sum_{j=0}^{q-1} \pi_j^+ \Delta msg_{t-j}^+ + \sum_{j=0}^{q-1} \pi_j^- \Delta msg_{t-j}^- + \mu_t \tag{3.12}$$

Where $\alpha_1 = -\rho\beta^+$ and $\alpha_2 = -\rho\beta^-$ and θ_j is the autoregressive parameter; π_j^+ and π_j^- are the symmetric distributed lag parameters; μ_t is the stochastic error term that is independently and identically distributed with zero mean and constant variance.

Equation (3.12) may be re-written as;

$$\Delta inf_t = \alpha_0 + \rho inf_{t-1} + \alpha_1 msg_{t-1}^+ + \alpha_2 msg_{t-1}^- + \sum_{j=1}^{p-1} \theta_j \Delta inf_{t-1} +$$

$$\sum_{j=0}^{q-1} (\pi_j^+ \Delta msg_{t-j}^+ + \pi_j^- \Delta msg_{t-j}^-) + \mu_t \tag{3.13}$$

The restricted ECM may be written as;

$$\Delta inf_t = \aleph_1 ecm_{t-1} + \sum_{j=1}^{p-1} \theta_j \Delta inf_{t-1} + \sum_{j=0}^{q-1} (\pi_j^+ \Delta msg_{t-j}^+ + \pi_j^- \Delta msg_{t-j}^-) + \mu_t \quad (3.14)$$

3.2 A priori Expectations

The table below shows the expected relationships between inflation rate and the explanatory variables in the model.

Note: > 0 and < 0 imply positive and negative relationship.

Variable	Relationship
Interest Rate	< 0
Output Growth	> 0
Liquidity Ratio	> 0
Exchange Rate	< 0
Money Supply	> 0
Government Expenditure	> 0

3.3 Estimation Method

Further, to identify the threshold value in the first objective, equation (3.4) is estimated using OLS. The sum of squared errors (S_1) is then computed for all possible values of the threshold variable (money supply), where $S_1(msg)$. In the second step, the threshold parameter is obtained by minimizing S_1. In addition, there is need to test whether the threshold is statistically significant. The null hypothesis is that there is no threshold effect, that is,

H_0: $\alpha_1 = \alpha_2$ (3.15)

The null hypothesis implies that the slope coefficients are equivalent in the two regimes. Therefore, under the H_0, the threshold model, Equation (3.4) is equivalent to the linear

model, Equation (3.14). The likelihood ratio test of the null hypothesis is based on the F-statistic:

$F1 = (S_0 - S_1(\pi))/ \ \sigma^2$ (3.16)

Where S_0 and S_1 are the sum of squared errors under the null and alternative hypotheses, while σ^2 is the estimate of the regression error variance (σ^2). Given that the threshold value is not identified under the null hypothesis, the asymptotic distribution of F1 is not standard. As a solution, Hansen proposed a bootstrap method to simulate the probability value for the F-statistic (F1). For threshold effect to exist, it is expected that from Equation (3.5), $\alpha_1 > 0$ and $\alpha_2 < 0$ or otherwise, where $\alpha_1 < 0$ and $\alpha_2 > 0$.

For the second objective, the ARDL bound test will be conducted to test for cointegration of the variables. After establishing a long run relationship, the Non-linear Autoregresive Distributed Lag (NARDL) will then be estimated to establish a long run and short run non-linear asymmetric relationship.

3.5 Data Requirement and Sources

For this study, time series (annual) data on inflation rate, cash reserve ratio, interest rate, liquidity ratio, exchange rate and money supply were obtained from the CBN Statistical Bulletin and the World Bank World Development Indicators[3].

Endnotes

[1] S Khan Mohsin and Abdelhak S Senhadji. "Threshold Effects in the Relationship Between Inflation and Growth" (2001) 48(1) 1–21.

[2] Shin, Yongcheol, and Matthew Greenwood-nimmo. *"Modelling Asymmetric Cointegration and Dynamic Multipliers in a Nonlinear ARDL Framework"* (20040), 44(0), 1–44.

[3] https://www.cbn.gov.ng/rates/mnycredit.asp

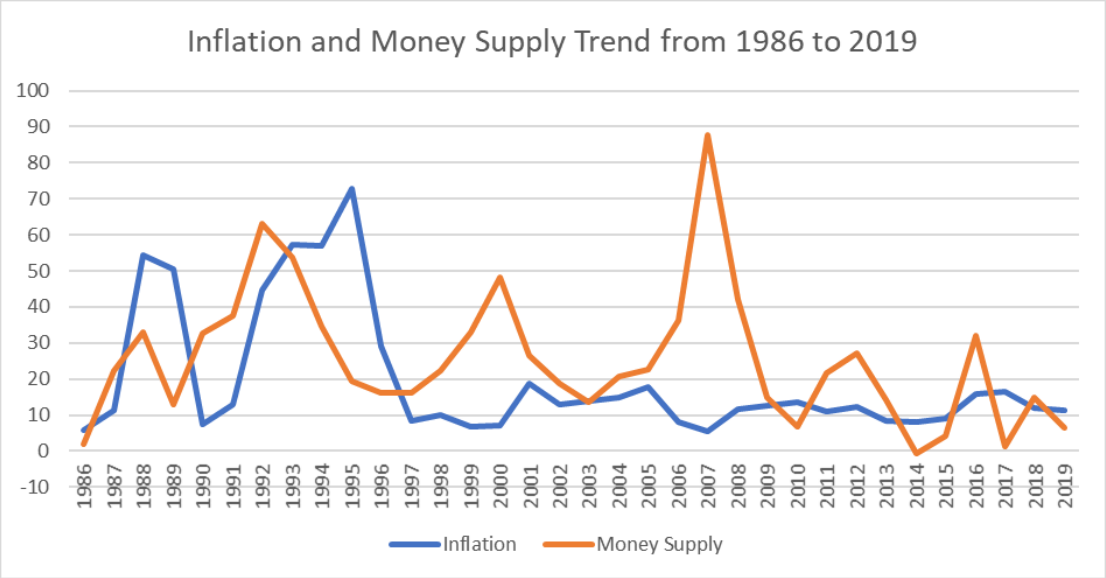
Chapter Four

Results and Discussion of Findings

This chapter presents data collected which were analyzed and interpreted in accordance with the objectives of the study. The empirical results of the study were discussed starting with the preliminary analysis. The study presents descriptive statistics, trend and correlation analysis while the pre-estimation tests presented were the unit root and co-integration tests. The results and findings were discussed with regard to the two objectives

4.1 Presentation of Data

Graphical Trend Analysis of Variables



Source: WDI

Figure 4.1 Inflation and Money Supply from 1986 to 2019

The figure above present a trend movement of inflation (INF) and money supply (MS) in Nigeria between 1986 and 2019. The above figure shows that the up till 1997 money supply shows a positive relationship with inflation, however, beginning from 1998, they

both move in opposite directions such that contractionary monetary policy such as reduction in money supply leads to an increase in inflation till date.

Expansionary fiscal policies during 2000 to 2003 gave rise to large liquidity injections in the real sector causing a sharp rise in money supply from 2003 to 2008 resulting in inflationary pressures and a fall in international reserves. Following this, the CBN tried to absorb excess liquidity by tightening monetary policy through open market operation from 2005 by selling Government T-bills and foreign exchange.. This account for the sharp fall in money supply in 2006. In addition, as a result of the contractionary monetary policy implemented by the CBN, there was a decline in inflation rate between 2006 and 2007 achieving a single digit inflation.Beyond this period, inflation rate continue to maintain a slow growth.

The sharp rise in money supply from 1986 is as a result of low interest rates on government debt instruments did not sufficiently attract private sector savers and since the CBN was required by law to absorb the unsubscribed portion of government debt instruments, large amounts of high-powered money were usually injected into the economy. In the oil boom era, the rapid monetization of foreign exchange earnings resulted in large increases in government expenditure which substantially contributed to monetary instability. In the early 1980s, oil receipts were not adequate to meet increasing levels of demands and since expenditures were not rationalised, government resorted to borrowing from the Central Bank to finance huge deficits. This had adverse implications for monetary management thereby causing inflation to rise in return and continue to rise till 1994 when budget announcement by the Head of State General Sani Abacha announced the abandonment of most 1986 structural adjustment program reforms and instituted tight government control over key economic variables. This caused the rapid fall in money supply and also inflation rate.

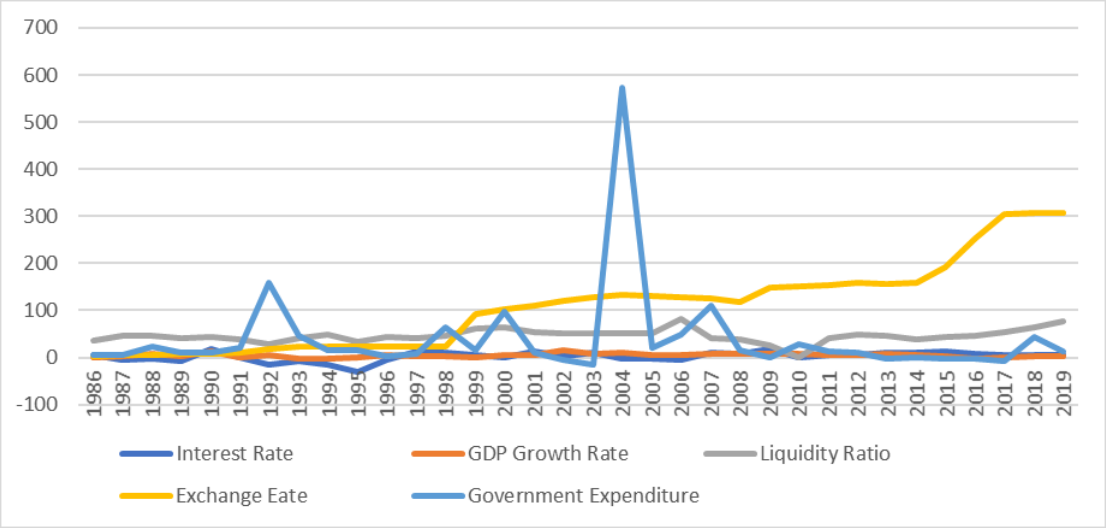


Figure 4.2 Interest Rate, Liquidity Ratio, Exchange Rate, GDP Growth Rate, and Government Expenditure.

Source: WDI and CBN Statistical Bulletin 2020

The graph above presents the trend review of GE (government expenditure), EXR (exchange rate), INT (Interest rate), LR (liquidity ratio), and YG (GDP Growth rate) in Nigeria from 1986-2019. The figure shows that the exchange rate has been increasing consistently since1998, this is because Nigeria is export dependent. The interest rate and GDP growth rate are both negative between 1992 and 1993 after which the GDP growth rate have maintained a growth rate below 10 with a spike in 2002 where 15% was recorded, while interest rate continue to fluctuate between negative and positive. The sharp rise in government expenditure in 2003 can be explained by the expansionary fiscal policies during 2000 to 2003 gave rise to large liquidity injections in the real sector. The liquidity ratio maintained a steady pace up till 2005 and then fall till 2010 thereafter begin to rise till date.

4.1.1 Presentation of Descriptive Statistics

	GE	INF	EXR	INT	LR	MS	YG
Mean	39.39	19.69	107.88	2.46	46.79	25.23	4.38
Median	12.09	12.39	119.57	5.10	45.47	22.00	4.43
Maximum	572.50	72.83	306.92	18.18	81.42	87.76	15.32
Minimum	-16.31	5.38	1.76	-31.45	26.39	-0.79	-2.03
Std. Dev.	100.93	18.06	91.68	10.24	12.17	18.59	3.87
Skewness	4.57	1.66	0.67	-1.16	0.91	1.29	0.49
Kurtosis	24.38	4.38	2.75	4.91	4.10	5.23	3.38
Jarque-Bera	765.68	18.28	2.65	12.75	6.42	16.52	1.58
Probability	0.00	0.000	0.26	0.00	0.04	0.00	0.45
Sum	1339.53	669.73	3667.91	83.78	1590.85	857.95	148.90
Sum Sq. Dev.	336191.7	10763.7	277363	3457.70	4892.23	11412.54	496.55
Observations	34	34	34	34	34	34	34

Table 4.1 Descriptive Statistics

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

The table above presented a descriptive statistic of the variables of this study. It showed that the mean value of inflation (inf) is 19.698% with its highest and lowest value at72.83% in 1995 and 5.38% in 2007 respectively. The mean of money supply (ms) is 25.23%, where its highest and lowest value is 87.76 in 2007 and -0.79 IN 2014 respectively. The growth rate of real GDP (yg) grows at an average of 4.380%, which imply that actual economic activities carried out in Nigeria within 1986 to 2019 grew at an average rate of 4.380%. In addition, the average value of exchange rate, government expenditure, and liquidity ratio are N107.88, 39.398%, and 46.78% respectively within 1986 and 2019.

Furthermore, the standard deviation reports the rate at which the variables deviated from their individual mean values. The variable with the highest deviation rate from its

mean value is government expenditure (GE) with 100.934 while the lowest deviation is GDP growth rate with standard deviation at (3.879). Also, skewness which measures asymmetry of the distribution of the series around its mean. The skewness of a normal distribution is zero. Positive skewness implies that the distribution has a long right tail and negative skewness implies that the distribution has a long-left tail. The variables presented in the table above are all positively skewed with the exception of interest rate (INT) which shows a long left tail distribution which a negative skewness of -1.155.

4.2 Pre-Estimation Tests

The pre-estimation test of the variables in this study are presented before the findings of the stated objectives. The pre-estimation tests carried out are test for stationarity and cointegration (long-run relationship). This are done in order to know the appropriate estimation approach to use for the empirical analysis.

4.2.1 Unit Root Test

The pre-estimation approach used to estimate the stationary level of the variables is the Augmented Dickey Fuller (ADF). It was employed to test the stationary level of the monetary policy inflation to suggest the appropriate technique to estimate the parameter coefficients. Intercept and trend model were used to statistically find the significance of the variables at 1%, 5% and 10% critical point at levels and first difference. Furthermore, it should be noted that the lag length for ascertaining this stationarity level of our variables as well as unit-root test is automatic and optimally chosen by the Schwarz-Bayesian Information Criterion (SIC). The results of the unit root tests for the variables are summarized in the table below.

Table 4.2 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	
Exchange Rate (EXR)	0.98	-3.65	-4.028*	-3.65	I(1)
Government Expenditure (GE)	-6.03*	-3.65	-	-	I(0)
Inflation Rate (INF)	-4.35*	-3.71	-	-	I(0)
Interest Rate (INT)	-3.49**	-2.95	-	-	I(0)
Liquidity Ratio (LR)	-2.75	-3.65	-6.84*	-3.65	I(1)
Money Supply (MS)	-3.48**	-2.95	-	-	I(0)
GDP Growth (YG)	-3.88*	-3.65	-	-	I(0)

Note that; * 1%, ** 5%, * 10% level of significance**

Source: Author's Computation (2022)

The unit root test result presented in the table above shows that exchange rate (EXR) and liquidity ratio (LR) were found to reject the null hypothesis, that is, not stationary at 5% significant level. These variables were further tested at first difference where they were found to be significant at 1% significance level. This imply that the time series of the variable were stationary and integrated of the first order, hence a long-run equilibrium convergence. Government expenditure (GE), inflation rate (INF), and GDP growth rate (YG) were all found to be stationary at level, at 1% significant level. Also, Interest rate (INT) and money supply (MS) were found to be significant at level, at 5% level of significance. The results suggest that at levels, the time series of the variables were stationary and integrated of order zero, which imply that the variable converges to its long-run equilibrium or true mean at levels.

4.3. Data Analysis and Interpretation

This section presents the results obtained for the threshold at which money supply affect inflation rate in Nigeria and the asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria between 1986 and 2019.

4.3.1 Empirical Findings of the Thresholds at which Money Supply Affect Inflation Rate in Nigeria.

Money supply as a monetary policy tool used by the central bank to curb inflation and stimulate economic growth is increased when the monetary policy is expansionary and reduced when the policy is contractionary. However, money supply leads to inflation when it exceeds certain limit. The task of finding the precise value of money supply threshold and its effect on inflation involve estimating equation 3.3 and computing the residual sum of squares (RSS) for threshold level of money supply ranging from msg_1 to msg^h. The optimal threshold level is the one that minimises the sequence of RSS (that is, the msg* with the lowest RSS). The search for the optimal threshold effect is conducted for money supply $msg_1 = 20$ and $msg^h = 85$ where all observations lie within the bounds of money supply level. This exercise yielded 6 linear regressions of equation 3.3. These results are presented in the table below

Table 4.3 Threshold Model Estimation Result

msg*	Variable	Coefficient	Std. Error	t-Statistics	Probability	RSS
20	INT	-1.3037	0.2391	-5.4510	0	3319.152
	LR	-0.3006	0.1919	-1.5660	0.1294	
	MS	0.0507	0.1541	0.3294	0.7444	
	YG	-0.3707	0.5755	-0.6432	0.5258	
	GE	-0.0181	0.0220	-0.8535	0.4012	
	EXR	-0.0112	0.0284	-0.3940	0.6967	
	D20	-1.9163	6.0936	-0.3144	0.7557	
	C	40.338	8.7510	4.6095	0.0001	
40	INT	-1.3255	0.2337	-5.6719	0	3316.533
	LR	-0.3390	0.1898	-1.7865	0.0857	
	MS	0.0670	0.1814	0.3694	0.7148	
	YG	-0.3440	0.5672	-0.6073	0.5489	
	GE	-0.0204	0.0212	-0.9662	0.3428	
	EXR	-0.0059	0.0280	-0.2115	0.8341	
	D40	-3.1066	8.9866	-0.3456	0.7324	
	C	40.5524	8.6884	4.6674	0.0001	
60	INT	-1.3438	0.2318	-5.7966	0	3234.424
	LR	-0.3979	0.1998	-1.9914	0.057	
	MS	0.1251	0.1655	0.7561	0.4564	
	YG	-0.2831	0.5635	-0.5023	0.6196	
	GE	-0.0190	0.0210	-0.9050	0.3738	
	EXR	0.0004	0.0285	0.0151	0.988	
	D60	-11.2702	12.7402	-0.8846	0.3845	
	C	41.0774	8.5845	4.7850	0.0001	
70	INT	-1.2886	0.2354	-5.4733	-5.4733	3265.221
	LR	-0.3489	0.1845	-1.8906	-1.8905	
	MS	0.0916	0.1519	0.6032	0.6032	
	YG	-0.3234	0.5630	-0.5743	-0.5746	
	GE	-0.0206	0.0210	-0.9791	-0.9796	
	EXR	-0.0030	0.0278	-0.1083	-0.1083	
	D70	-11.3015	15.5248	-0.7279	-0.7279	
	C	39.7732	8.7025	4.5702	4.5702	
80	INT	-1.2886	0.2354	-5.4733	0	3265.221
	LR	-0.3489	0.1845	-1.8905	0.0699	
	MS	0.0916	0.1519	0.6032	0.5516	
	YG	-0.3234	0.5630	-0.5743	0.5705	
	GE	-0.0206	0.0210	-0.9791	0.3365	
	EXR	-0.0030	0.0278	-0.1083	0.9145	
	D80	-11.3018	15.5248	-0.7279	0.4731	
	C	39.7732	8.7025	4.5702	0.0001	
85	INT	-1.2883	0.2354	-5.4737	0	3265.221
	LR	-0.3489	0.1845	-1.8905	0.0699	
	MS	0.0916	0.1519	0.6032	0.5516	
	YG	-0.3234	0.5630	-0.5743	0.5705	
	GE	-0.0206	0.02103	-0.9791	0.3365	
	EXR	-0.0030	0.0278	-0.1083	0.9145	
	D85	-11.3015	15.5248	-0.7279	0.4731	
	C	39.7732	8.7025	4.5702	0.0001	

Source: Author's computation using E-views 10 (2022)

The table 4.3 presents the results of the estimation of non-linear model to search for a precise value for the threshold of money supply that affect inflation. The optimal threshold level is one that minimizes the sequence of RSS, from the table, 60 percent is

selected as the money supply threshold level for inflation in Nigeria. The results in the table 4.3 indicate a positive but insignificant effect of money supply on inflation at all levels of msg*. However, the smaller the residual sum of squares, the better the model fits the data. With 60% having the lowest RSS of 3234.424, if money supply is increased beyond this level, it will lead to inflation.

It was observed that the monetary policy implemented by the central bank of Nigeria as discussed in this study to curbing inflation shows that the central bank of Nigeria has a lot to do to combine both monetary policy and fiscal policy in combating inflation in Nigeria.

4.3.2 Empirical Findings of the Asymmetric (non-linear) Relationship Between Money Supply and Inflation Rate in Nigeria

Before investigating the asymmetric non-linear relationship between money supply and inflation rate in Nigeria, there is need to test for the unit root in the data series. The augmented Dickey–Fuller (ADF) unit root tests was used. Table 4.2 above summarizes the results for the unit root tests. It was shown that all the selected variables are I(0) and I(1). A maximum of two lags was imposed on the variables. This choice is based on Akaike's Information Criterion (AIC) to select the optimum number of lags as shown in the table below.

Table 4.4 VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-955.76	NA	3.20	60.17	60.49*	60.28
1	-872.95	124.23	4.17	58.06	60.62	58.91
2	-802.84	74.49*	1.80*	56.74*	61.55	58.33*

* Indicates lag order selected by the criterion

Source: Author's computation (2022)

In view of this, the bound test for non-linear cointegration which was proposed by Pesaran, Shin, and Smith in 2001[1] was conducted to determine long run relationship among the variables. The table 4.5 presents the result of the bound test for non-linear cointegration test.

Table 4.5. Bound Test For Non-Linear Cointegration

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	7.43	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
Actual Sample Size	33		Finite Sample: n=35	
		10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326
			Finite Sample: n=30	
		10%	2.334	3.515
		5%	2.794	4.148
		1%	3.976	5.691

Source: Author's Computation using E-Views 10 (2022)

The table 4.5 revealed evidence of long run cointegration since the F-statistics is 7.4343 which is greater than the upper and lower critical bound. This indicate that the variables move together in the long run. Also, since there is no variable integrated at the order 2, therefore, long and short-term with the Non-linear Autoregressive Distributed Lag (NARDL) Model can be estimated.

4.3.3 Short Run Result

The short run Non-Linear Autoregressive Distributed Lag (NARDL) model is presented in Table 4.6. The model result in the table presents inflation (inf) as the dependent variable with money supply (ms), output growth (yg), and exchange rate (exr) as the dependent variables.

Table 4.6 Short Run Model Results

Variable	Coefficient	t-Statistic
D(INF(-1))	0.2727***	5.4685
D(MS_POS)	-0.2521***	-3.7994
D(MS_POS(-1))	-0.3076***	-3.2497
D(MS_NEG)	0.1128	1.2776
D(YG)	-1.6651***	-8.5773
D(EXR)	-0.0076	-0.1810
D(EXR(-1))	-0.1284***	-3.0399
CointEq(-1)*	-0.9267***	-17.0679

R-squared	0.94	Adjusted R-Squared	0.9171
S.E of regression	1.08	Sum squared resid	382.35
F-statistic	25.33		
Durbin-Watson stat	2.15		

***** represents 1%, ** represents 5% and * represents 10%**

Source: Author's computation using E-Views 10 (2022)

In the model result presented in the table 4.6 above, it can be observed that inflation in the last month have a positive and significant relationship with the current inflation rates such that, a percentage increase in this period gave rise to 0.27% increase in the current level of inflation rate. It can also be seen from the table that short run asymmetry of positive changes in money supply is significant for the last month and in the current month at 1% significant level respectively. It is revealed that a 1% increase in the positive change in money supply makes inflation rate reduce by 0.25% and 0.31% one month ago and in the current month respectively. Whereas, the case is different for a negative change in money supply depicting a positive and insignificant relationship

with inflation, where a percentage increase in negative changes in money supply increases inflation rate by 0.11% in the current month.

Output growth for the current month shows a negative and significant effect on inflation such that, a percentage increase in output growth in the current month made inflation fall by 1.67% at 1% level of significance. As for exchange rate, it revealed a negative and significant effect on inflation only in the month before the current month where a percentage increase in exchange rate one month ago creates a reduction in inflation rate by 0.19% in the current month at 1% level of significance.

4.3.4 Long Run Result

The long run Non-Linear Autoregressive Distributed Lag (NARDL) model is presented in Table 4.7. The model result in the table presents inflation (inf) as the dependent variable with money supply (ms), output growth (yg), exchange rate (exr), liquidity ratio (lr), interest rate (int), and government expenditure (ge) as the dependent variables.

Table 4.7 Long Run Model Result

Variable	Coefficient	t-Statistic
MS_POS	0.1471**	0.8740
MS_NEG	0.4058**	2.2234
YG	-2.2098***	-4.7614
LR	-0.6165***	-3.5384
INT	-0.6462***	-4.0716
GE	-0.0435**	-2.1926
EXR	0.2241***	3.1567
C	72.7978***	6.9018

***** represents 1%, ** represents 5% and * represents 10%**

Source: Author's computation using E-Views 10 (2022)

In the long run as shown in the table 4.7, the model revealed a positive relationship between positive and negative change in money supply and inflation rate with the negative change having a higher effect. Where the positive and negative asymmetry are significant at 1% and 5% level of significance respectively. This imply that a 1% increase in negative change in money supply creates 0.41% increase in inflation at 5% level of significance. Therefore, an increment of 1% in the positive changes in money supply creates a 0.15% increase in inflation, although this is not significant at 1% and 5% level of significance.

All other independent variable (yg, lr, int, ge) have a negative and significant effect on inflation in the long run with an exception of the exchange rate (exr) which had a positive and significant effect on inflation. The implication of this is that a percentage increase in output growth (yg), liquidity ratio (lr), interest rate (int), and government expenditure (ge) makes inflation fall by 2.21%, 0.62%, 0.65%, and 0.04% respectively. Also inflation rate increases by 0.22% as a result of a percentage increase in exchange rate. This might be as a result of the heavy dependence of the economy on imported goods.

4.3.5 Post Estimation Tests

The post-estimation tests are presented in table 4.8 for the estimated models. In assessing the suitability of the model described above, four post estimation tests are carried out namely, Normality test; Serial Correlation test; Heteroskedasticity test and stability test were carried out.

Table 4.8 Diagnostic Test Result

Tests	Obs*R-squared/Jarque-Bera	P-value
Normality	0.0938	0.9542
Serial Correlation	0.3016	0.9338
Heteroskedasticity	17.1571	0.2501

Source: Author's computations

In **Table 4.8**, the first three tests have been summarized. The table revealed that the residuals are normally distributed as shown in the Jarque-Bera statistics and its accompanied probability which failed to reject the null hypothesis that errors are normally distributed. The serial correlation test was conducted on the null hypothesis of "No serial correlation". From the test result, the null hypothesis was failed to be accepted, hence rejected and the conclusion of no serial correlation in the residual is upheld. For the test for heteroskedasticity, the null hypothesis that was tested was "there is homoscedasticity" thus, the result shows that this null hypothesis failed to be accepted to accept the alternative hypothesis to conclude that the residual is homoskedastic.

Figure 4.3 and **Figure 4.4** shows the Cumulative Sum of recursive residuals (CUSUM) and Cumulative Sum of recursive residual square (CUSUMSQ) graphs which depict the stability of the model built in analyzing the asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria.

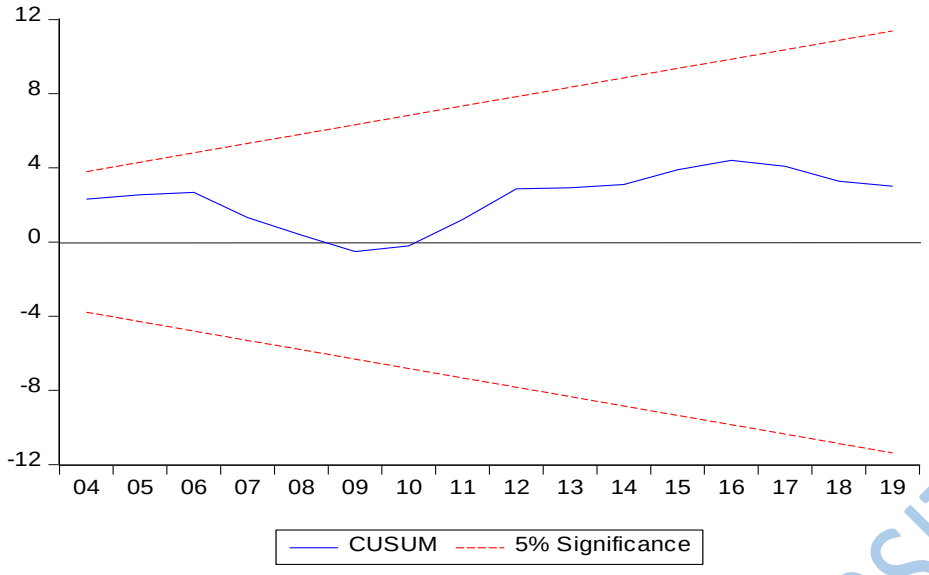


Figure 4.3. Cumulative Sum of Recursive Residuals at 5% Level of Significance

Source: Author's computation using E-Views 10 (2022)

The CUSUM test takes the cumulative sum of recursive residuals and plots its value against the upper [K, ±3a(T-k)1/2] and lower [K, ±a(T-k)1/2] bounds of the 95% confidence interval at each point. 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.

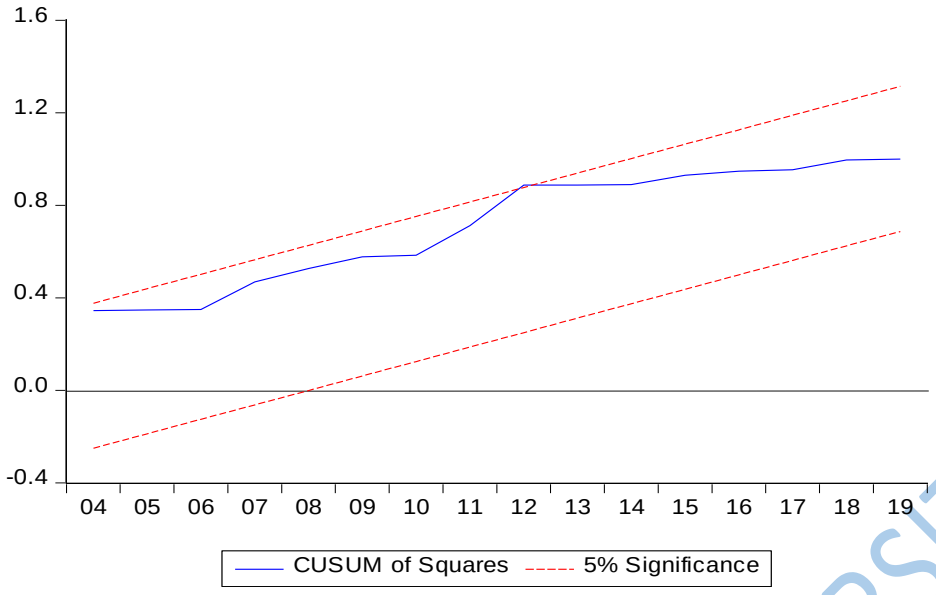


Figure 4.4 Cumulative Sum of Squares at 5% Level of Significance

Source: Author's computation using E-Views 10 (2022)

Figure 4.3 and 4.4 illustrates CUSUM and CUSUMSQ tests. As cumulative sum of recursive residuals and cumulative sum of square of recursive residuals both are within the critical bounds at 5% significance level, therefore, these statistics confirms that our model is stable and trustworthy to estimate short-run and long-run coefficient of money supply on inflation in Nigeria.

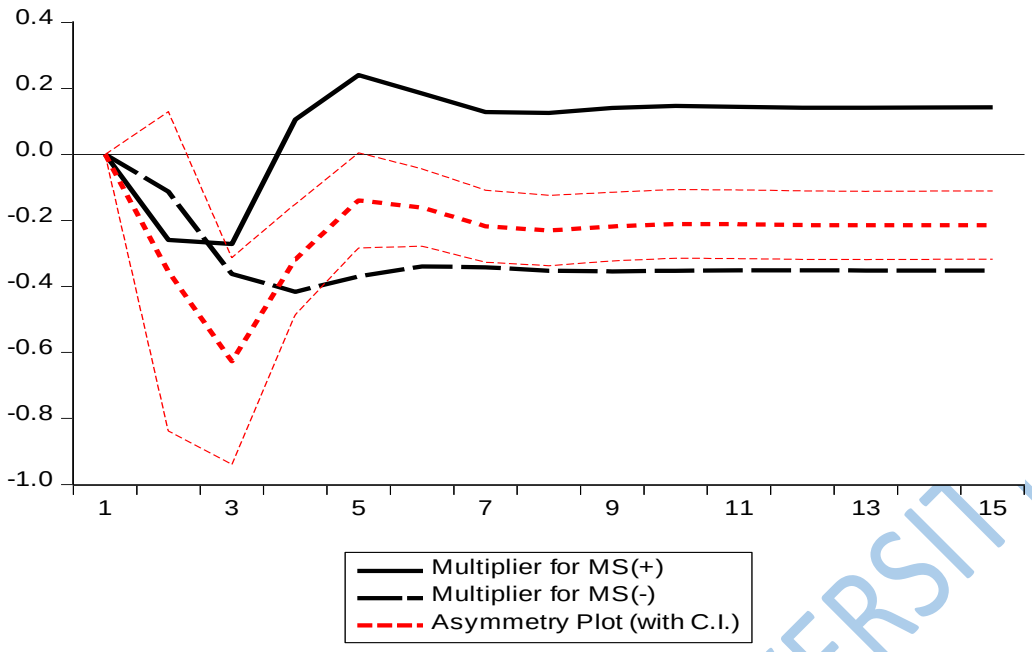


Figure 4.5 Asymmetric Cumulative Dynamic Multiplier

Source: Author's computation (2022)

Figure Asymmetric cumulative dynamic multiplier impact of money supply on inflation in Nigeria. The black line shows the positive impact of the money supply on inflation while the black dotted line shows the negative impact. The red tick line shows the asymmetry in short term and finally, the dotted Red lines show the upper and the lower bounds of the asymmetry.

The Wald test shows the results of long-run asymmetry (reaction asymmetry) and short-run asymmetry (impact asymmetry). The null hypothesis of symmetry in the long run against the alternative of asymmetry is tested using the Wald statistic.

Table 4.9 Wald Test

Wald Test:

Equation: NARDL

Test Statistic	Value	Df	Probability
F-statistic	9.5362	(4, 16)	0.0004
Chi-square	38.1448	4	0.0000

Source: Author's computation (2022)

Table 4.9 reports the results of the long run and short run symmetry tests for the effect of money supply on inflation rate index. The Wald test statistic for the long run symmetry, which tests the null hypothesis of $\theta^{+} = \theta^{-}$ for money supply and the Wald test statistic for the short run asymmetry, which tests the null hypothesis that $\pi^{+} = \pi^{-}$ for money supply. The probability values (0.0004 and 0.0000) indicate rejection of the null hypothesis of symmetry at 1% level of significance. The results of the Wald test show the rejection of the null hypothesis of significant short run and long run symmetry for the positive and negative changes in all independent variables. Consequently, the findings of the model confirm the presence of significantly asymmetric responses of inflation rate index to both positive and negative changes in all explanatory variables, which may be also verified by the plots of the cumulative dynamic multipliers in figure 4.5.

4.4 Discussion of Findings

Several studies have investigated and tested the effect of monetary policy on inflation rate in Nigeria. These studies however, have failed to investigate the threshold at which money supply as a tool of monetary policy affect inflation rate in Nigeria. The steady

growth in inflation rate in Nigeria notwithstanding the efforts of the monetary policy authority to curb its growth, this also warrants the re-examination of the asymmetric non-linear relationship between monetary policy and inflation in Nigeria.

The first objective was to evaluate the threshold at which money supply affect inflation rate in Nigeria. The estimation of non-linear model to search for a precise value for the threshold of money supply that affect inflation revealed that the optimal threshold level is 60 percent for Nigeria. The results also indicate a positive but insignificant effect of money supply on inflation at all levels of msg*. This imply that below this money supply threshold, inflation is less harmful to the economy whereas, above this threshold, the growth of inflation begins to exhibit its negative impact on the growth of the economy. The finding of this study is similar to that of a study on examining the threshold effect of inflation on economic growth in Ghana between 1965 and 2013, the study found that inflation-growth nexus is mediated by the level of broad money supply and while inflation negatively affects overall growth, the result of the study suggests that, inflation significantly inhibits economic growth when the broad money supply exceeds a threshold of 21.57% of GDP at 95% confidence interval, below this threshold, the impact of inflation is benign[2]. Thus, at persistently rising money supply, government expenditure may be ineffective in promoting long run economic growth. Net export-growth nexus is also insignificant when money supply exceeds the threshold although it has a negative coefficient.

The threshold effect of inflation on economic growth in Nigeria between 1981 and 2009 have also been investigated by some some scholars using the threshold regression model. The study estimated a threshold inflation level of 13 per cent for Nigeria. This implies that below the threshold level, inflation has a mild effect on economic activities, while above it, the magnitude of the negative effect of inflation on growth was high.

The negative and significant relationship between inflation and economic growth for inflation rates both below and above the threshold level is robust with respect to changes in econometric methodology, additional explanatory variables and changes in data frequency[3]. Similar to the findings of this study and which is in agreement with its findings is the result which shows that the ratio of broad money (M2) to nominal GDP is statistically insignificant.

This result also point to the weakness of monetary policy tools in controlling inflation in Nigeria as it was evidenced in a similar study which examined the efficacy of monetary policy in curbing inflation in Nigeria. Time series data between 1986 and 2015 were used and the Vector Error Correction Model (VECM) was employed to give empirical content. The study found out that monetary policy is significant in curbing inflation threshold in Nigeria, however the effect of monetary policy variables are weak in controlling inflation. This is as a result of the large proportion of informal sector which culminates into a high currency outside bank economy that is largely not affected by monetary policy tools[4].

Another study in its re-examination of the issue of the existence and the level of inflation threshold in the relationship between inflation and growth in Nigeria used three different approaches that provide appropriate procedures for estimating the threshold level and inference. One of the approaches provided a threshold point estimate of 9.9 per cent that was not well identified by the data, however, using the same technique, another study identifies a 10.5 per cent inflation threshold as statistically significant to explain the inflation-growth nexus in Nigeria. Also, the approach of other scholars suggests a two threshold point model with 11.2 and 12.0 per cent as the appropriate inflation threshold points. These results suggest that the threshold level of inflation above which inflation is inimical to growth is estimated at

10.5 to 12 per cent for Nigeria[5,6,7]. These studies concluded that there is a threshold level of inflation above which money is not super-neutral which have been discovered in this study.

The second objective of this study is to evaluate the asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria. The result revealed that in the short run, asymmetry of positive changes in money supply have a negative and significant (at 1% level of significance) impact on inflation rate while the asymmetry of negative changes in money supply have a positive but insignificant effect on inflation rate in Nigeria. It can also be observed from the result that the positive effect is higher than that of the negative effect. In the long run however, the asymmetry of both the positive and negative changes in money supply have positive and significant (at 5% level of significance) impact on inflation rate in Nigeria. Also in the long run, the asymmetry of the negative change is higher that the positive change. The Wald test also confirms the presence of significant asymmetric responses of inflation rate to both positive and negative changes in all explanatory variables, which was also verified by the plots of the cumulative dynamic multipliers.

The findings of this study opposed the discovery of a related study that examined the asymmetric effect of positive and negative monetary policy shocks on output and prices in Nigeria using interest rate shocks with a view to ascertaining the impact of monetary policy on sustainable output growth and price stability in Nigeria from 1986 to 2016. Data collected were analyzed using Non-linear Autoregressive Distributive Lag (NARDL) econometric techniques. The result showed that in the short run, negative changes in monetary policy have more significant effects while in the long run, positive changes in monetary policy have more significant effects than the negative changes on price level. The same study however, corroborated the findings of this study that the

monetary policy do not have significant effect on price level in the short run, whereas in the long run the changes in monetary policy have significant effects[8].

Similarly, other studies have found out that money supply has a significant effect on inflation rate in Nigeria which implies that money supply serves as one of the major tool of controlling inflation rate. Also, the result of one of such study showed that where money supply was significant in controlling inflation, exchange rate had an insignificant effect on inflation rate while interest rate proved to be significant in explaining variation in inflation rate in Nigeria. It was therefore concluded that monetary policy has been partially effective in controlling inflation rate in Nigeria. This is also similar to the findings the work of a scholar that examined the extent to which policy target of macroeconomic variables lead to changes in inflation in developing countries, Nigeria in particular. The result of the study showed that money supply and past level of inflation have the potentials of causing significant changes in inflation in Nigeria[9],[10].

The findings of this study is also supported by a study that investigated the relationship between money growth and inflation using a Nonlinear Auto-Regressive Distributed Lag model (NARDL) for three countries (the U.S., U.K. and Japan) over an estimation period spanning 1950Q1 to 2014Q4. The results of the study revealed that inflation responds asymmetrically to monetary shocks in the longrun for all three countries and that there exist a relationship between money growth and inflation in the post-crisis period only in the case of the U.K[11].

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Chapter Five

Conclusion

This chapter highlighted the summary of the study, the empirical findings as well as the conclusion and recommendations, the contribution to the body of knowledge and suggested areas of further study.

5.1 Summary of Findings

The overall goal of this study is to test the effectiveness of monetary policy on inflation control in Nigeria. Specifically, the objectives of this study is to evaluate the thresholds at which money supply affect inflation rate in Nigeria and to investigate the asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria.

The effectiveness of monetary policy is a long standing issue in developing countries like Nigeria, this is mostly due to the underdeveloped nature of their financial sector. With the monetary policy been given the central role of managing the economy, the Central Bank of Nigeria have been given the mandate and responsibility to formulate and implement the monetary policy in the country and among its objective is to achieve and maintain price stability and ensure a sound and efficient financial system in the country. Notwithstanding the efforts of the Central Bank to control inflation and maintain price stability through its monetary policies, inflation continue to become a serious and persistence problem in Nigeria. During the period under review, there has been an proliferate in the inflationary rates leading to major economic distortions, it is therefore, important to examine if monetary policy tools are effective in management of inflation in the country.

While many empirical studies have focused on how monetary policy influence the level of economic activities and inflation rate in Nigeria with much attention given to

linearity, only a few studies have directed efforts towards assessing the differential effects (as captured by different thresholds) of monetary policy on inflation rate in Nigeria.

The second chapter of this study detailed several of this literature that have been reviewed as well as the conceptual and theoretical review which broadens the knowledge of the researcher. The conceptual review discussed the concepts of inflation, its advantages and disadvantages, as well as the types of inflation. The policies that have been implemented in the process of controlling inflation was also reviewed. The meaning and functions of money, monetary policies and its instruments, and the different institutional developments. The theoretical identified and reviewed various theories explaining the growth in price level (inflation) in the literature. The theories are purchasing power parity theory, the monetary theory, the structuralist theory, and the structuralist-monetary theory.

Chapter three showed the methodology employed for this study. It depict the models that were used in estimation as well as the techniques of estimation. It goes further by showing the functional relationship associated with models and the a priori expectation as well as the method of data collection and sources.

The fourth chapter consisted of five parts which include the descriptive part which identified the mean, standard deviation, minimum and maximum values, kurtosis and skewness. The result of the summary of statistics was shown in table 4.1. The second part is the pre-test where the data were tested for unit root using the augmented dickey fuller test (ADF) test. The result of the ADF test is summarized in table 4.2. The next part is the analysis of the data in line with the objectives of the study. Regression analysis was employed to evaluate the threshold at which money supply affect inflation

rate in Nigeria while the Nonlinear Auto-Regressive Distributed Lag model (NARDL) was employed to examine the asymmetric (non-linear) relationship between money supply and inflation rate in Nigeria. The fourth part is the post estimation test which include the normality test, serial correlation test, and heteroskedasticity test. The last part presents the discussion of findings.

Chapter five presents the summary of the study as well as the findings and their implications, conclusions that were drawn and recommendations were suggested. Finally, the chapter highlighted the study's contribution to knowledge and suggestion for further studies.

The findings of this study discussed in the previous chapter is summarized as follows:

The empirical analysis of this study employed data from the World Development Indicators (WDI) and the Central Bank of Nigeria (CBN) statistical bulletin for 2021 based on yearly time series data for inflation and money supply. These variables were transformed and presented into percentages. Other macroeconomic variables as control variables; liquidity ratio, exchange rate, interest rate, government expenditure, and GDP growth were also obtained from the same sources for the period under examination falling between 1986 and 2019.

The variables under investigation in this study revealed a mix of stationarity at level and first difference. Specifically, INF, GE, INT, MS, and YG are stationary at level (that is I(0)) while, EXR and LR are stationary at first difference (that is I(1)). The respective orders of integration are at 1% and 5% level of significance. To achieve the objectives of the study based on the combination of the statistical properties of included variables as mentioned above, the Khan and Senhadji threshold regression model was drawn and with the Ordinary Least Squares technique the threshold level of money

supply that affect inflation rate was defined (objective one). The asymmetric ARDL of Shin, Yu and Greenwood was employed with the NARDL estimation technique to establish the asymmetric non-linear relationship between money supply and inflation rate in Nigeria (objective two).

From the result it has been discovered that the threshold level at which money supply affect inflation rate in Nigeria is 60%. When money supply grows beyond 60% money supply have positive and significant effect on inflation, whereas, below this level, the effect of money supply is less significant though positive, on inflation rate in Nigeria.

It was also observed that the variables depict a long run relationship, therefore, the estimation of the asymmetric non-linear relationship between money supply and inflation in Nigeria using the NARDL shows that there exist an asymmetric non-linear relationship in the short run and long run between money supply and inflation rate.

The short run asymmetry of positive changes in money supply revealed a negative (-0.25%) and significant (at 1% level of significance) impact on inflation rate while the asymmetry of negative changes in money supply have a positive (0.11%) but insignificant effect on inflation rate in Nigeria. It can also be observed from the result that the positive effect is higher than that of the negative effect.

In the long run however, the asymmetry of both the positive and negative changes in money supply have positive and significant (0.15% and 0.41% respectively, at 5% level of significance) impact on inflation rate in Nigeria. Also in the long run, the asymmetry of the negative change is higher that the positive change.

5.2 Conclusion

This study investigated the effectiveness of monetary policy (using monetary policy tools-money supply, interest rate, exchange rate, and liquidity ratio) on inflation control

in Nigeria between the period of 1986 and 2019. Two objectives were examined using the threshold regression model and the Non-linear Autoregressive Distributed Lag (NARDL). The study concluded that the threshold at which money supply as a tool of monetary policy affect inflation rate in Nigeria is 60%. The result of the study showed that in the short run, there is a positive and negative relationship between money supply and inflation rate for a positive and negative change in money supply respectively. Whereas, in the long run, there is a positive relationship between money supply and inflation rate for both positive and negative change in money supply. Thus the study concluded that there exist an asymmetric non-linear relationship between money supply and inflation rate in Nigeria which confirmed that money supply only have significant control in the long run.

5.3 Recommendations

From the analysis in this study, the recommendations for the monetary policy authority in Nigerian for stability and development are to;

a. Implement the policy of changing the currency every five to eight years to mop up excess liquidity in the economy targeted at controlling the level of money supply reasonably below the threshold level (60%). This is because higher money supply potentially raises inflation rate which distorts the efficient allocation of resources and limit economic growth.

b. Regulate the inflow of cash to depositors by the commercial banks that will ensure the stability of the macroeconomic environment for stabilizing economic activities in the economy.

5.4 Contribution to Knowledge

The study focused on testing the effectiveness of monetary policy on inflation control and determining the threshold at which money supply affect inflation rate in Nigeria. Therefore, this study proceed to provide insight as to the extent to which money supply as an instrument of monetary policy should be allowed to grow before it begins to have significant effect on inflation rate, that is, the threshold level at which money supply affect inflation rate in Nigeria which was discovered to be 60%.

This study further contribute to the body of existing knowledge by affirming the asymmetric non-linear relationship effect of money supply on inflation rate and provided empirical evidence that that money supply is more effective in controlling inflation in the long run.

5.5 Area of Further Research

This study had only evaluated the threshold of a monetary policy tool (money supply), it therefore suggest that further studies should be carried out to determine the threshold of other monetary policy tools such as interest rate, exchange rate, monetary policy rate and liquidity ratio and determine the extent to which each of this tools can be increased or decreased in the process of controlling inflation without having significant effect on growth level of the economy.

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Appendix I

Inflation Rate in Nigeria, 1988 − 2018

Year	Inflation Rate (%)	Annual Change
2018	12.09%	-4.43%
2017	16.52%	0.85%
2016	15.68%	6.67%
2015	9.01%	0.95%
2014	8.06%	-0.41%
2013	8.48%	-3.74%
2012	12.22%	1.38%
2011	10.84%	-2.88%
2010	13.72%	1.17%
2009	12.56%	0.97%
2008	11.58%	6.19%
2007	5.39%	-2.84%
2006	8.23%	-9.64%
2005	17.86%	2.87%
2004	15.00%	0.97%
2003	14.03%	1.16%
2002	12.88%	-6.00%
2001	18.87%	11.94%
2000	6.93%	0.31%
1999	6.62%	-3.38%
1998	10.00%	1.47%
1997	8.53%	-20.74%

1996	29.27%	-43.57%
1995	72.84%	15.80%
1994	57.03%	-0.13%
1993	57.17%	12.58%
1992	44.59%	31.58%
1991	13.01%	5.64%
1990	7.36%	-43.10%
1989	50.47%	-4.04%
1988	54.51%	43.22%

Table 1.1:

Source: https://www.macrotrends.net/countries/NGA/nigeria/inflation-ratecpi'

Appendix II

Data Presentation

Source	WDI	WDI	WDI	CBN	WDI	WDI	WDI
Measurement	%	%	%	%	Naira	%	%
Year	Inflation	Money Supply	Interest Rate	Liquidity Ratio	Exchange Eate	Government Expenditure	GDP Growth Rate
1986	5.7171515	1.953094631	4.310292242	36.4	1.754523004	4.903119615	0.06094527
1987	11.290323	22.41116364	-4.769644808	46.5	4.016037344	4.5170393	3.20012547
1988	54.511225	32.91319726	-2.962676481	45.0	4.536966667	22.66977796	7.33402549
1989	50.466688	12.92799525	-6.612412439	40.3	7.364735	11.34134814	1.9193813
1990	7.3644003	32.70102765	17.46624444	44.3	8.038285	10.61161156	11.7768859
1991	13.006973	37.3802139	0.990847349	38.6	9.909491667	19.37209705	0.3583526

1992	44.588843	63.26025377	-14.98716799	29.1	17.298425	157.5065269	4.63119295
1993	57.165253	53.75796832	-7.052474658	42.2	22.0654	45.58881586	-2.0351188
1994	57.031709	34.49514215	-15.92023297	48.5	21.996	15.84790744	-1.8149245
1995	72.835502	19.41171475	-31.4525655	33.1	21.89525833	15.54643758	-0.0726648
1996	29.268293	16.17815859	-5.260784138	43.1	21.884425	2.983891019	4.19592405
1997	8.5298742	16.03900295	12.12661189	40.2	21.88605	8.299470966	2.93709942
1998	9.9963781	22.31775759	11.48466906	46.8	21.886	63.93038796	2.5812541
1999	6.6183734	33.1210582	6.047248346	61.0	92.3381	14.73258335	0.58412689
2000	6.9332922	48.06752269	-1.140888642	64.1	101.6973333	97.74534975	5.01593476
2001	18.873646	26.37680042	12.1387025	52.9	111.23125	9.297755206	5.91768465
2002	12.876579	18.82109827	3.023542275	52.5	120.5781583	-5.943253763	15.3291557
2003	14.031784	13.51136897	9.935713387	50.9	129.22235	-16.31096913	7.34719497

2004	14.998034	20.67702554	-2.60484706	50.5	132.888025	572.5005803	9.25055823
2005	17.863493	22.60363252	-1.593680481	50.2	131.2743333	21.09800321	6.43851653
2006	8.2252215	36.3507212	-5.627968049	81.42	128.6516667	48.17342161	6.05942803
2007	5.388008	87.76134864	9.187171228	41.56	125.8081083	110.4261814	6.59113036
2008	11.581075	42.22342955	6.684908635	37.72	118.5666667	14.98533002	6.76447278
2009	12.55496	14.86435294	18.18000167	26.39	148.88	-0.208959448	8.0369251
2010	13.720202	6.724867343	1.067736064	27.39	150.2975	28.53530232	8.00565592
2011	10.840028	21.68561624	5.685579859	42.02	153.8625	11.99999993	5.3079242
2012	12.217782	27.08446798	6.224808614	49.72	157.5	10	4.23006118
2013	8.4758273	14.30208607	11.20162222	46.23	157.3116667	-2.63330642	6.67133539
2014	8.0624858	-0.794167076	11.35621303	38.27	158.5526417	0.525371952	6.30971866
2015	9.0093872	4.090156629	13.59615325	42.35	192.4403333	-3.053820861	2.6526933

2016	15.675341	31.92216861	6.686233617	45.95	253.492	-2.230510969	-1.6168689
2017	16.52354	1.38782911	5.790566873	54.79	305.7901092	-8.393584874	0.80588662
2018	12.094732	14.98211002	6.055977154	65.04	306.0836882	42.99106157	1.92275734
2019	11.396795	6.448631051	4.522188497	75.91	306.9209515	12.17175709	2.20842928

Appendix III:

Introduction of Dummy Variables

Appendix IV

Year	Inflation	Money Supply	Interest Rate	Liquidity Ratio	Exchange Rate	Government Expenditure	GDP Growth Rate	d20	d40	d60	d80	d85	d70
1986	5.7171515	1.953094631	4.310292242	36.4	1.754523004	4.903119615	0.06094527	0	0	0	0	0	0
1987	11.290323	22.41116364	-4.769644808	46.5	4.016037344	4.5170393	3.20012547	1	0	0	0	0	0
1988	54.511225	32.91319726	-2.962676481	45.0	4.536966667	22.66977796	7.33402549	1	0	0	0	0	0
1989	50.466688	12.92799525	-6.612412439	40.3	7.364735	11.34134814	1.9193813	0	0	0	0	0	0
1990	7.3644003	32.70102765	17.46624444	44.3	8.038285	10.61161156	11.7768859	1	0	0	0	0	0
1991	13.006973	37.3802139	0.990847349	38.6	9.909491667	19.37209705	0.3583526	1	0	0	0	0	0
1992	44.588843	63.26025377	-14.98716799	29.1	17.298425	157.5065269	4.63119295	1	1	1	0	0	0
1993	57.165253	53.75796832	-7.052474658	42.2	22.0654	45.58881586	-2.0351188	1	1	0	0	0	0

1994	57.031709	34.49514215	-15.92023297	48.5	21.996	15.84790744	-1.8149245	1	0	0	0	0	0
1995	72.835502	19.41171475	-31.4525655	33.1	21.89525833	15.54643758	-0.0726648	0	0	0	0	0	0
1996	29.268293	16.17815859	-5.260784138	43.1	21.884425	2.983891019	4.19592405	0	0	0	0	0	0
1997	8.5298742	16.03900295	12.12661189	40.2	21.88605	8.299470966	2.93709942	0	0	0	0	0	0
1998	9.9963781	22.31775759	11.48466906	46.8	21.886	63.93038796	2.5812541	1	0	0	0	0	0
1999	6.6183734	33.1210582	6.047248346	61.0	92.3381	14.73258335	0.58412689	1	0	0	0	0	0
2000	6.9332922	48.06752269	-1.140888642	64.1	101.6973333	97.74534975	5.01593476	1	1	0	0	0	0
2001	18.873646	26.37680042	12.1387025	52.9	111.23125	9.297755206	5.91768465	1	0	0	0	0	0
2002	12.876579	18.82109827	3.023542275	52.5	120.5781583	-5.943253763	15.3291557	0	0	0	0	0	0
2003	14.031784	13.51136897	9.935713387	50.9	129.22235	-16.31096913	7.34719497	0	0	0	0	0	0
2004	14.998034	20.67702554	-2.60484706	50.5	132.888025	572.5005803	9.25055823	1	0	0	0	0	0
2005	17.863493	22.60363252	-1.593680481	50.2	131.2743333	21.09800321	6.43851653	1	0	0	0	0	0
2006	8.2252215	36.3507212	-5.627968049	81.42	128.6516667	48.17342161	6.05942803	1	0	0	0	0	0

2007	5.388008	87.76134864	9.187171228	41.56	125.8081083	110.4261814	6.59113036	1	1	1	1	1	1
2008	11.581075	42.22342955	6.684908635	37.72	118.5666667	14.98533002	6.76447278	1	1	0	0	0	0
2009	12.55496	14.86435294	18.18000167	26.39	148.88	-0.208959448	8.0369251	0	0	0	0	0	0
2010	13.720202	6.724867343	1.067736064	27.39	150.2975	28.53530232	8.00565592	0	0	0	0	0	0
2011	10.840028	21.68561624	5.685579859	42.02	153.8625	11.99999993	5.3079242	1	0	0	0	0	0
2012	12.217782	27.08446798	6.224808614	49.72	157.5	10	4.23006118	1	0	0	0	0	0
2013	8.4758273	14.30208607	11.20162222	46.23	157.3116667	-2.63330642	6.67133539	0	0	0	0	0	0
2014	8.0624858	-0.794167076	11.35621303	38.27	158.5526417	0.525371952	6.30971866	0	0	0	0	0	0
2015	9.0093872	4.090156629	13.59615325	42.35	192.4403333	-3.053820861	2.6526933	0	0	0	0	0	0
2016	15.675341	31.92216861	6.686233617	45.95	253.492	-2.230510969	-1.6168689	1	0	0	0	0	0
2017	16.52354	1.38782911	5.790566873	54.79	305.7901092	-8.393584874	0.80588662	0	0	0	0	0	0
2018	12.094732	14.98211002	6.055977154	65.04	306.0836882	42.99106157	1.92275734	0	0	0	0	0	0
2019	11.396795	6.448631051	4.522188497	75.91	306.9209515	12.17175709	2.20842928	0	0	0	0	0	0

Dummy Variables

		20			40			60			80			85			70		
Year	**msg**	**msg ***		**d20**	**msg ***		**d40**	**msg ***		**d60**	**msg ***		**d80**	**msg***		**d85**	**msg ***		**d70**
1986	1.953095	20	-18.0469	0	40	-38.0469	0	60	-58.0469	0	80	-78.0469	0	85	-83.0469	0	70	-68.0469	0
1987	22.41116	20	2.411164	1	40	-17.5888	0	60	-37.5888	0	80	-57.5888	0	85	-62.5888	0	70	-47.5888	0
1988	32.9132	20	12.9132	1	40	-7.0868	0	60	-27.0868	0	80	-47.0868	0	85	-52.0868	0	70	-37.0868	0
1989	12.928	20	-7.072	0	40	-27.072	0	60	-47.072	0	80	-67.072	0	85	-72.072	0	70	-57.072	0
1990	32.70103	20	12.70103	1	40	-7.29897	0	60	-27.299	0	80	-47.299	0	85	-52.299	0	70	-37.299	0
1991	37.38021	20	17.38021	1	40	-2.61979	0	60	-22.6198	0	80	-42.6198	0	85	-47.6198	0	70	-32.6198	0
1992	63.26025	20	43.26025	1	40	23.26025	1	60	3.260254	1	80	-16.7397	0	85	-21.7397	0	70	-6.73975	0
1993	53.75797	20	33.75797	1	40	13.75797	1	60	-6.24203	0	80	-26.242	0	85	-31.242	0	70	-16.242	0
1994	34.49514	20	14.49514	1	40	-5.50486	0	60	-25.5049	0	80	-45.5049	0	85	-50.5049	0	70	-35.5049	0

1995	19.41171	20	-0.58829	0	40	-20.5883	0	60	-40.5883	0	80	-60.5883	0	85	-65.5883	0	70	-50.5883	0
1996	16.17816	20	-3.82184	0	40	-23.8218	0	60	-43.8218	0	80	-63.8218	0	85	-68.8218	0	70	-53.8218	0
1997	16.039	20	-3.961	0	40	-23.961	0	60	-43.961	0	80	-63.961	0	85	-68.961	0	70	-53.961	0
1998	22.31776	20	2.317758	1	40	-17.6822	0	60	-37.6822	0	80	-57.6822	0	85	-62.6822	0	70	-47.6822	0
1999	33.12106	20	13.12106	1	40	-6.87894	0	60	-26.8789	0	80	-46.8789	0	85	-51.8789	0	70	-36.8789	0
2000	48.06752	20	28.06752	1	40	8.067523	1	60	-11.9325	0	80	-31.9325	0	85	-36.9325	0	70	-21.9325	0
2001	26.3768	20	6.3768	1	40	-13.6232	0	60	-33.6232	0	80	-53.6232	0	85	-58.6232	0	70	-43.6232	0
2002	18.8211	20	-1.1789	0	40	-21.1789	0	60	-41.1789	0	80	-61.1789	0	85	-66.1789	0	70	-51.1789	0
2003	13.51137	20	-6.48863	0	40	-26.4886	0	60	-46.4886	0	80	-66.4886	0	85	-71.4886	0	70	-56.4886	0
2004	20.67703	20	0.677026	1	40	-19.323	0	60	-39.323	0	80	-59.323	0	85	-64.323	0	70	-49.323	0
2005	22.60363	20	2.603633	1	40	-17.3964	0	60	-37.3964	0	80	-57.3964	0	85	-62.3964	0	70	-47.3964	0
2006	36.35072	20	16.35072	1	40	-3.64928	0	60	-23.6493	0	80	-43.6493	0	85	-48.6493	0	70	-33.6493	0

2007	87.76135	20	67.76135	1	40	47.76135	1	60	27.76135	1	80	7.761349	1	85	2.761349	1	70	17.76135	1
2008	42.22343	20	22.22343	1	40	2.22343	1	60	-17.7766	0	80	-37.7766	0	85	-42.7766	0	70	-27.7766	0
2009	14.86435	20	-5.13565	0	40	-25.1356	0	60	-45.1356	0	80	-65.1356	0	85	-70.1356	0	70	-55.1356	0
2010	6.724867	20	-13.2751	0	40	-33.2751	0	60	-53.2751	0	80	-73.2751	0	85	-78.2751	0	70	-63.2751	0
2011	21.68562	20	1.685616	1	40	-18.3144	0	60	-38.3144	0	80	-58.3144	0	85	-63.3144	0	70	-48.3144	0
2012	27.08447	20	7.084468	1	40	-12.9155	0	60	-32.9155	0	80	-52.9155	0	85	-57.9155	0	70	-42.9155	0
2013	14.30209	20	-5.69791	0	40	-25.6979	0	60	-45.6979	0	80	-65.6979	0	85	-70.6979	0	70	-55.6979	0
2014	-0.79417	20	-20.7942	0	40	-40.7942	0	60	-60.7942	0	80	-80.7942	0	85	-85.7942	0	70	-70.7942	0
2015	4.090157	20	-15.9098	0	40	-35.9098	0	60	-55.9098	0	80	-75.9098	0	85	-80.9098	0	70	-65.9098	0
2016	31.92217	20	11.92217	1	40	-8.07783	0	60	-28.0778	0	80	-48.0778	0	85	-53.0778	0	70	-38.0778	0
2017	1.387829	20	-18.6122	0	40	-38.6122	0	60	-58.6122	0	80	-78.6122	0	85	-83.6122	0	70	-68.6122	0
2018	14.98211	20	-5.01789	0	40	-25.0179	0	60	-45.0179	0	80	-65.0179	0	85	-70.0179	0	70	-55.0179	0

2019	6.448631	20	-13.5514	0	40	-33.5514	0	60	-53.5514	0	80	-73.5514	0	85	-78.5514	0	70	-63.5514	0

Appendix V

Unit Root Test: Augmented Dickey-Fuller Test

Exchange rate (EXR)

At level

Null Hypothesis: EXR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.987512	0.9955
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

First difference

Null Hypothesis: D(EXR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.028096	0.0039
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

Government Expenditure (GE)

At level

Null Hypothesis: GE has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.030598	0.0000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

Inflation (INF)

At level

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.354483	0.0022
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

Interest rate (INT)

At level

Null Hypothesis: INT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.486966	0.0148
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

Liquidity ratio (LR)

At level

Null Hypothesis: LR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.748795	0.0768
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

First difference

Null Hypothesis: D(LR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.837722	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

Money supply (MS)

At level

Null Hypothesis: MS has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.485984	0.0148
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

GDP Growth (YG)

At level

Null Hypothesis: YG has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.876402	0.0056
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

Appendix VI

Threshold Model Estimation Result

msg*	Variable	Coefficient	Std. Error	t-Statistics	Probability	RSS
20	INT	-1.303708	0.239166	-5.451071	0	3319.152
	LR	-0.300618	0.191959	-1.566056	0.1294	
	MS	0.050793	0.15416	0.329483	0.7444	
	YG	-0.37017	0.575584	-0.64312	0.5258	
	GE	-0.018818	0.022047	-0.853531	0.4012	
	EXR	-0.01122	0.028472	-0.394075	0.6967	
	D20	-1.916348	6.093688	-0.314481	0.7557	
	C	40.33851	8.751073	4.60955	0.0001	
40	INT	-1.325567	0.233705	-5.671977	0	3316.533
	LR	-0.339098	0.18981	-1.786513	0.0857	
	MS	0.067047	0.181496	0.369411	0.7148	
	YG	-0.344507	0.567212	-0.607369	0.5489	
	GE	-0.020499	0.021216	-0.966218	0.3428	
	EXR	-0.005936	0.028059	-0.211545	0.8341	
	D40	-3.106666	8.986652	-0.345698	0.7324	
	C	40.55241	8.688416	4.667411	0.0001	
60	INT	-1.343898	0.231841	-5.796644	0	3234.424
	LR	-0.397949	0.199828	-1.99146	0.057	
	MS	0.125143	0.165511	0.756102	0.4564	
	YG	-0.283117	0.563575	-0.50236	0.6196	
	GE	-0.019032	0.021028	-0.905044	0.3738	

	EXR	0.000434	0.028578	0.015189	0.988	
	D60	-11.27022	12.74002	-0.884631	0.3845	
	C	41.07742	8.584577	4.785025	0.0001	
70	INT	-1.28863	0.235438	-5.473337	-5.473337	3265.221
	LR	-0.348906	0.184543	-1.89065	-1.89065	
	MS	0.091636	0.151911	0.603226	0.603226	
	YG	-0.323492	0.56305	-0.574536	-0.574536	
	GE	-0.020605	0.021043	-0.97916	-0.97916	
	EXR	-0.003023	0.027896	-0.108383	-0.108383	
	D70	-11.30185	15.5248	-0.727987	-0.727987	
	C	39.77329	8.702592	4.57028	4.57028	
80	INT	-1.28863	0.235438	-5.473337	0	3265.221
	LR	-0.348906	0.184543	-1.89065	0.0699	
	MS	0.091636	0.151911	0.603226	0.5516	
	YG	-0.323492	0.56305	-0.574536	0.5705	
	GE	-0.020605	0.021043	-0.97916	0.3365	
	EXR	-0.003023	0.027896	-0.108383	0.9145	
	D80	-11.30185	15.5248	-0.727987	0.4731	
	C	39.77329	8.702592	4.57028	0.0001	
85	INT	-1.28863	0.235438	-5.473337	0	3265.221
	LR	-0.348906	0.184543	-1.89065	0.0699	
	MS	0.091636	0.151911	0.603226	0.5516	
	YG	-0.323492	0.56305	-0.574536	0.5705	
	GE	-0.020605	0.021043	-0.97916	0.3365	
	EXR	-0.003023	0.027896	-0.108383	0.9145	

D85	-11.30185	15.5248	-0.727987	0.4731
C	39.77329	8.702592	4.57028	0.0001

OLS Result (D20)

Dependent Variable: INF
Method: Least Squares
Date: 11/23/21 Time: 16:27
Sample: 1986 2019
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-1.303708	0.239166	-5.451071	0.0000
LR	-0.300618	0.191959	-1.566056	0.1294
MS	0.050793	0.154160	0.329483	0.7444
YG	-0.370170	0.575584	-0.643120	0.5258
GE	-0.018818	0.022047	-0.853531	0.4012
EXR	-0.011220	0.028472	-0.394075	0.6967
D20	-1.916348	6.093688	-0.314481	0.7557
C	40.33851	8.751073	4.609550	0.0001

R-squared	0.691635	Mean dependent var	19.69804
Adjusted R-squared	0.608613	S.D. dependent var	18.06025
S.E. of regression	11.29866	Akaike info criterion	7.889569
Sum squared resid	3319.152	Schwarz criterion	8.248713
Log likelihood	-126.1227	Hannan-Quinn criter.	8.012048
F-statistic	8.330792	Durbin-Watson stat	1.671393
Prob(F-statistic)	0.000025		

OLS Result (D40)

Dependent Variable: INF
Method: Least Squares
Date: 11/23/21 Time: 16:30
Sample: 1986 2019
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-1.325567	0.233705	-5.671977	0.0000
LR	-0.339098	0.189810	-1.786513	0.0857
MS	0.067047	0.181496	0.369411	0.7148
YG	-0.344507	0.567212	-0.607369	0.5489
GE	-0.020499	0.021216	-0.966218	0.3428
EXR	-0.005936	0.028059	-0.211545	0.8341
D40	-3.106666	8.986652	-0.345698	0.7324
C	40.55241	8.688416	4.667411	0.0001

R-squared	0.691878	Mean dependent var	19.69804
Adjusted R-squared	0.608922	S.D. dependent var	18.06025
S.E. of regression	11.29420	Akaike info criterion	7.888780
Sum squared resid	3316.533	Schwarz criterion	8.247924
Log likelihood	-126.1093	Hannan-Quinn criter.	8.011258
F-statistic	8.340304	Durbin-Watson stat	1.640214
Prob(F-statistic)	0.000024		

OLS Result (D60)

Dependent Variable: INF
Method: Least Squares
Date: 11/23/21 Time: 16:31
Sample: 1986 2019
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-1.343898	0.231841	-5.796644	0.0000
LR	-0.397949	0.199828	-1.991460	0.0570
MS	0.125143	0.165511	0.756102	0.4564
YG	-0.283117	0.563575	-0.502360	0.6196
GE	-0.019032	0.021028	-0.905044	0.3738
EXR	0.000434	0.028578	0.015189	0.9880
D60	-11.27022	12.74002	-0.884631	0.3845
C	41.07742	8.584577	4.785025	0.0001

R-squared	0.699506	Mean dependent var	19.69804
Adjusted R-squared	0.618604	S.D. dependent var	18.06025
S.E. of regression	11.15352	Akaike info criterion	7.863711
Sum squared resid	3234.424	Schwarz criterion	8.222855
Log likelihood	-125.6831	Hannan-Quinn criter.	7.986189
F-statistic	8.646319	Durbin-Watson stat	1.719534
Prob(F-statistic)	0.000018		

OLS Result (D70)

Dependent Variable: INF
Method: Least Squares
Date: 11/23/21 Time: 16:41
Sample: 1986 2019
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GE	-0.020605	0.021043	-0.979160	0.3365
EXR	-0.003023	0.027896	-0.108383	0.9145
INT	-1.288630	0.235438	-5.473337	0.0000
LR	-0.348906	0.184543	-1.890650	0.0699
MS	0.091636	0.151911	0.603226	0.5516
YG	-0.323492	0.563050	-0.574536	0.5705
D70	-11.30185	15.52480	-0.727987	0.4731
C	39.77329	8.702592	4.570280	0.0001

R-squared	0.696645	Mean dependent var	19.69804
Adjusted R-squared	0.614972	S.D. dependent var	18.06025
S.E. of regression	11.20649	Akaike info criterion	7.873187
Sum squared resid	3265.221	Schwarz criterion	8.232331
Log likelihood	-125.8442	Hannan-Quinn criter.	7.995666
F-statistic	8.529737	Durbin-Watson stat	1.711073
Prob(F-statistic)	0.000020		

OLS Result (D80)

Dependent Variable: INF
Method: Least Squares
Date: 11/23/21 Time: 16:31
Sample: 1986 2019
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-1.288630	0.235438	-5.473337	0.0000
LR	-0.348906	0.184543	-1.890650	0.0699
MS	0.091636	0.151911	0.603226	0.5516
YG	-0.323492	0.563050	-0.574536	0.5705
GE	-0.020605	0.021043	-0.979160	0.3365
EXR	-0.003023	0.027896	-0.108383	0.9145
D80	-11.30185	15.52480	-0.727987	0.4731
C	39.77329	8.702592	4.570280	0.0001

R-squared	0.696645	Mean dependent var	19.69804
Adjusted R-squared	0.614972	S.D. dependent var	18.06025
S.E. of regression	11.20649	Akaike info criterion	7.873187
Sum squared resid	3265.221	Schwarz criterion	8.232331
Log likelihood	-125.8442	Hannan-Quinn criter.	7.995666
F-statistic	8.529737	Durbin-Watson stat	1.711073
Prob(F-statistic)	0.000020		

OLS Result (D85)

Dependent Variable: INF
Method: Least Squares
Date: 11/23/21 Time: 16:32
Sample: 1986 2019
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-1.288630	0.235438	-5.473337	0.0000
LR	-0.348906	0.184543	-1.890650	0.0699
MS	0.091636	0.151911	0.603226	0.5516
YG	-0.323492	0.563050	-0.574536	0.5705
GE	-0.020605	0.021043	-0.979160	0.3365
EXR	-0.003023	0.027896	-0.108383	0.9145
D85	-11.30185	15.52480	-0.727987	0.4731
C	39.77329	8.702592	4.570280	0.0001

R-squared	0.696645	Mean dependent var	19.69804
Adjusted R-squared	0.614972	S.D. dependent var	18.06025
S.E. of regression	11.20649	Akaike info criterion	7.873187
Sum squared resid	3265.221	Schwarz criterion	8.232331
Log likelihood	-125.8442	Hannan-Quinn criter.	7.995666
F-statistic	8.529737	Durbin-Watson stat	1.711073
Prob(F-statistic)	0.000020		

Appendix VII

VAR Lag Order Selection Criteria

Endogenous variables: INF MS YG LR INT GE EXR

Exogenous variables: C

Date: 12/13/21 Time: 13:28

Sample: 1986 2019

Included observations: 32

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-955.7681	NA	3.20e+17	60.17300	60.49363 *	60.27928
1	-872.9483	124.2296	4.17e+16	58.05927	60.62431	58.90951
2	-802.8373	74.49298 *	1.80e+16 *	56.73983 *	61.54928	58.33403 *

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Appendix VIII

The Non-linear Autoregressive Distributed Lag (NARDL) Result

Dependent Variable: INF

Method: ARDL

Sample (adjusted): 1989 2019

Included observations: 31 after adjustments

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic): MS_POS MS_NEG YG LR INT GE EXR

Fixed regressors: C

Number of models evaluated: 4374

Selected Model: ARDL(2, 2, 0, 2, 1, 0, 1, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INF(-1)	0.386913	0.089885	4.304528	0.0009
INF(-2)	-0.306096	0.078216	-3.913454	0.0018
MS_POS	-0.455751	0.117215	-3.888172	0.0019
MS_POS(-1)	0.381225	0.162595	2.344632	0.0356
MS_POS(-2)	0.209748	0.119346	1.757478	0.1023

MS_NEG	0.373094	0.150483	2.479304	0.0276
YG	-1.797253	0.363107	-4.949652	0.0003
YG(-1)	-0.820285	0.357405	-2.295112	0.0390
YG(-2)	0.586295	0.465352	1.259894	0.2299
LR	-0.739370	0.117463	-6.294500	0.0000
LR(-1)	0.172672	0.133564	1.292797	0.2186
INT	-0.593992	0.136922	-4.338173	0.0008
GE	-0.023607	0.012521	-1.885317	0.0819
GE(-1)	-0.016438	0.009836	-1.671189	0.1186
EXR	-0.004627	0.068791	-0.067263	0.9474
EXR(-1)	0.074609	0.093334	0.799372	0.4384
EXR(-2)	0.136019	0.071129	1.912295	0.0781
C	66.91449	13.60205	4.919440	0.0003

R-squared	0.968608	Mean dependent var	19.29724
Adjusted R-squared	0.927557	S.D. dependent var	17.58845
S.E. of regression	4.733975	Akaike info criterion	6.239660
Sum squared resid	291.3367	Schwarz criterion	7.072298
Log likelihood	-78.71473	Hannan-Quinn criter.	6.511079
F-statistic	23.59519	Durbin-Watson stat	2.716122

Prob(F-statistic)	0.000000

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

Appendix IX

Short Run Relationship

ARDL Error Correction Regression

Dependent Variable: D(INF)

Selected Model: ARDL(2, 2, 1, 1, 0, 0, 2)

Case 2: Restricted Constant and No Trend

Sample: 1986 2019

Included observations: 31

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	0.272717	0.049871	5.468479	0.0001
D(MS_POS)	-0.252071	0.066345	-3.799374	0.0016
D(MS_POS(-1))	-0.307666	0.094674	-3.249753	0.0050
D(MS_NEG)	0.112839	0.088319	1.277630	0.2196
D(YG)	-1.665142	0.194134	-8.577262	0.0000
D(EXR)	-0.007612	0.042036	-0.181072	0.8586
D(EXR(-1))	-0.128402	0.042238	-3.039965	0.0078

CointEq(-1)*	-0.926774	0.054299	-17.06798	0.0000

R-squared	0.936426	Mean dependent var	-1.390788
Adjusted R-squared	0.917077	S.D. dependent var	14.15908
S.E. of regression	4.077288	Akaike info criterion	5.866377
Sum squared resid	382.3584	Schwarz criterion	6.236439
Log likelihood	-82.92885	Hannan-Quinn criter.	5.987008
Durbin-Watson stat	2.149350		

* 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	25.33183	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Appendix X

Longrun Relationship

ARDL Long Run Form and Bounds Test

Dependent Variable: D(INF)

Selected Model: ARDL(2, 2, 0, 2, 1, 0, 1, 2)

Case 2: Restricted Constant and No Trend

Sample: 1986 2019

Included observations: 31

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	66.91449	13.60205	4.919440	0.0003
INF(-1)*	-0.919183	0.108717	-8.454806	0.0000
MS_POS(-1)	0.135223	0.147154	0.918921	0.3749
MS_NEG**	0.373094	0.150483	2.479304	0.0276
YG(-1)	-2.031243	0.536118	-3.788800	0.0023
LR(-1)	-0.566698	0.168046	-3.372283	0.0050
INT**	-0.593992	0.136922	-4.338173	0.0008
GE(-1)	-0.040045	0.017907	-2.236297	0.0435
EXR(-1)	0.206001	0.063615	3.238215	0.0065

D(INF(-1))	0.306096	0.078216	3.913454	0.0018
D(MS_POS)	-0.455751	0.117215	-3.888172	0.0019
D(MS_POS(-1))	-0.209748	0.119346	-1.757478	0.1023
D(YG)	-1.797253	0.363107	-4.949652	0.0003
D(YG(-1))	-0.586295	0.465352	-1.259894	0.2299
D(LR)	-0.739370	0.117463	-6.294500	0.0000
D(GE)	-0.023607	0.012521	-1.885317	0.0819
D(EXR)	-0.004627	0.068791	-0.067263	0.9474
D(EXR(-1))	-0.136019	0.071129	-1.912295	0.0781

* 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.
MS_POS	0.147112	0.168316	0.874024	0.3980
MS_NEG	0.405897	0.182553	2.223453	0.0445
YG	-2.209835	0.464106	-4.761490	0.0004

LR	-0.616524	0.174234	-3.538488	0.0036
INT	-0.646217	0.158712	-4.071642	0.0013
GE	-0.043566	0.019869	-2.192653	0.0471
EXR	0.224113	0.070994	3.156764	0.0076
C	72.79780	10.54761	6.901826	0.0000

EC = INF - (0.1471*MS_POS + 0.4059*MS_NEG -2.2098*YG -0.6165*LR -0.6462*INT -0.0436*GE + 0.2241*EXR + 72.7978)

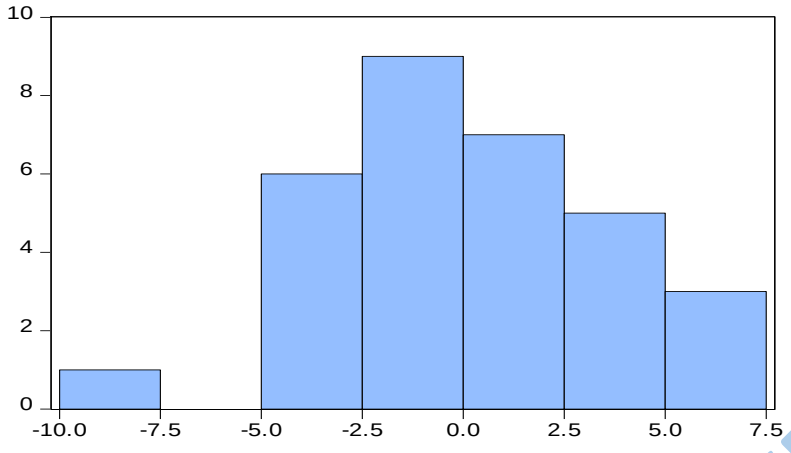
F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	14.21773	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:	
Actual Sample Size	31		n=35	
		10%	2.196	3.37
		5%	2.597	3.907
		1%	3.599	5.23
			Finite Sample:	
			n=30	
		10%	2.277	3.498
		5%	2.73	4.163
		1%	3.864	5.694

Appendix XI

Normality Test Result



Series: Residuals	
Sample 1989 2019	
Observations 31	
Mean	2.09e-15
Median	-0.064123
Maximum	7.283426
Minimum	-8.437299
Std. Dev.	3.570053
Skewness	0.033695
Kurtosis	2.739143
Jarque-Bera	0.093759
Probability	0.954202

Appendix XII

Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.068776	Prob. F(2,14)	0.9338
Obs*R-squared	0.301616	Prob. Chi-Square(2)	0.8600

Appendix XIII

Heteroskedasticity Test Result

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.416473	Prob. F(14,16)	0.2501
Obs*R-squared	17.15709	Prob. Chi-Square(14)	0.2479
Scaled explained SS	3.974346	Prob. Chi-Square(14)	0.9956

Appendix XIV

Model Specification

Ramsey RESET Test

Equation: NARDL02

Specification: INF INF(-1) INF(-2) MS_POS MS_POS(-1) MS_POS(-2) MS_NEG MS_NEG(-1) YG YG(-1) LR INT EXR EXR(-1) EXR(-2) C

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	5.591428	15	0.0001
F-statistic	31.26406	(1, 15)	0.0001

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	258.3880	1	258.3880
Restricted SSR	382.3584	16	23.89740
Unrestricted SSR	123.9704	15	8.264696

Bio-data

A. Personal Data

Name: Adeniyi Benjamin Adedoyin

Email Address: prestigiouscrowns@yahoo.com

Phone Number: +2348066773670

House Address: Amoke Ekunola Street, Oganla Lasokun, Wire and Cable, Apata, Ibadan Oyo-State, Nigeria

Date of Birth: 05/02/1982

Nationality: Nigerian

Marital Status: Married

Name of Next of Kin: Mrs Olusola Adedoyin

Address of Next of Kin: Oganla Lasokun, wire and Cable, Ibadan, Oyo State, Nigeria

B. Educational Institutions Attended with Dates

I. Primary Education: Ebenezer African Primary School, Odo-Ona, Apata, Ibadan.

II. Secondary Education: Jericho High School Eleyele, Ibadan. 2001

III. Higher Educational Institution: University of Ibadan, 2007

C. Working Experience with Dates

Date of Assumption of Duty in Current Establishment: April 20th, 2012

Status of First Appointment in Current Establishment: Economic Tutor

Present Position: Assistant Head of Department

Date of Commencement: January, 2020

_____ _____

Signature Date

University Compliance Certificate

This is to certify that **Adeniyi Benjamin Adedoyin** with the matriculation number LCU/PG/001120 in the Department of Economics, Faculty of Social Sciences, Lead City University, Ibadan is in full compliance with the approved University Format and Style.

_____ _____

Signature Date