

**CURRENCY HOARDING, MONETARY POLICY AND INFLATION IN
NIGERIA**

BY

**Naomi Aimalohi AKHIGBE
SSC1809389**

**DEPARTMENT OF ECONOMICS
FACULTY OF SOCIAL SCIENCES
UNIVERSITY OF BENIN**

OCTOBER, 2023

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**BEING A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT
OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF
BENIN, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE AWARD OF BACHELOR OF SCIENCE (B.Sc.) DEGREE IN
ECONOMICS**

OCTOBER, 2023

CERTIFICATION

This is to certify that this project titled “**CURRENCY HOARDING, MONETARY POLICY AND INFLATION IN NIGERIA**” was carried out by **Naomi Aimalohi AKHIGBE** with matriculation number **SSC1809389** from the department of Economics. It is found worthy of acceptance in partial fulfillment of the award of Bachelor of Science (B.Sc.) Degree in Economics.

Dr. F. Mogbolu
(Project Supervisor)

Date

Dr. S.O. Igbinedion
(Project Coordinator)

Date

Dr. S.O Igbinedion
(Ag. Head of Department)

Date

DEDICATION

This project is solely dedicated to almighty God for the grace of determination, consistency, wisdom, and courage he bestowed upon me throughout my years of academic pursuits in the great university of Benin, And to my mother Mrs Victoria Akhigbe.

ACKNOWLEDGMENTS

I will forever remain grateful to God almighty for his infinite mercy that has been with me from the very first phase of this school to the last.

I will like to appreciate my family especially Mrs Victoria Akhigbe and Mrs Ekwi Olannye for their support all through my academic years. I am so blessed to have you both as my Mother and my Aunty.

To my project supervisor Dr F .O Mogbolu thank you for being the best and for taking out time to guide me through this project. God bless you abundantly ma.

And also to my Uncles Victor, Tony, ken, Chukwuma, Emeka, Mr Steve Olannye, Uncle Emmanuel and Taiwo Akhigbe. Thank you for always helping me out at every point and in time and for assisting me in carrying out this work efficiently I am blessed to have you all in my life and God bless you.

To my Aunties Ifeoma, Ifeyinwa, Sonia, Rita, Ejiro, Osas, Maryjane, Mrs Osazuwa, Mrs Amigo, and a host of others thank you for your constant support and guidance may God bless you all.

My special thanks goes to my Siblings Tony, Daniella, Ogor, Dubem and Gika thank you for all your support.

To my friends Gloria, Hannah, Tega, Osazuwa, Moses, Ethel, Precious, Olga, Blessing, Ruth, Favour and those whom i have failed to include may God bless you all for your help in this research and to all my colleagues and course mates who helped me out at my point of confusion God bless you.

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ABSTRACT

This study delves into the intricate relationship between currency hoarding, monetary policy, and inflation within the context of Nigeria for the period of 1990 to 2020. It aims to ascertain if there is a relationship between currency hoarding and inflation in Nigeria and also examine how currency hoarding affects the relationship between monetary policy and inflation in Nigeria. The study would be of utmost significance to student and other researchers who are interested in understanding how currency hoarding affects the relationship between monetary policy and inflation in Nigeria. It focuses on unravelling how changes in currency in circulation, interest rates and money supply impact inflation dynamics. The methodology employed is the Error Correction Model (ECM), analysing data spanning the years 1990 to 2000. Findings reveal crucial insights. Currency in Circulation as a percentage of GDP (CPG) is positively related to inflation rate (INF), signifying that an increase in CPG contributes to inflationary pressures. Conversely, interest rates (INTR), exhibits a statistically significant negative relationship with inflation, with higher interest rates acting as a counterforce to inflation. However, changes in money supply (MS) shows no significant impact on inflation. The interaction term (CHMP) was found to have minimal impact on inflation. Policy recommendations drawn from these findings emphasize a balanced management of currency in circulation to avoid excessive inflation, continued use of interest rates as an effective tool for controlling inflation, diversification of monetary policy tools, and the adaptation of holistic economic policies. Improved data collection and research, exchange rate management, and transparent communication are also highlighted as critical factors for effectively addressing inflation in Nigeria. In summary, this study uncovers the multifaceted nature of inflation dynamics in Nigeria and provides valuable guidance for crafting comprehensive policies to manage inflation in the nation.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Currency hoarding refers to the phenomenon where individuals and businesses hold on to cash rather than using it for productive economic activities or financial transactions, this behavior can have adverse effects on the economy, particularly in the context of inflation and monetary policy. The distortions that excessive inflation can have on domestic macroeconomic conditions, which have the ability to throw the economy off the path of sustainable economic growth and development, serve the foundation of the significance of inflation. The general rate of growth, the expansion of the financial industry, and the vulnerable impoverished population are all negatively impacted by inflation. Additionally, it fosters uncertainty, discourages savings, encourages consumption, threatens macroeconomic stability and has significant social consequences. (Chaudhary and Ahmad, 1996).

Inflation is a monetary phenomenon, according to Friedman (1963), because it is and can only be caused by a more rapid growth in the quantity of money than in output. Since the 1970s, Nigeria has seen high and unpredictable inflation rates, according to Masha (2000) the country's high inflation episodes since the 1970s were primarily caused by the expansion of the money supply and a few other elements that reflected the structural characteristics of the economy.

Climate, wage growth, production structure, currency depreciation, and changes in trade agreements were among these variables. According to Adenekan and Nwanna, (2004), Nigeria's inflation had risen to more than 50% between 1988 and 1989, in addition Bawa and Abdullahi, (2012) noted that although inflation decreased to roughly 7.5% in 1990, it increased in 1992, 1993, and 1994 to 44.8%, 57.2% and 57% respectively. In 1995, it rose to an all – time high of 72.8% (Mordi et al, 2007) stated that this was caused by an excessive money supply, a lack of foreign currency, severe commodities shortages, ongoing labor unrest, and political turmoil following the June 1993 elections. In 1994, it grew to an all – time high of over 80%. Studies on Nigerian inflation have looked at how currency rate depreciation, a traditional driver of inflation affect internal inflation in the nation. However there are few studies on institutional causes of inflation in Nigeria, causes originating from product market and labor market sources.

Monetary policy plays a crucial role in managing inflation and promoting economic stability. The Central Bank of Nigeria (CBN) implements monetary policy measures to regulate the money supply, interest rates, and exchange rates in an effort to control inflation and foster economic growth. The key target of Nigerian monetary policy is to ensure price stability and maintain inflation rate at single digit, the Nigerian government try to achieve this through the use of monetary policy instrument such as the Open Market Operation (OMO) in order to enhance economic growth. Since its founding, the central bank of Nigeria (CBN)

has used two monetary policy frameworks: monetary targeting from 1974 to the present and exchange rate targeting from 1959 to 1973. The aforesaid monetary policy frameworks were put into practice using the direct and indirect monetary control regimes, the amount of budget deficit that needed to be covered by the banking system during the direct control regime controlled the credit allotted to the government, while the credit ceiling determined the distribution to the private sector. Credit imposed on banks, administratively controlled interest rates and exchange rates, and the requirement of sectorial credit allocation. Were the policy mechanisms in operation under the regulated system, In order to ensure efficient resource allocation, encourage the expansion of the preferred sectors, achieve orderly financial market growth, control inflation the CBN set the level and structure of interest rates administratively. In addition to having a negative impact on the efficiency of monetary policy, the extended use of direct tools also caused other economic inefficiencies. As a result it was decided that using direct control tools at a time when the global financial system was becoming liberalized and deregulated was unacceptable.

Indirect monetary management focused on the employment of market – based instruments of open markets aims to address the drawbacks of direct control regimes. When indirect control was implemented in 1993, banks that complied with certain requirements relating to cash reserves and the minimum statutory paid – up capital had their selective credit controls lifted. Due to the fragile situation of the

economy in 1994, when managed interest and exchange rates were reintroduced to quell inflationary pressures and restore some degree of macroeconomic stability, partial deregulation was reserved. The CBN started a two – year medium – term monetary framework in 2002 to liberate monetary policy implementation from the issue of time inconsistency and reduce overreaction to shocks. The monetary policy rate (MPR) replaced MRR as the nominal anchor in a new monetary policy implementation framework that was adopted in 2006. The purpose of the new system is to establish a policy rate that would effectively convey the direction of monetary policy and smooth out the volatility in money market rates. The MPR was initially set at 10% with a lending facility corridor of 3.0% above the MPR and a deposit facility corridor of 3.0% below the MPR. The wide measure of money supply grew by 30.9% in 2006 and 2007. However the growth in monetary aggregates was only moderate in 2006 and 2007, the significant rise in the banking system’s net foreign assets as well as a rise in the net domestic credit were the main drivers of money supply growth. The bank maintained its policy of maintaining market – based interest rate throughout 2007, responding solely to the current market conditions, since the end of 2009, there has been reduced volatility in interbank and other short – term rates. Even through it is obvious from economic theory that monetary policy reduces inflationary pressure, existing empirical research offer contradictory data (Gbadebo and Muhammed, 2015).

In Nigeria, the activities of keeping significant sum of cash frequently in foreign currencies on hand rather than depositing it in the bank or spending it for transactions is known as currency hoarding, due to the decreased amount of money available for lending and investment as well as the potential for inflation, this may have a negative impact on the economy. To prevent currency hoarding and advanced financial inclusion, the Nigerian government and the central bank have put in place a number of policies, such as restricting access to foreign exchange and promoting electronic payments. It is still a complicated subject though because both social and economic issues are involved.

The economic issues of inflation and currency hoarding have been persistence issues in the Nigerian economy over the years. In the 1980s, Nigeria experienced high inflation rates due to a combination of factors such as increased government spending, falling oil prices, and a devaluation of naira, all these led to a shortage of physical currency as individuals and businesses hoarded cash to protect their purchasing power. The 1990s were marked by a period of political and economic instability in Nigeria, which led to high inflation rate and currency hoarding. The country also experienced a series of devaluations of naira, which further fueled inflation and currency hoarding. In the 2000s, Nigeria implemented various reforms to stabilize its economy, including the adaptation of a market based foreign exchange system and the establishment of the central bank of Nigeria.

Nigeria has experienced high inflation rates in recent years, with the annual inflation rate reaching a record high of 18.17% in March 2021. The Central Bank of Nigeria has implemented various monetary policy measures to address this, including adjusting interest rates, reserve requirements, and exchange policies. These measures may also have unintended consequences, such as exacerbating inflation.

One of the fundamental objectives of the central bank of Nigeria is to sustain price stability in the economy through monetary policy. It is achieved by ensuring the rate of inflation is sustained to enable a viable economic activity in all aspects of the economy. The financial and economic condition of any nation or state is mainly centered on the monetary policy being established by the central bank of that state. It has been generally agreed that monetary policy contributes to sustainable growth by maintaining the stability of prices. Christiano and Fitzgerald, (2003) identifies that when inflation rate is low, individual do not have to take account when taking daily choices. The government of Nigeria controls its economy through combined actions of monetary policy and fiscal policy. The fiscal policy is aimed at government expenditures and investment, the government regulates its spending in order to control and positively impact the state's economy while monetary policy is an economic tool which contributes to the fulfillment of the goals of economic policy.

The level and structure of interest rates were determined by the central bank of Nigeria in order to ensure an efficient allocation of resources, promote economic growth and stability and to also subdue inflation and reduce debt obligations, (Philip et al, 2014) stated that inflation causes excessive relative price variability and misallocation of resources.

Currency hoarding also has its effect on inflation, as it reduces the amount of money available for the circulation in the economy. When individuals and businesses hoard cash instead of spending or investing it, the overall money supply can potentially lead to deflationary pressures or slower inflation, as there is less money available to drive economic activity and stimulate demand, as it may also cause aggregate demand in the economy to decline. Reduced demand can lead to lower prices for goods and services, potentially contributing to deflation or lower inflation rates.

Currency hoarding can also result in a slowdown in economic activities, as money is being hoarded by individuals it reduces their participation in economic transactions, which can lead to decreased production, lower employment levels, and overall economic stagnation. A slowdown in economic activity can put downward pressure on prices and contribute to inflation. Carvalho, and Riberio, (2017) indicates that an increase in currency hoarding leads to higher inflation rates, stating that currency hoarding behavior has inflationary effects.

In times of economic uncertainty and distrust currency hoarding often occurs, if people perceive high inflation or expect currency hoarding depreciation, they may hoard cash as precautionary measure. The hoarding behavior itself can reinforce inflation expectations and contribute to a self-fulfilling prophecy. Higher inflation expectations can influence price-setting behavior and contribute to higher inflation rates over time. Also in the banking system currency hoarding can create liquidity challenges, when currency is hoarded it reduces the availability of funds for banks to lend and support economic activities. This can lead to a credit crunch, where businesses and individual face difficulties accessing loans or credit, further dampening economic growth and inflationary pressure.

To mitigate the problem of inflation, the Federal Government of Nigeria has lately implemented certain safety net initiatives, such as cash transfers (Holmes et al., 2012; World Bank, 2016; Adesina, 2017). In an effective line currency hoarding and monetary policy tends to have a correlating response to inflation in the economy. Therefore it is against this background that this study is being undertaken.

1.2 Statement of the Research Problem

The research problem of the study is the influence of currency hoarding affects the impact of monetary policy on inflation in Nigeria. Over the years Nigeria has been faced with the problems of reoccurring high level of inflation which has restricted her growth process. While the monetary policy implemented in

the economy over the past years has been inconsistent with the developmental needs of the economy, (Apata, 2007). Various trends of currency hoarding has been observed in Nigeria since the 1980s till date, which has been caused by many socio-economic factors such as exchange rate volatility, naira scarcity, health factors like COVID-19 and high inflation rate.

With the trend of inflation which can be traced to begin in the 1970s when inflation increased to a double digit, inflation rate however rose in 1990s from 63.6% to 72.8% which was later followed by the inflation rate of 12.9% in 2000 and 14% in 2001. Inflation rate remained at double digits at 2002 it was recorded as 15%, and 17.9% in 2005, regardless it decreased drastically to 8.24% and 5.38% in 2006 and 2007 before increasing back to a double digit rate of 11.60% and 12.00% in 2008 and 2009 respectively, although it dropped slightly to 11.8% and 12.3% in 2010 and 2013 respectively (Gbadebo and Muhammed,2015). There has been a drop in rate of inflation to 8.1% in 2014 but rises to 9.1% in 2015 and also a rise in 2016 to 15.7%, inflation rate was at 15.75% in 2020 which was primarily attributed to the COVID-19 pandemic and was at 17.01% in 2021. From the above data it shows that the economic issue of inflation has continued to stress the Nigeria economy.

With the reoccurring inflationary conditions after all the variety of measures adopted by the government to control and reduce it, currency hoarding tends to contribute to these inflationary pressures in Nigeria and also contributes to being a

barrier to the monetary policies laid down by the Central Bank of Nigeria (CBN) to combat inflation as it has been an economic problem in Nigeria, decreasing the standard of living of the citizens in the county. Therefore this study has been enacted due to these above stated problems.

1.3 Research Questions

The study seeks to answer the following questions

1. Is there a relationship between currency hoarding and inflation in Nigeria?
2. Does monetary policy affect inflation in Nigeria?
3. To what extent does currency hoarding affect the relationship between monetary policy and inflation in Nigeria?

1.4 Objective of the Study

The broad objective of this study is to examine how currency hoarding influences the relationship between monetary policy and inflation in Nigeria.

- 1 To investigate if there is a relationship between currency hoarding and inflation in Nigeria.
- 2 To determine how monetary policy affects inflation in Nigeria.
- 3 To examine how currency hoarding affects the relationship between monetary policy and inflation in Nigeria.

1.5 Hypothesis of the Study

- 1 There is no relationship between currency hoarding and inflation in Nigeria.
- 2 Monetary policy does not affect inflation in Nigeria

3 Currency hoarding does not affect the relationship between monetary policy and inflation in Nigeria.

1.6 Scope of the Study

This study will focus on how currency hoarding influences the correlation between monetary policy and inflation in Nigeria. The data covers the period from (1990 to 2020) it will convey the existence and the impact of currency hoarding on the relationship between monetary policy and inflation in Nigeria. The data for this study will be obtained mainly from secondary sources particularly the Central Bank of Nigeria (CBN) statistical bulletins, annual reports and statements of accounts and also statistical reports from the National Bureau of Statistics (NBS) among other sources.

1.7 Limitation of the Study

The main objective of this study is to examine how currency hoarding influences the relationship between monetary policy and inflation in Nigeria. But due to insufficient time frame in order to provide a clear and concise analysis, the study is limited to the period of (1990 – 2020) which saw the role played by currency hoarding on monetary policy and inflation in Nigeria. This study is also limited by non – availability of current data which adds up to the inadequacy of properly carrying out this study.

1.8 Significance of the Study

Due to uprising issues of currency hoarding, ineffective monetary policies in relation to high inflation rates in Nigeria. This study analyzes the factors responsible for these issues and how currency hoarding and monetary policy react to inflation in the economy.

The findings and recommendations of this study will be beneficial to individuals, monetary authority, economic policy planners, future researchers (academic and non- academic) and firms. It will give a better insight to members of the public on the reason for the current trend of these factors and Government will as well be aware of the causes of the menace before them and will be able to provide positive feedback for them.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Conceptual Clarification

2.1.1 Currency Hoarding

Currency hoarding refers to the act of individuals or entities accumulating and holding large quantities of currency, often for an extended period. This behavior can have various implications for the economy and financial system. From a macroeconomic standpoint, currency hoarding can be seen as a symptom of low confidence in the economy or lack of trust in the financial system. When people hoard currency, it reduces the money supply available for lending and spending, potentially slowing down economic growth and exacerbating deflationary pressures. The Central Bank of Nigeria (CBN) defines currency hoarding as “the withdrawal of cash from circulation and its retention by the public”. It highlights that hoarding reduces the availability of cash for economic transactions, leading to liquidity shortage.

Currency hoarding can have significant implications for the economy. When large amount of cash are taken out of circulation and held idle, it reduces the money supply available for productive economic activities. This reduction in liquidity can hinder economic growth, affect monetary policy effectiveness, and make it challenging for central banks to manage inflation. The International Monetary Fund (IMF) defines currency hoarding as “the accumulation of cash by

the public (individuals and businesses) beyond the level needed for transactions and precautionary purposes”. It emphasized that hoarding is a behavior that reduces the effectiveness of monetary policy and can have adverse effects on economic stability.

Feigh (1987) defined currency hoarding as the phenomenon of people holding currency outside of the formal banking system, which is not used for transactions.

2.1.1.1 Currency in Circulation

Currency in circulation (CIC) refers to the total amount of currency (banknotes and coins) held by individuals, businesses, and financial institutions that is actively used for transactions within the economy. It represents the portion of money supply that is readily available for spending. Money in circulation and currency hoarding are closely related concepts, as currency hoarding directly affects the amount of money available for circulation within an economy.

2.1.1.2 Currency outside Banks

Currency outside banks (COB) refers to physical money, such as coins and banknotes, held by individuals, businesses, or other entities that is not deposited in a bank. This currency is in circulation and is in use for everyday transactions, making purchases, and conducting trade outside the formal banking system. It represents the tangible form of money that people can use for buying goods and services in the economy.

2.1.2 Monetary Policy

Monetary policy refers to the actions and strategies employed by a central bank or monetary authority to manage and control the money supply, interest rates, and credit conditions in an economy. It is also one of the key tools used by central banks to achieve macroeconomic objectives such as price stability, full employment, and sustainable economic growth. According to central bank of Nigeria, (2006) monetary policy was defined as “any policy measure designed by the federal government through the Central Bank of Nigeria (CBN) to control cost availability and supply of credit. It is also referred to as the regulation of money supply and interest rate by the CBN in other to control inflation and stabilize the currency flow in any economy. Also Central Bank of Nigeria, (2009), defined monetary policy as combination of measures designed to regulate the value supply and cost of money on an economy in consonance with the expected levels of economic activities. The Wikipedia encyclopedia defines monetary policy as the process by which the monetary authorities of a country controls the supply of money, often targeting an inflation rate to ensure price stability and general trust in the currency. Friedman, (1969), explains monetary policy as the action taken by the monetary authorities usually the central bank to affect monetary and other financial conditions through influence over the availability of cost or credit in pursuit of the broad objectives of sustainable growth of output, price stability and a healthy balance of payment position. Monetary policy can also be defined as a combination

of measures designed to control the supply of money and credit condition in an economy. From a financial stability perspective, monetary policy can be defined as a mechanism for promoting the stability of the financial system by regulating the supply of money and credit.

2.1.2.1 Money Supply

Money supply or broad money supply (MS) refers to currency in circulation with non- bank in addition to demand deposit (that is money in pocket + money in current or deposit account) in addition to this are savings deposits and time deposits as well as treasury bills and commercial papers. In Nigeria when individuals or entities hoard cash, it effectively reduces the amount of money available for circulation in the economy. As a result the money supply is constrained.

2.1.2.2 Interest Rates

Interest rate is a key tool and is closely related to monetary policy. Central banks use interest rates to implement and influence monetary policy, by adjusting interest rates central banks can impact borrowing costs, influence investment decisions, and control the overall availability of credit in the economy. When central banks lower interest rates, it stimulates aggregate demand by making borrowing cheaper, which encourages consumers and businesses to spend and invest.

2.1.2.3 Exchange Rates

Exchange rate can be referred to as the amount which a domestic currency can be exchanged for a foreign currency. Exchange rates and monetary policy are closely interrelated, and changes in monetary policy can have an impact on exchange rates.

2.1.2.4 Monetary Policy Instruments

Central banks use a variety of instruments to implement and control monetary policy. These instruments are designed to influence the money supply, interest rates and credit conditions in the economy.

- i. Open market operations: this involves buying or selling government securities (such as treasury bonds or bills) in the open market.
- ii. Reserved requirements: Central banks set reserve requirements, which determine the minimum amount of funds that commercial banks must hold as reserves against their deposits.
- iii. Discount window lending: central banks offer loans to commercial banks through discount window,
- iv. Policy interest rates: The central banks set policy interest rates, which serves as reference rates for financial system. These rates determine the cost of borrowing for banks and influence other interest rates in the economy.
- v. Forward guidance: Central banks communicate their future monetary policy intentions and outlook through forward guidance.

2.1.2.5 Types of Monetary Policy

There are generally two main types of monetary policy

Expansionary Monetary Policy: Expansionary monetary policy aims to stimulate economic activity and promote economic growth. It is typically implemented during periods of recession, low inflation, or high unemployment. The key objective is to increase the money supply, lower interest rates, and encourage borrowing and spending. Expansionary monetary policy measures may include, lowering policy interest rate, open market operations, reducing reserve requirements.

Contractionary monetary policy: contractionary monetary policy aims to slow down economic activities and curb inflationary pressures. It is implemented when the economy is overheating, experiencing high inflation, or facing financial imbalances. The objective is to reduce the money supply, increase interest rates, and discourage borrowing and spending. Contractionary monetary policy measures may include interest rates, open market operations and increasing reserve requirements.

2.1.3 Inflation

Inflation can be defined as an economic situation where a persistence rise in general prices of goods and services on a sustained basis over a period of time in an economy or country as a result of currency decline.

The economist John Maynard Keynes defined inflation as a general and sustained rise in prices of goods and services in an economy over a period of time. Milton Friedman defined inflation as “always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more paid increase in quantity of money”. Economist Irving Fisher defined inflation as “a process of the circulating medium of exchange without a corresponding increase in goods”.

2.1.3.1 Measurement of Inflation

The Consumer Price Index (CPI) is a key measure for assessing the rate of inflation in a country's economy. As a statistical instrument, the CPI is used to calculate the rate of inflation in a given economy. The index, which is adjusted for inflation, accounts for changes in the cost of living increase caused by inflation has a particularly negative impact on final consumers and people with fixed incomes, who are left unable to meet even their most basic necessities. In order to achieve this, inflation depreciates the real worth of money, which lowers consumer purchasing power. Therefore, countries attempt to keep inflation under control globally through their central bank, preferably single digit through monetary policy of fiscal policy tools.

2.1.3.2 Types of Inflation

There are three major types of inflation, which are the demand –pull inflation, cost – push inflation, and hyperinflation. (Anyanwu, 1993):

Demand –pull inflation: this is brought on by excessive demand when supply growth is not keeping up. Here, there is an economic situation where too much money is chasing too little goods. This was the case both before and after the Udoji salary awards of 1974, which marked a significant increase in pay, and during the Nigeria- Biafra war. Consumers improved purchasing power as a result of higher earnings increased demand.

Cost – push inflation: also known as wage-price spiral inflation, is brought on by growing production costs, most notably rising wages. For instance, if worker cost of living suddenly increase and they are paid more, this raises the cost of manufacturing. This will be reflected in higher pricing for the goods that consumers and workers must buy, workers then want higher pay because the original rise has been reduced by rising prices. In actuality, the cycle keeps going and costs keep rising. Thus the wage – price spiral got its name.

Hyperinflation: Hyperinflation happens when prices increase very quickly. In this situation money ceases to serve as a store of value and may lose its capacity as a medium of exchange if individuals choose bartering over trade rather than accepting it as a payment. After World War II, in 1945 this was the scenario in Germany, when people valued cigarettes over cash. And also a large increase in money in circulation is the primary cost of hyperinflation.

2.1.3.3 Major Causes of Inflation

The causes of inflation in an economy often include the following (Anyanwu, 1933).

Excessive money supply: An economy will always have inflation if there is excessive amount of money available due to bad monetary policy or other factors. The 1974 Udoji salary awards, the 1981 minimum salary Act, and the increase in the minimum salary in 2020 from ₦18,000 to ₦33,000 all contributed significantly to inflation in Nigeria. A contributing factor is also expansionary monetary policy.

Budget deficit: Since the 1970s, virtually every government in West African nations has had a budget deficit. Government spending on capital projects and other capital expenditures has also increased significantly. These have made a significant contribution to inflationary patterns in these economies.

Imported – inflation: Almost all of the manufactured commodities we use in Nigeria are imported from industrialized countries that are currently dealing with inflation. This entails importing these more expensive goods directly into countries in West Africa.

Consumer's excessive demand: As consumer's purchasing power grows, there will be more demand which will result in inflation. This is the easiness of increasing earnings in Nigeria brought on by regular upward salary adjustments or revisions.

Higher production costs: In general, higher wages results in higher production costs. These could prevent productivity gains or result in high commodity prices that sre passed on to consumers, which would cause inflation.

2.1.3.4 General Ways of Controlling Inflation

According to Anyanwu (1993), there are several ways of controlling inflation and these ways are examined below.

Price control measures: this entails the government creating a price control board that establishes the maximum prices that can be charged for specific commodities that are experiencing inflation. However, experience has proven that this approach, which is plagued by numerous issues, is ineffective, the Nigerian case is an illustration of this. Hoarding, profiteering, and black marketing are typically the outcomes which defeat the basic objectives.

Wage control freeze: the majority of governments impose freezes on salary increases as a strategy to fight inflation. However, because workers have developed strategies to enforce the government or employers to dance to their songs, this strategy is useless or does not function. Go – slow, work – to – rule, industrial actions etc. are some of these methods, and these methods are most frequently applied in democracies.

Monetary policy: To limit the amount of money in circulation, monetary policy uses conventional financial tools. These include raising the bank or discount rate, raising the liquidity ratio, using open market operations (in this case contractionary

monetary policy), allocating funds to specific industries or issuing special directives, etc. however, experience in the developing world has demonstrated that these conventional monetary tools are ineffective.

Fiscal policy: When inflation is demand – pull in nature, a combination of a higher personal income tax and a decrease in government spending may be stressful. These lessen consumer demand (given the supply) and purchasing power, which in turn lowers commodity prices.

Increased production of goods and services: The best way to reduce inflation is to boost production of goods and services. Naturally, as the quantity of goods increases, prices will decline.

2.2 Review of Theoretical Literature

The theoretical literatures reviewed below addresses the areas of hoarding creation, money circulation, demand for and transaction of money, and also various theories of inflation with their view on monetary policies and monetary processes. These theories explains that there is no relationship between currency hoarding and monetary policy and currency hoarding does not affect the relationship between monetary policy and inflation in Nigeria.

2.2.1 Marx's Theory of Money

The creation of hoarding is discussed in relation to capitalist production and circulation rather than as a result of personal preferences in discussions of money hoarding. This theory offers a number of structural causes for the establishment of

money hoards in the capitalist system based on Marx's thesis. It is demonstrated that Marx's analysis of how production and circulation time overlap in the circuit and his inferences about hoarding, while insightful, include a technical flaw. The argument is made that the grounds capitalism, money hoarding provides for creation of the credit system and what gives it its greater relevance. Amon,(1984).

2.2.2 Fisher's Quantity Theory of Money

Money is demanded not for its own sake (for hoarding it), but for transaction purposes. The demand for money is equal to the total market value of all goods and services transacted. It is obtained by multiplying total amount of goods and services (T) by average price level (P).

Fisher's equation of exchange represents equality between the supply of money and the total value of money expenditures in all transactions and the demand for money expenditures in all transactions and the demand for money or the total value of all items transacted.

Supply of money = demand of money

Total value of money expenditure in all transactions = total value of all items transacted

MV =PT or

P = MV/ T

Where;

M is the quantity of money

V is the transaction velocity

P is the price level

T is the total good and services transacted

Irving Fisher used the equation of exchange to develop the classical quantity theory of money that is a casual relationship between the money supply and the price level.

2.2.3 Theory of Demand –Pull Inflation

When the total demand for goods and services exceeds the total supply, the demand – pull paradigm is present. This means that the excess demand that results cannot be satisfied by depleting existing stocks, shifting supplies from the export market to the domestic market, increasing imports, or delaying demand. The majority of developing nations, particularly Nigeria are experiencing this problem Anyanwu (1993). The result of pressures on the existing goods in an increase in prices (inflation) when there is an increase in aggregate demand without a matching increase in aggregate supply. “Panic buying” is a good illustration of this; it may be brought on by fears of impending scarcity or by natural disasters.

2.2.4 Inflationary Cost – Push Theory

According to the cost – push school, rising salaries and other costs associated with production factors, especially those related to labor union or trade activities, are what cause inflation, (Anyanwu, 1993). Since labor is an important input in producing a certain level of output, an increase in labor’s nominal pay will

result in an increase in production costs. As a result, producers frequently pass the cost of their goods to consumers in the form of increased market pricing. The prices of final outputs would also rise when the costs of inputs (raw materials) increased.

2.2.5 The Keynesian Theory of Inflation

However, in the form that it has just been articulated, the Keynesian method does not offer much insight into price level swings. The simplest version of this argument that works is predicated on the notion that people's attempts to purchase more of the goods and services that are readily available more than can be produced at "full employment" levels of activity are the only factors contributing to inflation. For instance, there is an "inflationary gap" if government expenditure is more than the difference between output and consumption at full employment.

2.2.6 Monetarist Inflation Theory

Inflation according to the monetarists led by Friedman is a universally occurring monetary process. As a result, when the rate of expansion in the money supply exceeds the rate of increase in the real output of goods and services prices tends to rise generally. A rise in the money supply would result in more money in circulation and as a result a rise in nominal income, which puts upward pressure on the demand given the supply leading to an increase in prices. Everywhere there is inflation it is due to increased demand for products and services as a result of consumers trying to spend their cash balances. This excess spending is a result of

the relatively low and stable demand for money, which is the rise of the nominal stock of money supplied in the economy.

2.3 Review of Empirical Literature

In order to establish a context for understanding currency hoarding, monetary policy and inflation in Nigeria, this section reviews prior materials.

Cagan (1956) focuses on hyperinflation episodes and the factors that contribute to their occurrence. Currency hoarding is discussed as one of the behaviors that can exacerbate hyperinflation. As people lose confidence in the value of money they may hoard currency, leading to a decrease in its circulation and further accelerating inflation.

Friedman (1956) seminal work on the quantity theory of money discusses the relationship between the money supply, velocity of money, and inflation. According to this theory if the money supply increases without a corresponding increase in the velocity of money (the rate at which money changes hands), it leads to an increase in prices (inflation). Currency hoarding can potentially affect the velocity of money reducing the rate at which money circulates.

Gbadebo and Mohammed, (2015) evaluated the effectiveness of monetary policy as an anti – inflationary measure in Nigeria. Using quarterly time series data from 1980Q1 to 2012Q4, they employed the co- integration and error correction approach. The unit root test showed that all the variables were stationary with difference. A long – term link between inflation and the vector of used independent

variable was found by co – integration test. The findings indicated that the key contributors to inflation in Nigeria through the study period were interest rate, exchange rate, money supply and oil price. The paper argued that in order to achieve structural and economic stabilization, anti – inflationary monetary policy measures must be supported by some essential fiscal policies.

Bakare (2011) looked into “the factors influencing the expansion of the money supply and its effects on inflation in Nigeria”. The study used a quasi – experimental research design approach to analyze the data and, and the findings showed that in Nigeria increasing credit to the private sector has the greatest influence on the increase to the money supply. The findings also showed a favorable correlation between inflation and money supply growth in Nigeria. The study found that changes in the money supply are related to inflation in Nigeria and that there is a clear need to control the expansion of money supply in the economy.

Philip et al (2014) used annual time series data from 1970 to 2012 to assess “the effectiveness of monetary policy in reducing inflation in Nigeria.” The study used error correction technique and the co – integration test. In the contrast to the Granger causality test which demonstrated a one – way relationship between monetary policy and inflation rate, the co – integration and unit root tests results demonstrated that the variables have a long term relationship. The Vector Error Correction Model (VECM) test showed a negative relationship between inflation

rate, GDP and exchange rate, and a positive relationship between the broad money supply and domestic credit.

Adodo (2018) using annual data from 1985 to 2016 examined the “effectiveness of monetary policy and control of inflation in Nigeria”. The Johansen co – integration test, the vector correction model, and the augmented Dickey – fuller were used. Money supply, exchange rate, and interest rate were found to be stationary by the unit root test at first difference, and a long – run equilibrium relationship between the variables was found by the Johansen co – integration test. The results of the VECM showed that while exchange rate is not statistically significant in explaining the variation in inflation rate, money supply and interest rate are statistically significant in doing so.

The monetary authority should adopt suitable indirect instruments to control the amount of money in circulation in order to effectively and efficiently control inflation rate in Nigeria. It has been determined that monetary policy is the only partially effectively in containing inflation in Nigeria. For the objective of making the money market and its instruments an efficient inflation control mechanism in Nigeria, they should be appropriately developed. The regulatory authorities should implement a strict and efficient exchange rate regime to guarantee the stability of the exchange rate and its ability to moderate inflationary pressure in the economy.

Gul et al (2012) investigated the effects of monetary instruments on macroeconomic variables such as inflation, interest rate, real GDP, exchange rates

and money supply. The link between the aforementioned factors was examined using OLS. Data from a secondary source was used between 1995 and 2010, the study's finding revealed a high positive association between money supply and inflation but a weak negative correlation between money supply and output. The Pakistani economy is negatively impacted by exchange rates, however in Pakistan's situation a positive interest rate shock (contractionary monetary policy) resulted in an increase in price level. Tightening monetary policy is supposed to reduce inflation.

Ngerebo (2016) evaluated the effectiveness of monetary policy in containing inflation in Nigeria. OLS was used to analyze and test the relationship between various variables, including inflation, saving rates, monetary policy rates, prime lending rates, maximum lending rates, treasury bill rate, growth of narrow money supply, net domestic credit to government, and credit to private sector. The statistical bulletin of the Central Bank of Nigeria (CBN) used as a secondary source of data for years 1985 to 2012. The study found that while the growth of the broad money supply, credit to the government were statistically significant in explaining how they affect inflation in Nigeria, the monetary policy rate, maximum lending rate, prime lending rate, net domestic credit and treasury bill rate were not statistically significant. The results showed that some monetary policy tools in Nigeria are successful at controlling inflation, whereas others are not

Summer (1990) evaluated that to calculate the percentage of currency held in transaction and hoarding balances a model is created by comparing seasonal variations in retail sales and currency demand with those changes anticipated by the Baumol – Tobin inventory approach to money demand, transaction balances are calculated. The largest and most erratic part of the overall demand for currencies is found to be hoarding balances. Tests employing money demand by denomination offer more proof in favor of the hypothesis.

Dornbusch (1973) investigated the consequences of devaluation in a two – country, two – commodity, and two – money system with full employment and flexible prices. The primary focus is on the impact of changing the real value of money on actual spending as well as the impact of redistribution of spending between countries on relative pricing. The transfer problem in barter theory and the Marshall – Lerner condition are related to the stability characteristics of the model. It is demonstrated that a devaluation will enhance the balance of payments under stable conditions.

Ebipre and Amagberi (2020) studies the connection between the Nigeria money supply and inflation. In order to produce a numerical assessment of the link, time series data of the inflation rate, real gross domestic product (RGDP) growth rate, growth rate of the broad money supply, and financing of public deficit from 1971 to 2015 were gathered from the World Bank data source and central bank of Nigeria statistical bulletin. The variables unit root test revealed that the ordinary

least squares method is suitable for estimating the relationship parameter. The outcome demonstrates that in Nigeria there is a positive correlation between the money supply and inflation as well as between deficit financing and inflation. Furthermore, the analysis highlights the possibility of using productivity growth to lower Nigeria's long – term inflation.

Inam and Ime (2017) annual data from 1970 to 2012 it specifically seeks to availability of money and economic growth in Nigeria; pinpoint the type and direction of causation between the two. The Granger causality test and Ordinary Least Square (OLS) methods are used in the investigation. Then outcome suggests a favorable but insignificant correlation between the money supply and economic expansion. Additionally, it show no connection between the money supply and economic expansion.

Isiya and Benson (2022) contrary to predictions, the study found that when currency circulation is lagged by one period the effect is positive but statistically insignificant at 5%. The central bank of Nigeria's (CBN) ineffective monetary policies for fostering economic growth are further highlighted by statistically insignificant relationship between monetary instruments like exchange rate, inflation rate, normal interest rate, high power money, currency in circulation, demand deposit and normal GDP. According to these results, Nigeria's economy will likely be significantly affected by the CBN's envisaged cashless economy. As a result, the government should create the necessary infrastructure and regulatory

frameworks to encourage the use of the cashless payment system by the informal sector of the economy.

IB Iya (2014) macroeconomic instability factors particularly the fluctuating rate of inflation, are linked to Nigeria's slow economic growth. As a result, achieving the policy goals of economic growth and poverty reduction remained difficult. This study examined the primary factors that contributed to inflation in Nigeria between 1986 and 2011. In this essay, the causes of inflation in Nigeria between 1986 and 2011 are examined. The unit root property of the series and the Granger causality test of the relationship between inflation and the money supply, government spending, exchange rate and interest rate were both used to examine the properties of time series variables. Co - integration and vector error correction techniques were also used.

Tyodzer (2023) this study evaluated Nigeria's monetary policies from 2015 to 2023 in order to determine the effect of currency redesign. According to the studied literature, the redesign of the naira is being done for economic objectives, including but not limited to lowering inflation, thwarting counterfeiting, preventing financial instability, and decreasing the amount of currency in circulation. According to other studies, the program purges the economy of a significant amount of "black money" which helps it strengthen the monetary system and make it easier for authorities to keep tabs on the movement of money in the nation. Additionally, studies show that currency reform can reduce the impact of money on

the nation's political system by discouraging vote – buying and motivating election officials.

Asuquo (2012) the effect of monetary policy on price stability was examined by him. He looked at how changes in monetary policy affected inflation, market interest rates and currency rates, as a stand in for monetary policy rate was utilized, inputs from secondary sources was gathered between December 2006 and February 2012, due to the introduction of monetary policy rate in 2006, that year was selected. The model was estimated using structural VAR framework, the study findings showed that in Nigeria, market interest rates and exchange rates responded to changes in monetary policy rates more quickly than inflation did.

Ogunsakin and Awe (2014) examined the impact of financial sector reforms on the stability of money demand function in Nigeria. Real wide money balances, inflation, the currency rate, foreign interest rates, savings deposit rates, treasury bills, and a dummy variable for the post – liberalization era are all included in their estimation of a parsimonious error correction model (ECM). They discovered that real GDP, inflation, foreign interest rates, treasury bill rates, and savings deposit rates are the key predictors of money demand in Nigeria. The demand for money function remained stable despite the reforms, according to a stability test, indicating that using monetary targets is still important.

CHAPTER THREE

THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 Theoretical Framework

The renowned quantity theory of money put forward by Fisher (1911) serves as the foundation for this study. The theory's most basic form states that changes in the money supply will translate into an equal – proportionate change in the overall level of prices.

According to Adenuga et al (2000), this is predicated on the presumption that at full employment the level of transaction (national output) and the velocity is constant or at least changes gradually. Thus, the amount of money in circulation will immediately correlate with inflation, the well know identity;

$$MV = PY \quad (3.1)$$

Where **M** stands for “money supply”, **V** for the “money circulation velocity”, **Y** for “total amount of goods and services exchanged for money” and **P** for “aggregate price level”.

We can obtain the following equation from (3.1)

$$P = MV / Y \text{ or}$$

$$V = PY / M \quad (3.2)$$

Fisher is of the assumptions that velocity of money remains constant and stable over time which means that peoples spending habits and the speed at which money circulates in the economy are relatively constant. Also the assumption that

the volume of transactions (T) is considered constant in the short – run which implies that real output, the quantity of goods and services produced and exchanged does not change significantly during the period under consideration. Fisher also assumes that the economy operates at full employment, meaning all available resources are utilized and there is no cyclical unemployment.

The implications according to the Fisher's quantity theory, an increase in the quantity of money (M) will lead to a proportionate increase in the price level (P) if the velocity of money (V) and the volume of transactions (T) remain constant implying that changes in the money supply directly impact inflation. The theory suggests that controlling the money supply is a powerful tool for regulating inflation in the economy, by managing the quantity of money in circulation the central banks can influence the general price level.

Overall the Fisher's Quantity Theory of Money provides a valuable framework for understanding the relationship between currency hoarding, monetary policy and inflation in Nigeria.

3.2 Model Specification

The availability of economic data pertaining to the variables under consideration and the current state of the economy are the two main factors that influence the specification of an acceptable econometric model Koutusoyiannis (1997). The model is created with the intent of capturing the strength and direction

of the causal relationship between currency hoarding, monetary policy and inflation in Nigeria. The model can be specified as:

$$\text{Inflation (INF)} = \beta_0 + \beta_1 * (\text{CH}) + \beta_2 * \text{Monetary Policy (MP)} + \beta_3 * \text{Interaction Term (CH * MP)} + \varepsilon \quad (3.3)$$

Where

INF: Inflation rate in Nigeria (dependent variable)

CH: Currency hoarding

MP: Monetary policy

Interaction Term (CH * MP): This is the product of currency hoarding and monetary policy. It represents the joint effect of both variables on inflation and will help assess whether currency hoarding moderates the impact of monetary policy on inflation.

In order to achieve our research objectives, Currency hoarding will be represented by Currency in Circulation as a percentage of GDP (CPG). Monetary policy represented by Money Supply (MS) and Interest rate (INTR).

Our model will be specified as

$$\text{INF} = f(\text{CPG}, \text{MS}, \text{INTR}, \text{CHMP}) \quad (3.4)$$

Where

CPG represents Currency in circulation as a percentage of GDP

MS represents Money Supply

INTR represents Interest rate

CHMP represents the interaction term

The above mentioned model can be transformed into an econometric model with transformation into a double log model

$$\ln INF = \beta_0 + \beta_1 \ln CPG + \beta_2 \ln MS + \beta_3 \ln INTR + \beta_4 \ln CHMP + \varepsilon \quad (3.5)$$

Where log denotes the natural logarithm, b are the parameters to be estimated, and ε is the error term

Finally, the major estimation technique for this study is the error correction mechanism. Hence the ECM model for this study is specified as

$$\ln INF_t = b_0 + b_1 \ln CPG_{t-1} + b_2 \ln MS_{t-1} + b_3 \ln INTR_{t-1} + b_4 \ln CHMP_{t-1} + \varepsilon_t + \rho ECM_{t-1} \quad (3.6)$$

Currency in Circulation as a Percentage of GDP (CPG): The inclusion of CPG as an independent variable is rationalized by the economic theory that an increase in the proportion of currency in circulation relative to Nominal Gross Domestic Product (GDP) could potentially lead to inflation. If there's an excess of money supply in the economy compared to its productive capacity (GDP), it can drive up prices as individuals and businesses compete for limited goods and services with available money.

Money Supply (MS): The inclusion of MS is based on the idea that an increase in the money supply, all else being equal, is often associated with inflation. More money in circulation can lead to an increase in demand for goods and services. If

the supply of goods and services is relatively fixed, this increased demand can push up prices.

Interest Rate (INTR): The inclusion of INTR is rationalized by the economic principle that higher interest rates tend to reduce borrowing and spending. When interest rates rise, borrowing becomes more expensive, leading to reduced borrowing and spending by consumers and businesses. This reduction in demand can put downward pressure on prices and lead to lower inflation.

Interaction term: The interaction term (CHMP) is crucial because it assesses whether currency hoarding moderates the impact of monetary policy on inflation. Depending on the coefficients, if CHMP is significantly negative, it suggests that currency hoarding mitigates the inflationary impact of monetary policy. In other words, when currency hoarding is high, the influence of changes in money supply or interest rates on inflation is reduced. If β_4 is significantly positive, it suggests that currency hoarding amplifies the inflationary impact of monetary policy.

Apriori Expectation

The following are the a priori assumptions used for this study:

$B_1, \beta_2, >0$ while $\beta_3, <0, \beta_4 >0$ or <0

$B_1 > 0$, an increase in the proportion of currency in circulation relative to Gross Domestic Product (GDP) could potentially lead to inflation. If more currency is in circulation relative to the size of the economy, there may be an excess of money supply in the economy, which can drive up prices.

$\beta_2 > 0$, an increase in the money supply, all things being equal is often associated with inflation. More money in circulation can lead to increase in demand for goods and services which if supply is relatively fixed, can push up prices.

$B_3 < 0$, higher interest rates tends to reduce borrowing and spending, which can lower overall demand in the economy. Reduced demand can put downward pressure on prices and lead to lower inflation.

$B_4 > 0$ or < 0 , the effect of the interaction term (CHMP) on inflation can either be positive or negative depending on its coefficients. It is negative when currency hoarding mitigates the inflationary impact of monetary policy, and it is significantly positive when currency hoarding amplifies the inflationary impact of monetary policy.

3.3 Methodology

The Augmented Dickey-Fuller (ADF) test for unit root was applied to examine the stationarity or non-stationarity of the time series data utilized in this study. The long-term relationships among the variables included in this study were also determined using the Johansen co-integration test. In order to address any short-term disequilibrium, the Error Correction Model (ECM) is implemented. However, the following explanations of these testing techniques are provided:

3.3.1 The Unit Root Test

The unit root test is a statistical method used to test for the presence of a unit root in a time series data. A unit root is a characteristic of a time series in

which the data shows a tendency to return to a certain level or trend over time, which can lead to spurious regression and incorrect inferences in statistical analysis. The unit root test is commonly used in econometrics to test for stationarity of a time series, which is a key assumption in many econometric models. Stationarity refers to a time series that has constant statistical properties over time, such as a constant mean and variance. If a time series is non-stationary, it can lead to biased estimates and incorrect conclusions in econometric analysis.

There are several types of unit root tests, including the Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. These tests differ in their assumptions and the way they model the time series clears out by the next period and it is supposed to be negative.

The ADF test is one of the most widely used unit root tests in econometrics. It tests whether a time series is stationary by comparing the value of a test statistic to a critical value from a distribution table. If the test statistic is greater than the critical value, the null hypothesis of a unit root is rejected, indicating that the time series naturally follows after the analysis and testing of unit root. The basic idea behind co-integration testing is that even though is stationary.

Overall, the unit root test is an important tool in econometrics for testing the stationarity of time series data, which is crucial for accurate modeling and analysis of economic and financial data.

3.3.2 The Co-Integration Test

The co-integration test is the second test which two time-series may not themselves be stationary (although having the same order of integration), a linear combination of the two non-stationary time series may become stationary. If this holds true for two non-stationary data, then they can be said to be co-integrated Iyoha (2004). Therefore, if two or more variables are linked to form an equilibrium relationship spanning the long run, these variables are said to be co-integrated. A lack of co-integration suggests no long run relationship among the variables implying that they can wander arbitrarily far away from each other. This study employs the use of the Johansen test which is an improvement on the Engle-Granger test. This test assesses the validity of a cointegrating relationship using a maximum likelihood estimates (MLE) approach. The trace Johansen test is used whose null hypothesis states that there are no cointegrating equations while its alternate hypothesis is that the number of cointegrating relationships is at least one (shown by the number of linear combinations).

3.3.3 The Error Correction Model

If co-integration is established in the testing of variables, the next step to be carried out is the error correction model (ECM). This is because co-integration establishes the presence of a long run relationship which is appropriate for an ECM. The ECM estimates the speed of adjustment of the dependent variable to equilibrium after a change in explanatory variables. The co-efficient of the ECM is the proportion of disequilibrium from the long or short run period that

3.4 Data Sources

This study utilized secondary data spanning from the years 1990 to 2021. The data for the following variables: inflation (INF), money supply (MS), interest rate (INTR), currency in circulation (CIC), and Gross Domestic Product (GDP) were sourced from authoritative and reliable sources, including the annual publications of the Central Bank of Nigeria (CBN) 2021 issue and data provided by the National Bureau of Statistics (NBS) 2021.

Currency hoarding, CPG, is computed as Currency in Circulation (CIC) as a percentage of Nominal Gross Domestic Product (GDP).

To incorporate the interaction term into the model we will have to calculate the interaction term by multiplying by multiplying the values of currency hoarding and monetary policy. The interaction term will help provide a more comprehensive analysis of how currency hoarding and monetary policy jointly affect inflation in Nigeria.

To compute the interaction term $CHMP = \text{currency in circulation as a percentage of GDP} \times \text{Money supply}$.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESULT

4.1 Data Presentation

4.1.1 Descriptive Statistics

Descriptive statistics are statistical tools used to summarize and interpret a dataset, whether it represents a whole population or just a sample. These statistics fall into three main categories: measures of central tendency, measures of variability or dispersion, and sometimes measures of normality. They provide valuable insights into the characteristics of the variables being analyzed and include the mean (average), median (middle value), maximum (highest value), minimum (lowest value), standard deviation (variation from the mean), skewness (symmetry or asymmetry), kurtosis (peakedness or flatness), and the Jarque-Bera statistic.

The mean gives us the typical value of the data, while the median represents the middle value in the dataset. The maximum shows the highest data point, and the standard deviation indicates the amount of variation in the data around the mean. Skewness measures how symmetrical or asymmetrical the distribution is, with positively skewed distributions having longer tails on the right, and negatively skewed distributions having longer tails on the left. Kurtosis assesses the shape of the distribution, where a value of 3 indicates a standard shape, higher values indicate a more peaked distribution, and lower values indicate a flatter distribution.

Table 4.1 Descriptive Statistics

	LNCHMP	LNCPG	LNINF	LNINTR	LNMS
Mean	11.43402	0.828192	2.049883	1.919957	15.21100
Median	12.28674	0.737061	2.268030	1.899952	16.10332
Maximum	12.97423	1.467874	3.049702	2.900322	17.18736
Minimum	7.728737	0.392042	-0.376733	-0.009195	11.13696
Std. Dev.	1.616617	0.324817	0.718289	0.760274	1.902089
Skewness	-0.965902	0.369067	-1.732510	-1.245859	-0.830826
Kurtosis	2.689728	1.908342	7.097655	4.259991	2.427823
Jarque-Bera	3.509124	1.591845	26.39738	7.146547	2.831099
Probability	0.172983	0.451165	0.000002	0.028064	0.242792
Sum	251.5485	18.22022	45.09742	42.23905	334.6420
Sum Sq. Dev.	54.88243	2.215621	10.83473	12.13833	75.97676
Observations	31	31	31	31	31

Source: Authors compilation using E-views 10

From the provided statistics:

For LNCHMP (Natural Log of CHMP), the mean is approximately 11.43, with a median of approximately 12.29. It ranged from a minimum of approximately 7.73 to a maximum of approximately 12.97. The standard deviation is approximately 1.62, indicating moderate variability. It exhibits negative skewness with a coefficient of -0.97, indicating a left-skewed distribution. The kurtosis coefficient is approximately 2.69, suggesting moderate tailedness. The Jarque-Bera test yielded a p-value of 0.173, indicating that the distribution of LNCHMP does not significantly depart from normal. The sum of LNCHMP values amounted to approximately 251.55, with a sum of squared deviations approximately equal to 54.88.

For LNCPG (Natural Log of Currency in Circulation as a Percentage of GDP), the mean is approximately 0.83, with a median of approximately 0.74. The range extends from a minimum of approximately 0.39 to a maximum of approximately 1.47. The standard deviation is approximately 0.32, indicating relatively low variability. The skewness is positive, indicating a right-skewed distribution, and the kurtosis suggests moderate tailedness. The Jarque-Bera test yielded a p-value of 0.451, implying that the distribution of LNCPG does not significantly differ from normal. The sum of LNCPG values is approximately 18.22, with a sum of squared deviations approximately equal to 2.22.

For LNINF (Natural Log of Inflation Rate), the mean is approximately 2.05, with a median of approximately 2.27. It ranged from a minimum of approximately -0.38 to a maximum of approximately 3.05. The standard deviation is approximately 0.72, indicating moderate variability. It exhibits negative skewness with a coefficient of -1.73, indicating a left-skewed distribution, and the kurtosis coefficient suggests high tailedness. The Jarque-Bera test yielded a low p-value of 0.000002, indicating a significant departure from a normal distribution. The sum of LNINF values is approximately 45.10, with a sum of squared deviations approximately equal to 10.83.

For LNINTR (Natural Log of Interest Rate), the mean is approximately 1.92, with a median of approximately 1.90. It ranged from a minimum of approximately -0.01 to a maximum of approximately 2.90. The standard deviation is approximately

0.76, indicating moderate variability. It exhibits negative skewness with a coefficient of -1.25, indicating a left-skewed distribution, and the kurtosis coefficient suggests moderate tailedness. The Jarque-Bera test yielded a p-value of 0.028, indicating a significant departure from a normal distribution. The sum of LNINTR values is approximately 42.24, with a sum of squared deviations approximately equal to 12.14.

For LNMS (Natural Log of Money Supply), the mean is approximately 15.21, with a median of approximately 16.10. It ranged from a minimum of approximately 11.14 to a maximum of approximately 17.19. The standard deviation is approximately 1.90, indicating moderate variability. It exhibits negative skewness with a coefficient of -0.83, indicating a left-skewed distribution, and the kurtosis coefficient suggests moderate tailedness. The Jarque-Bera test yielded a p-value of 0.243, indicating that the distribution of LNMS is not significantly different from normal. The sum of LNMS values is approximately 334.64, with a sum of squared deviations approximately equal to 75.98.

4.2 Correlation Analysis

Correlation is a statistical measure or coefficient which indicates the direction and magnitude of the relationship existing between two or more variables of interest. The analysis of Correlation is an important statistical tool that measures magnitude and direction of the relationship between two or more variables. Correlation analysis is a useful tool for pre-test analysis, however it does not show

causality. The correlation among the relevant variables used in this research work is given in the table 4.2 below

Table 4.2. Correlation Matrix

	LNINF	LNCHMP	LNCPG	LNINTR	LNMS
LNINF	1				
LNCHMP	-0.18982	1			
LNCPG	0.181663	-0.8560	1		
LNINTR	-0.70768	0.00914	-0.0503	1	
LNMS	-0.19235	0.9961	-0.8983	0.01637	1

Source: Authors compilation using E-views 10

From table 4.2 above, the correlation coefficient between lnINF and lnCHMP is approximately -0.18982. This negative correlation suggests that as the interaction term (lnCHMP) increases, inflation (lnINF) tends to decrease slightly. However, the correlation is relatively weak.

lnCPG has a positive correlation of approximately 0.181663 with lnINF. This indicates a weak positive relationship between the percentage of currency in circulation and inflation rate. When the percentage of currency in circulation increases, inflation rate tends to increase slightly, but the correlation is not very strong.

lnINTR has a strong negative correlation of approximately -0.70768 with lnINF. This signifies a significant negative relationship between interest rates and inflation rate. When interest rates increase, inflation rate tends to decrease substantially.

lnMS has a weak negative correlation of approximately -0.19235 with lnINF. This suggests a slight negative relationship between money supply and inflation rate. When money supply increases, inflation rate may decrease slightly, but the correlation is not very strong.

4.2.1 Unit root test

In order to carry out the co-integration test, it is necessary to first ascertain the stationarity of the variables. Therefore, this study employs the use of the Augmented Dickey Fuller test to check for the stationarity of the variables employed in the model. In carrying out a unit root test, the order of integration is important as it helps in determining long run relationships among variables. Therefore, the null hypothesis that the variable has a unit root is tested and if the absolute values of the test statistics are greater than the critical values, the null hypothesis is rejected. This implies that the variable is stationary. If the absolute values of the test statistics are however less than the critical value, we fail to reject the null hypothesis. This implies the presence of a unit root and it shows that the variable is non-stationary. The unit root tests as well as the order of integration of the variables at level, are shown in the table below.

Table 4.3.1a Augmented Dickey Fuller test for unit root at Level

VARIABLES	ADF TEST STATISTIC	ADFCRITICAL VALUE			ORDER OF INTEGRATION	REMARK
		1%	5%	10%		
lnCHMP	-1.848089	-3.670170	-2.963972	-2.621007	I(0)	Not Stationary
lnCPG	-0.841825	-3.670170	-2.963972	-2.621007	I(0)	Not Stationary
lnINF	-3.420936	-3.670170	-2.963972	-2.621007	I(0)	Not Stationary
lnINTR	-3.067096	-4.420595	-3.259808	-2.771129	I(0)	Not stationary
lnMS	-2.366515	-3.670170	-2.963972	-2.621007	I(0)	Not Stationary

From Table 4.3.1a, it can be seen that the absolute values of the ADF Test Statistics for all the variables are lower than the critical values, meaning they are not stationary.

Table 4.3.1b Augmented Dickey Fuller test for unit root at First Difference

VARIABLES	ADF TEST STATISTIC	ADFCRITICAL VALUE			ORDER OF INTEGRATION	REMARK
		1%	5%	10%		
lnCHMP	-5.912804	-3.679322	-2.967767	-2.622989	I(0)	Not Stationary
lnCPG	-6.744605	-3.679322	-2.967767	-2.622989	I(0)	Not Stationary
lnINF	-7.668847	-3.679322	-2.967767	-2.622989	I(0)	Not Stationary
lnINTR	-4.740254	-4.582648	-3.320969	-2.801384	I(0)	Not stationary
lnMS	-4.458167	-3.679322	-2.967767	-2.622989	I(0)	Not Stationary

Source: computation from e-views 10

4.3.2 Co-integration Test

After conducting unit root tests, the next step is to perform a co-integration test. This test assesses whether two or more non-stationary time series exhibit stationarity over time and move in the same direction in the long run. Essentially, it

helps us determine if there's a long-term relationship between these economic variables from a statistical perspective.

The co-integration test relies on two key statistics: the Trace statistic and the Max-Eigen Value. In the case of the Trace statistic, if it exceeds the critical value at the chosen significance level, it indicates that the variables are co-integrated. Conversely, if the Trace statistic falls below the critical value at the chosen significance level, we conclude that the variables are not co-integrated. The same decision rule applies when comparing the Max-Eigen Value to the critical values. In both cases, if these statistics surpass the critical values, it suggests the presence of cointegrating equations among the variables.

Table 4.4a Johansen co-integration test (Trace)

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.777342	90.70213	69.81889	0.0005
At most 1	0.621300	47.14066	47.85613	0.0583
At most 2	0.320522	18.98137	29.79707	0.4942
At most 3	0.232768	7.774882	15.49471	0.4898
At most 4	0.003129	0.090878	3.841466	0.7631

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 4.4b Johansen co-integration test (Maximum Eigenvalue)
 Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.777342	43.56148	33.87687	0.0026
At most 1 *	0.621300	28.15928	27.58434	0.0422
At most 2	0.320522	11.20649	21.13162	0.6267
At most 3	0.232768	7.684004	14.26460	0.4117
At most 4	0.003129	0.090878	3.841466	0.7631

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's compilation using Eviews 10.0

4.3 Long run relationship

Table 4.5 Long run relationship

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.785139	2.863265	1.671218	0.113
CHMP	-0.00009	2.21E-06	-0.41537	0.6831
LNINTR	-0.67918	0.158066	-4.29679	0.0005
LNMS	-0.06122	0.165874	-0.36908	0.7166
LNCPG	-0.39196	0.966103	-0.40571	0.69
R-squared	0.539546	Mean dependent var		2.049883
Adjusted R-squared	0.431203	S.D. dependent var		0.718289
S.E. of regression	0.541724	Akaike info criterion		1.808595
Sum squared resid	4.988898	Schwarz criterion		2.056559
Log likelihood	-14.8946	Hannan-Quinn criter.		1.867008
F-statistic	4.980014	Durbin-Watson stat		1.412228
Prob(F-statistic)	0.007659			

Source: Author's Computation on Eviews10

From the table above, the R-squared value for the model is 0.539546, indicating that approximately 53.95% of the total variation in Inflation rate (INF) is explained by the variation in the explanatory variables. This suggests that a substantial portion of the variability in INF is captured by the included variables.

The adjusted R-squared value is 0.431203. This adjusted value takes into account the number of variables in the model and is slightly lower than the regular R-squared. It suggests that around 43.12% of the total variation in INF is attributable to the included explanatory variables.

The intercept term, represented by C, has a coefficient of 4.785139. This coefficient signifies the estimated value of Inflation rate (INF) when all other explanatory variables are held constant at zero. The coefficient suggests that, with all other factors constant, the expected Inflation rate (INF) will increase by approximately 4.79 units. However, this increase is not statistically significant at the 5% level (p-value of 0.113).

The coefficient for CHMP is -0.00009, indicating an extremely small and statistically insignificant negative relationship between the interaction term (CHMP) and Inflation rate (INF). A one-unit change in CHMP is associated with a negligible change in Inflation rate (INF).

The coefficient for LNINTR is -0.67918. This coefficient suggests a strong and statistically significant negative relationship between interest rates (LNINTR) and Inflation rate (INF). Specifically, a one-unit increase in LNINTR is associated

with a decrease in Inflation rate (INF) by approximately 0.679 units (p-value of 0.0005).

The coefficient for LNMS is -0.06122, indicating a small and statistically insignificant negative relationship between money supply (LNMS) and Inflation rate (INF). A one-unit change in LNMS is associated with a very slight change in Inflation rate (INF), and this relationship is not statistically significant at the 5% level (p-value of 0.7166).

The coefficient for LNCPG is -0.39196, suggesting a negative relationship between the natural logarithm of the percentage of currency in circulation (LNCPG) and Inflation rate (INF). A one-unit increase in LNCPG is associated with a decrease in Inflation rate (INF) by approximately 0.392 units. Similar to CHMP, this relationship is not statistically significant at the 5% level (p-value of 0.69).

4.4 Error Correction Model.

To determine the error correction model which is also referred to as the short run model, the variables need to be in differenced in their stationary form. The error correction terms, which are the residuals of the long run equation, are then incorporated into the model. The error correction term is however to be lagged one period. The results are shown in the table below:

Table 4.6: ECM Regression Result Summary

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.16234	0.546796	0.734582	0.4767
D(CHMP)	-0.00041	5.46E-06	-0.74459	0.4709
D(LNINTR)	-0.64236	0.128644	-4.99327	0.0003
D(LNMS)	-0.74785	1.303435	-0.57375	0.5767
D(LNCPG)	1.47176	1.284253	2.14601	0.0027
ECM(-1)	-0.61074	0.261532	-2.33526	0.0377
R-squared	0.858187	Mean dependent var		0.116102
Adjusted R-squared	0.799098	S.D. dependent var		1.117911
S.E. of regression	0.50107	Akaike info criterion		1.717062
Sum squared resid	3.01286	Schwarz criterion		2.013852
Log likelihood	-9.45356	Hannan-Quinn criter.		1.757985
F-statistic	14.52371	Durbin-Watson stat		2.370934
Prob(F-statistic)	0.000098			

Source: Author's Computation on Eviews10

The provided table presents the results of the error correction model (ECM). The coefficient of the error correction term (ECM) is negative, indicating that there is a tendency for the system to correct deviations from the long-run equilibrium. Moreover, the ECM is statistically significant at the 5% significance level, suggesting that it plays a significant role in adjusting the short-run deviations from the long-run equilibrium. Specifically, a coefficient of -0.61074 implies that approximately 61.07% of the discrepancy between the short-run and long-run models is corrected within a year.

The R-squared value for the model is 0.858187, indicating that approximately 85.82% of the total variability in Inflation rate (INF) can be explained by the variations in the explanatory variables included in the model.

The adjusted R-squared value is 0.799098, suggesting that around 79.91% of the growth in Inflation rate between 1990 and 2020 can be attributed to the growth in the explanatory variables after adjusting for the number of predictors in the model.

Looking at impact analysis, the coefficient for the intercept term (C) is -0.16234. This represents the estimated value of Inflation rate (INF) when all other explanatory variables are held constant. However, this coefficient is not statistically significant at the 5% level (p-value of 0.4767).

The coefficient for D(CHMP) is -0.00041, implying a very small and statistically insignificant negative relationship between changes in the interaction term (CHMP) and Inflation rate (INF). A one-unit increase in CHMP is associated with a 0.00041% decrease in INF. This result is in line with a priori expectations, as CHMP was expected to have either a positive or negative relationship with INF.

The coefficient for D(LNINTR) is -0.64236, indicating a strong and statistically significant negative relationship between changes in interest rates (INTR) and Inflation rate (INF). A one-percent increase in INTR is associated with a decrease in INF by approximately 0.6424% (p-value of 0.0003). This result aligns with a priori expectations.

The coefficient for $D(LNMS)$ is -0.74785 , suggesting a negative relationship between changes in money supply (MS) and Inflation rate (INF). A 1% change in MS is associated with a 0.74785% decrease in INF, but this relationship is not statistically significant at the 5% level (p-value of 0.5767). The result however contradicts a priori expectations.

The coefficient for $D(LNCPG)$ is 1.47176 , indicating a positive relationship between changes in the percentage of currency in circulation (CPG) and Inflation rate (INF). A one-unit change in CPG is associated with an increase in INF, and this relationship is statistically significant at the 0.05% level (p-value of 0.0027). This result is consistent with a priori expectations.

The F-statistic is 14.52371 with a very low probability ($\text{Prob}(F\text{-statistic})$) of 0.000098 , indicating that the overall model is statistically significant at the 0.01% level.

The Durbin-Watson statistic is approximately 2.37 , suggesting the absence of significant autocorrelation in the model's residuals.

4.5 Diagnostic Tests

4.5.1 Heteroskedasticity Test

One of the fundamental assumptions of the Classical Linear Regression Model (CLRM) is that the error terms have a constant variance, which means they exhibit equal distribution around a zero mean. This assumption is commonly known as homoscedasticity. When this assumption is violated, it leads to a

condition called heteroscedasticity, where the variance of the error terms differs across observations.

To assess whether this assumption holds or not, this study employs the Breusch-Pagan-Godfrey (BPG) test. The decision rule for this test is to accept the null hypothesis, which suggests the absence of heteroscedasticity (meaning homoscedasticity) if the p-values associated with the F-statistic and the observed R^2 exceed 0.05 (5% significance level). The results of the test indicate that there is no evidence of heteroscedasticity in this analysis.

Table 4.7 Heteroscedasticity results

Breusch-Pagan-Godfrey Test

F-statistic	1.458742	Prob. F(5,12)	0.2735
Obs*R-squared	6.804642	Prob. Chi-Square(5)	0.2356
Scaled explained SS	5.246609	Prob. Chi-Square(5)	0.3865

Source: Author's Computation on Eviews10

These p-values indicate that there is no statistically significant evidence of heteroscedasticity (varying variance of residuals) in the model. Therefore, we can conclude that the residuals' variance is stable across the range of measured values. In simpler terms, the assumption of constant variance of residuals is not violated. This means that the model's errors do not show a systematic pattern of increasing or decreasing variability as the independent variables change, which is an important assumption in linear regression analysis. The high p-values from these tests suggest

that there is no substantial departure from homoscedasticity, supporting the reliability of the assumption of constant variance in the residuals.

4.5.2 Serial Correlation Test

Serial correlation, also known as autocorrelation, refers to the presence of a linear relationship between the error terms of different observations in a regression analysis. This represents a significant violation of a crucial assumption in the Classical Linear Regression Model (CLRM). When autocorrelation is present in a dataset, it can lead to biased estimates of variances and standard errors, ultimately undermining the reliability of commonly computed summary statistics.

To investigate the existence of autocorrelation in the dataset, the Breusch-Godfrey Serial Correlation LM Test was employed. This test follows the same decision rule as the Breusch-Pagan-Godfrey (BPG) test for heteroscedasticity. The results of the test indicate that both the p-values associated with the F-statistic and the observed R^2 exceed the threshold of 0.05, indicating the absence of autocorrelation in the dataset. You can find these results in Table 4.8 below.

Table 4.8 Serial Correlation Test

F-statistic	2.202118	Prob. F(2,10)	0.1613
Obs*R-squared	5.503675	Prob. Chi-Square(2)	0.0638

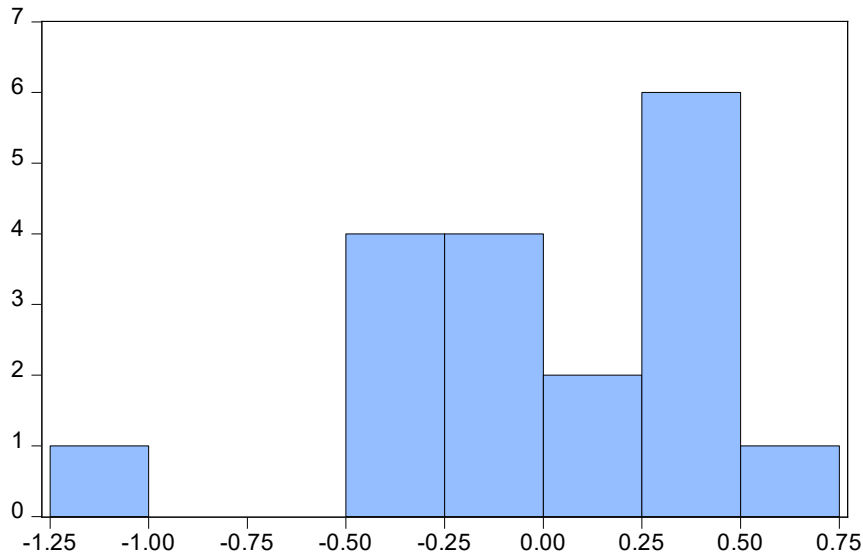
Source: Author's Computation on Eviews10

The p-value for the serial correlation test, as indicated by the "Prob. Chi-Square(2)" value of 0.0638, is moderately low. This suggests that there is some evidence of residual autocorrelation in the model at a specific lag order. However,

the p-value is not as low as the typical significance level (e.g., 0.05), indicating that the evidence for serial correlation is not very strong at the given lag order. In practical terms, this suggests that there may be some temporal dependencies in the residuals, but they might not be statistically significant at the chosen lag order. It's possible that the model adequately captures most of the serial correlation in the data, but there could still be some unaccounted-for autocorrelation at the specified lag. Further investigation or model refinement may be necessary to address this issue fully.

4.5.3 Normality Test

Another important assumption of the Classical Linear Regression Model (CLRM) is that the error terms or residuals are independently and identically distributed with a zero mean and a constant variance. In econometric jargon, this is usually referred to as the Gaussian white noise process. These above two key statistical properties are the basic features of a normal distribution. Hence, it is assumed that the error terms generated from a given regression exercise should be normally distributed. To test for the fulfillment or otherwise of this criterion, we utilized the Jarque-Berra (JB) statistic. The decision rule is to reject the null hypothesis which holds that the series is normally distributed, if the probability of the JB statistics is less than 0.05 (5%) and accept the null hypothesis if otherwise.



Series: Residuals	
Sample 1991 2020	
Observations 18	
Mean	-8.87e-17
Median	0.008684
Maximum	0.518975
Minimum	-1.187754
Std. Dev.	0.420983
Skewness	-1.084374
Kurtosis	4.469652
Jarque-Bera	5.147507
Probability	0.076249

4.5.4 Ramsey Reset Test

	Value	df	Probability
t-statistic	1.399712	11	0.1892
F-statistic	1.959192	(1, 11)	0.1892
Likelihood ratio	2.950382	1	0.0859

Source: Author's Computation on Eviews10

The p-value (0.0859) obtained from the Ramsey RESET test is greater than the typical significance level (0.05). Therefore, you do not have enough evidence to reject the null hypothesis that the model is correctly specified. In other words, there is no significant indication of omitted non-linear terms in your regression model based on this test at the chosen significance level.

This suggests that, based on the Ramsey RESET test, there is no strong evidence to suggest that your model is misspecified due to the omission of non-

linear terms. However, it's important to consider other diagnostic tests and the context of your analysis to ensure the overall adequacy of your regression model.

4.6 Discussion of Findings

The empirical investigation into the relationship between currency hoarding, monetary policy, and inflation in Nigeria utilized an Error Correction Model (ECM) for the period spanning from 1990 to 2020. Several key variables, including Currency in Circulation as a percentage of GDP (CPG), Interest rate (INTR), Money supply (MS), Inflation rate (INF), and an interaction term (CHMP), were analyzed to draw meaningful conclusions.

The coefficient for $D(LNCPG)$ was found to be 1.47176. This implies that a 1% increase in currency in circulation as a percentage of GDP (LNCPG) is associated with a substantial estimated increase of 1.47176% in the Inflation rate (INF). Importantly, this relationship was found to be statistically significant at the 0.05% level (p-value of 0.0027). This result aligns with a priori expectations, indicating that an expansion of currency in circulation can contribute to inflationary pressures.

The coefficient for $D(LNINTR)$ was -0.64236, suggesting a strong and statistically significant negative relationship between changes in interest rates (INTR) and the Inflation rate (INF). Specifically, a one-percent increase in interest rates is associated with a decrease in the Inflation rate by approximately 0.6424%.

This result is in line with expectations, as higher interest rates typically tend to dampen inflationary pressures.

The coefficient for D(LNMS) was -0.74785, indicating a negative relationship between changes in money supply (MS) and the Inflation rate (INF). However, this relationship was not statistically significant at the 5% level (p-value of 0.5767). This result contradicts a priori expectations, as an increase in money supply is often expected to stimulate inflation. The lack of statistical significance suggests that other factors may be at play, influencing the relationship between money supply and inflation.

Lastly, the coefficient for D(CHMP) was -0.00041, suggesting a very small and statistically insignificant negative relationship between changes in the interaction term (CHMP) and the Inflation rate (INF). A one-unit increase in CHMP is associated with a 0.00041% decrease in INF. This result is in line with a priori expectations, as CHMP was expected to have either a positive or negative relationship with INF.

4.7 Test of hypothesis

Hypothesis 1: There is no relationship between currency hoarding (CPG) and inflation in Nigeria.

Null Hypothesis (H0): The coefficient of CPG (1.47176) is equal to zero.

Alternative Hypothesis (H1): The coefficient of CPG (1.47176) is not equal to zero.

To test this hypothesis, we'll look at the t-statistic for CPG, which is 2.14601 with a p-value of 0.0027. Since the p-value is less than the significance level of 0.05, we can reject the null hypothesis.

Interpretation: There is a statistically significant relationship between currency hoarding (CPG) and inflation in Nigeria. In other words, changes in currency hoarding are associated with changes in inflation in the Nigerian context.

Hypothesis 2: Monetary policy (MS and INTR) does not affect inflation in Nigeria.

Null Hypothesis (H0): The coefficients of MS and INTR are both equal to zero.

Alternative Hypothesis (H1): At least one of the coefficients of MS or INTR is not equal to zero.

To test this hypothesis, we'll use the F-statistic, which is 14.52371 with a p-value of 0.000098. Since the p-value is less than the significance level of 0.05, we can reject the null hypothesis.

Interpretation: Monetary policy, as represented by the variables MS (Money Supply) and INTR (Interest Rate), collectively affects inflation in Nigeria. In other words, at least one of these variables has a statistically significant impact on inflation.

Hypothesis 3: Currency hoarding (CPG) does not affect the relationship between monetary policy (MS and INTR) and inflation in Nigeria.

Null Hypothesis (H0): The coefficient of CHMP (interaction term) is equal to zero, indicating no interaction effect. Alternative Hypothesis (H1): The coefficient of CHMP (interaction term) is not equal to zero, indicating an interaction effect.

Given the t-statistic for CHMP as -0.74459 and the p-value as 0.4709, we can evaluate this hypothesis.

Since the p-value (0.4709) is greater than the typical significance level of 0.05, we fail to reject the null hypothesis.

Interpretation: There is insufficient evidence to conclude that currency hoarding (CPG) affects the relationship between monetary policy (MS and INTR) and inflation in Nigeria. In other words, based on the available data, it appears that the interaction term CHMP does not have a statistically significant impact on the relationship between monetary policy and inflation in Nigeria

4.8 Policy Implications

Based on the findings of the empirical investigation into the relationship between currency hoarding, monetary policy, and inflation in Nigeria, there are several policy implications that can be drawn in the Nigerian context:

The positive and statistically significant relationship between currency in circulation (CPG) and inflation rate (INF) suggests that the Central Bank of Nigeria and policymakers should carefully manage the expansion of currency in circulation. While it can stimulate economic activity, an excessive increase in currency supply may lead to inflationary pressures. Policymakers should strike a balance between providing liquidity to the economy and controlling inflation.

The negative and statistically significant relationship between interest rates (INTR) and inflation rate (INF) underscores the effectiveness of using interest rates

as a tool to manage inflation. Policymakers can continue to use interest rate adjustments as part of their monetary policy toolkit to control inflation. However, it's important to consider the broader economic context when making interest rate decisions.

The non-significant relationship between changes in money supply (MS) and inflation rate (INF) suggests that money supply alone may not be a reliable predictor of inflation in Nigeria. Policymakers should be cautious about using changes in the money supply as the sole indicator for inflationary pressures. They need to take into account other macroeconomic factors that could influence inflation.

The small and statistically insignificant relationship between the interaction term (CHMP) and inflation rate (INF) implies that this specific interaction may not have a significant impact on inflation in Nigeria. Policymakers should focus on broader monetary and fiscal policies rather than relying heavily on the specific interaction term studied in this model to manage inflation.

The findings highlight the complexity of inflation dynamics in Nigeria, suggesting that inflation is influenced by a multitude of factors. Policymakers should adopt a holistic approach to economic management, taking into account not only monetary policy but also fiscal policy, external factors, and structural issues in the economy.

CHAPTER FIVE

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Summary of findings

- An increase in currency in circulation (CPG) is associated with higher inflation, supporting the idea that changes in the money supply can influence inflation.
- Higher interest rates (INTR) are linked to lower inflation, in line with conventional monetary policy expectations.
- Changes in money supply (MS) do not have a statistically significant impact on inflation in this model, which may warrant further investigation into the factors affecting the money supply-inflation relationship.
- The interaction term (CHMP) does not show a substantial or significant relationship with inflation.

5.2 Policy Recommendations

Based on the discussion of findings and policy implications regarding currency hoarding, monetary policy, and inflation in Nigeria, here are some policy recommendations for Nigerian policymakers:

1. **Manage Currency in Circulation (CPG) Prudently:**

Given the positive relationship between currency in circulation and inflation, policymakers should exercise caution when increasing the money supply through currency issuance. While providing liquidity is essential for economic growth, it

should be done in moderation to prevent excessive inflation. Monitoring and managing CPG growth can help in achieving this balance.

2. Use Interest Rates as an Inflation Control Tool:

The negative relationship between interest rates (INTR) and inflation rate (INF) suggests that policymakers can continue using interest rate adjustments as an effective tool for controlling inflation. However, the impact of interest rate changes should be carefully assessed within the broader economic context to avoid unintended consequences.

3. Broaden the Focus on Monetary Policy Tools:

While interest rates are a vital tool, policymakers should not rely solely on them. They should consider using a mix of monetary policy instruments, including open market operations and reserve requirements, to manage the money supply and inflation effectively.

4. Consider Holistic Economic Policies:

Recognizing that inflation is influenced by various factors, policymakers should adopt a comprehensive approach to economic management. This includes coordinating monetary and fiscal policies to ensure they complement each other in achieving macroeconomic stability.

5. Enhance Data and Research Efforts:

The unexpected result related to money supply (MS) highlights the need for ongoing research and data collection. Policymakers should invest in improving data

accuracy and conducting in-depth research to understand the specific drivers of inflation in Nigeria better.

6. Strengthen Exchange Rate Management:

While not covered in the provided analysis, exchange rate fluctuations can also influence inflation. Nigerian policymakers should continue to manage exchange rate stability and consider its impact on inflation when formulating policies.

7. Enhance Communication and Transparency:

Clear communication of monetary policy decisions and their rationale can help manage inflation expectations. Policymakers should maintain transparency and provide guidance to the public and financial markets regarding their inflation-fighting strategies.

5.3 Conclusion

In conclusion, the empirical investigation into currency hoarding, monetary policy, and inflation in Nigeria using an Error Correction Model (ECM) spanning from 1990 to 2020 has yielded valuable insights and policy recommendations.

The findings indicate that currency in circulation (CPG) plays a pivotal role in driving inflation, with a 1% increase associated with a substantial 1.47176% rise in inflation, a relationship confirmed as statistically significant. Interest rates (INTR) were found to be effective in dampening inflation, with a 1% increase

resulting in a 0.6424% decrease in inflation, in line with monetary policy expectations.

Surprisingly, changes in money supply (MS) were not statistically significant in explaining inflation dynamics, highlighting the complexity of inflation drivers in Nigeria. The interaction term (CHMP) also showed negligible impact on inflation.

Policy recommendations include prudent management of currency in circulation, continued use of interest rates as an inflation control tool, diversification of monetary policy tools, adoption of holistic economic policies, and improved data and research efforts. Strengthening exchange rate management, enhancing communication, and maintaining transparency were also emphasized.

In summary, managing inflation in Nigeria requires a multifaceted approach, considering various economic factors and employing a mix of policy tools. While the study sheds light on specific relationships, the broader economic context must be considered, and continuous research and adaptability in policymaking are crucial for effectively addressing inflationary challenges in Nigeria's evolving economy.

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APPENDIX

year	CPG	MS	CHMP	INTR	INF
1990	3.31	68662.5	2272.729	17.46624	6.668942
1991	4.34	87499.8	3797.491	0.990847	18.86391
1992	4.43	129085.5	5718.488	-14.9872	46.75236
1993	3.11	132439.8	4118.878	-7.05247	41.63906
1994	3.31	208020.5	6885.479	-15.9202	43.29646
1995	2.97	275184.9	8172.992	-31.4526	75.40165
1996	2.66	324359.9	8627.973	-5.26078	26.49109
1997	2.74	394976.4	10822.35	12.12661	5.055346
1998	2.94	435811.7	12812.86	11.48467	6.009344
1999	3.15	536013.8	16884.43	6.047248	13.43057
2000	2.85	648506.6	18482.44	-1.14089	22.67374
2001	3.76	1092754	41087.55	12.1387	10.07648
2002	3.35	1347266	45133.41	3.023542	21.10905
2003	3.29	1746192	57449.72	9.935713	9.804324
2004	2.68	1917503	51389.08	-2.60485	22.36834
2005	2.28	2349890	53577.49	-1.59368	19.85849
2006	1.91	2967140	56672.37	-5.62797	23.86438
2007	2.06	3900135	80342.78	9.187171	7.099731
2008	2.19	6527673	142956	6.684909	7.921387
2009	2.47	9294036	229562.7	18.18	0.686099
2010	1.96	10446374	204748.9	1.067736	16.34277
2011	2.12	11561526	245104.4	5.68558	9.778458
2012	2.06	13755293	283359	6.224809	9.947637
2013	1.82	15308393	278612.8	11.20162	4.964746
2014	1.78	15493690	275787.7	11.35621	4.662623
2015	1.77	18965534	335690	13.59615	2.863665
2016	1.7	19799458	336590.8	6.686234	9.54367
2017	1.75	23096527	404189.2	5.790567	11.11892
2018	1.52	23963031	364238.1	6.055977	10.22849
2019	1.48	26771087	396212.1	4.522188	10.38478
2020	1.48	29132380	431159.2	5.37128	7.849142

Appendix 1

Ramsey reset test

Ramsey RESET Test

Equation: UNTITLED

Specification: D(LNINF) C D(CHMP) D(LNINTR) D(LNMS)
D(LNCPPG)

ECM(-1)

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.399712	11	0.1892
F-statistic	1.959192	(1, 11)	0.1892
Likelihood ratio	2.950382	1	0.0859

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.455489	1	0.455489
Restricted SSR	3.012860	12	0.251072
Unrestricted SSR	2.557370	11	0.232488

LR test summary:

	Value
Restricted LogL	-9.453555
Unrestricted LogL	-7.978364

Unrestricted Test Equation:

Dependent Variable: D(LNINF)

Method: Least Squares

Date: 10/03/23 Time: 12:51

Sample: 1991 2020

Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.187151	0.212518	0.880635	0.3973
D(CHMP)	-4.51E-06	5.26E-06	-0.856966	0.4097
D(LNINTR)	-0.742148	0.142854	-5.195136	0.0003
D(LNMS)	-0.127949	1.330162	-0.096191	0.9251
D(LNCPPG)	-2.489004	1.433665	-1.736113	0.1104
ECM(-1)	-1.117635	0.441000	-2.534319	0.0278

FITTED^2	-0.149224	0.106611	-1.399712	0.1892
R-squared	0.879627	Mean dependent var	0.116102	
Adjusted R-squared	0.813968	S.D. dependent var	1.117911	
S.E. of regression	0.482170	Akaike info criterion	1.664263	
Sum squared resid	2.557370	Schwarz criterion	2.010518	
Log likelihood	-7.978364	Hannan-Quinn criter.	1.712007	
F-statistic	13.39706	Durbin-Watson stat	2.228953	
Prob(F-statistic)	0.000172			

Appendix II

Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.202118	Prob. F(2,10)	0.1613
Obs*R-squared	5.503675	Prob. Chi-Square(2)	0.0638

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 10/03/23 Time: 12:45

Sample: 1991 2020

Included observations: 18

Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.104374	0.206908	-0.504446	0.6249
D(CHMP)	-3.03E-06	5.19E-06	-0.583796	0.5723
D(LNINTR)	-0.047053	0.134483	-0.349880	0.7337
D(LNMS)	0.750209	1.244314	0.602909	0.5600
D(LNCPG)	-0.907107	1.313887	-0.690399	0.5057
ECM(-1)	0.342424	0.354200	0.966753	0.3565
RESID(-1)	-0.351357	0.496054	-0.708304	0.4949
RESID(-2)	-0.757535	0.379470	-1.996300	0.0738

R-squared	0.305760	Mean dependent var	-8.87E-17
Adjusted R-squared	-0.180208	S.D. dependent var	0.420983
S.E. of regression	0.457345	Akaike info criterion	1.574347
Sum squared resid	2.091648	Schwarz criterion	1.970067
Log likelihood	-6.169120	Hannan-Quinn criter.	1.628911
F-statistic	0.629176	Durbin-Watson stat	2.403930
Prob(F-statistic)	0.723294		

Appendix 3

Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.458742	Prob. F(5,12)	0.2735
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Obs*R-squared	6.804642	Prob. Chi-Square(5)	0.2356
Scaled explained SS	5.246609	Prob. Chi-Square(5)	0.3865

Test Equation:
 Dependent Variable: RESID^2
 Method: Least Squares
 Date: 10/03/23 Time: 12:36
 Sample: 1991 2020
 Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.015811	0.132242	0.119563	0.9068
D(CHMP)	2.42E-06	3.28E-06	0.738599	0.4743
D(LNINTR)	0.072645	0.077316	0.939589	0.3660
D(LNMS)	0.702345	0.783372	0.896566	0.3876
D(LNCPG)	0.306924	0.771844	0.397651	0.6979
ECM(-1)	-0.111690	0.157182	-0.710578	0.4909
R-squared	0.378036	Mean dependent var	0.167381	
Adjusted R-squared	0.118884	S.D. dependent var	0.320820	
S.E. of regression	0.301146	Akaike info criterion	0.698761	
Sum squared resid	1.088270	Schwarz criterion	0.995552	
Log likelihood	-0.288853	Hannan-Quinn criter.	0.739685	
F-statistic	1.458742	Durbin-Watson stat	2.745074	
Prob(F-statistic)	0.273472			

Research Data

Given that CIC and GDP is gotten from CBN 2021 statistical bulletin

To compute the Currency in Circulation (CIC) as a percentage of Nominal Gross Domestic Product (GDP),

1. Convert the CIC data from million naira to billion naira to match nominal GDP data.
2. Calculate CIC as a percentage of GDP for each year.

Here's the calculation:

First, let's convert the CIC data from million naira to billion naira:

Now, calculate the CIC as a percentage of GDP for each year:

To incorporate the interaction term into the model we will have to calculate the interaction term by multiplying by multiplying the values of currency hoarding and monetary policy. The interaction term will help provide a more comprehensive analysis of how currency hoarding and monetary policy jointly affect inflation in Nigeria.

To compute the interaction term $CHMP = \text{currency in circulation as a percentage of GDP} \times \text{Money supply}$

Given that CPG is in percentage and money supply is in naira. We will convert it to the same base by converting CPG into decimal then multiplying it by Money supply which is in million naira.

Note computation for the interaction term will be done using Microsoft Excel by the author.

MS is measured in million Naira

CHMP represents the interaction term between currency hoarding and monetary supply