

CURRENCY HOARDING, MONETARY POLICY AND AGGREGATE CONSUMPTION

BY

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DEPARTMENT OF ECONOMICS

FACULTY OF SOCIAL SCIENCES

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**BEING A PROJECT SUBMITTED TO THE
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CERTIFICATION

This is to certify that this work titled The Impact of Exchange Rate Volatility on Trade in Nigeria was carried out by me Alice Oheji ODEY for the award of Bachelor of Science (B.sc) Degree in the Department of Economics, Faculty of Social Sciences University of Benin, Benin City, under the supervision of the following persons;

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DEDICATION

This project is dedicated to God Almighty for his infinite mercy, favour, grace, strength, knowledge and wisdom upon me.

This project is also dedicated to my late father Mr Marcus Elemhonmahn, in instilling in paving the way and instilling the discipline to carry out my education.

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ABSTRACT

This research investigates the relationship between currency hoarding and the effectiveness of monetary policy in Nigeria. Using the Autoregressive Distributed Lag (ARDL) model, we find that currency hoarding and monetary policy both have positive associations with aggregate consumption. However, the study does not conclude that currency hoarding affects the effectiveness of monetary policy on consumption. This complex interplay calls for nuanced policy measures, including tailored strategies for diverse currency hoarding motivations and improved communication to optimize policy outcomes.

**CURRENCY HOARDING, MONETARY POLICY AND AGGREGATE
CONSUMPTION**

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Currency is anything that people use to store value or trade for goods or services, currencies can be paper and coins such as naira, dollars. Hoarding on the other hand is the voluntary failure of any sector in the circular flow of income to pass on to another sector much money as it receives from it (Robert, 1959). Put together, currency hoarding can be said to be the practice of individuals, businesses or entities to pile and hold large amounts of physical currency typically in the form of bank notes, rather than engaging in economic activities that would facilitate its circulation and use within the broader economy. It also has to do with the withdrawal of currency from the financial system, resulting in reduced liquidity and potentially disrupting the normal functioning of monetary policy, According to the Central Bank of Nigeria (CBN), more than 85% of the money in circulation is kept outside the vaults of commercial banks, this led to the currency redesign by the CBN in 2022. The amount of money in circulation has more than doubled, rising from N1.46 trillion in December 2015 to N3.23 trillion in September 2022. Data from the CBN shows an 11.07% increase in the value of cash kept outside of banks from the N2.54 trillion reported in a comparable time of 2021 Year-on-Year (Onimisi, 2023). In an article released by thisdaylive in April of 2023 it found out that in a nine-month breakdown that prompted the naira redesign policy showed a N3.23 trillion currency in circulation in September 2022, N3.29 trillion in October 2022, November 2022, N3.16 trillion and December 2022, N3.01 trillion. In January 2023, currency in circulation was N3.29 trillion, February 2023, N982 billion, March 2023, N1.68 trillion and April 2023, N2,38 trillion. Also, the nine-month breakdown of currency outside the banks reveals that the month of September was N2.72 trillion October N2.83 trillion November N2.65 trillion and December N2.57, While January recorded

its lowest at N792 billion, February N843 billion, and in March N1.45 trillion and April N2.07 trillion. Experts said the spike is vastly because of the spillover effect of the cash crunch adding that average Nigerians are hoarding the new notes and are not depositing in the banks because of distrust in electronic banking (Thisdaylive, 2023).

Monetary policy refers to any conscious or deliberate actions of the monetary authorities, mostly central banks, to control (change) the quantity, availability or cost of money in an economy in order to achieve laid down goals/ objectives. It is also a combination of policy measures designed by a central bank to control the quantity of money and cost of credit in the economy in consonance with the expected level of economic activity. In other words, monetary policy is the process by which the central bank or monetary authorities of a country controls the supply, availability and cost of money in order to attain a set of objectives, usually geared towards promoting national economic goals. It is, therefore, the deliberate actions taken by the central bank to stabilize the economy (CBN, 2016), The authority charged with the responsibility for monetary policy in Nigeria is the Central bank of Nigeria (CBN), established in 1958 under the CBN act, and came into operation in 1959, the CBN had to rely mainly on a combination of administrative controls in the conduct in the conduct of its monetary policy (Iyoha, 2003).

Consumption is one of the most popular determinants of living standards, it depicts the aggregate demand of goods and services in the country. Measuring consumption over a week or month provides an indication of a household's consumption habits over a year because it has a smooth flow to it in other words it is steady. Income however, tends to vary widely from week to week or month to month. In compiling gross domestic product (GDP), the amount of money spent on a

country— consumables are used in the computation of final household expenditure and in most cases it constitutes about 60 percent of the total GDP.

The relationship between monetary policy and aggregate consumption can be shown by the Central bank monetary policy rate (MPR) and GDP. Available data shows that over the years, the CBN has interfered with the MPR to stimulate economic growth in Nigeria. For example, in 2006 the monetary policy rate was pegged at 10% but it later fell by 5 percent later in the same year, it was increased to 10.25 % in 2008, it was increased to 12% in 2011 and furthered increased to 14% in 2018, and it is presently at its all time high of 18% in 2023. Nigeria's GDP has been fluctuating since the early 2000's as a result of the economic instability, but it was at its lowest when it was sprung into a recession in 2016, but, since it has been on a part of recovery. The CBN is playing an integral and important role in the stabilization of the Nigeria economy, using both expansionary and contractionary monetary policy . it has changed the economic situation at a time, though this policy has proven not to be permanent but temporary, Nigeria's annual real GDP growth rate, which averaged 7% from 2000 to 2014, fell to 2.7 percent in 2015 and to -1.6 percent in 2016. Growth rebounded to 0.8 percent in 2017, 1.9 percent in 2018, and then plateaued at 2 percent in the first half of 2019, where it is expected to remain for the rest of the year.(world bank,2022).

.The relationship between currency hoarding, monetary policy, and aggregate consumption has been an area of interest for economists for several decades. It is widely believed that currency hoarding can have a negative impact on aggregate consumption and economic growth. When currency is hoarded, it reduces the amount of money in circulation, which can lead to a decline in spending and investment.

Therefore, it is crucial to study the effects of currency hoarding and monetary policy on aggregate consumption to understand how these factors affect the economy. This study will examine the relationship between currency hoarding, monetary policy, and aggregate consumption in the context of the financial market, the interplay between currency hoarding, monetary policy, and aggregate consumption can have significant implications for the financial market and the broader economy. A central bank's decisions regarding interest rates and money supply aim to strike a balance between encouraging economic activity and controlling inflation, while the behavior of individuals and businesses, including currency hoarding, can impact the effectiveness of these policies. Understanding these dynamics is crucial for policymakers and investors in navigating financial markets and assessing economic conditions. Focusing on the Nigerian economy as a case study. The findings of this study will help policymakers develop effective strategies to manage currency hoarding and monetary policy to enhance aggregate consumption and promote economic growth.

1.2: Statement of the Research Problem

Nigeria being an underdeveloped country has faced streams of consistent inflation, which has played a role in the currency of the country being undervalued in the international stage. Despite various monetary policy measures implemented by the Central Bank of Nigeria (CBN) to stimulate aggregate consumption and economic growth, the Nigerian economy has continued to experience persistent inflationary pressures, sluggish growth, and weak consumer demand. One potential factor contributing to this economic malaise is the hoarding of naira currency by individuals and businesses, which may be impeding the effectiveness of monetary policy transmission mechanisms. While some studies have examined the determinants and effects of currency hoarding in Nigeria, there is a need for further research to investigate the potential

linkages between currency hoarding, monetary policy, and aggregate consumption in the country. Also Nigeria, as a rapidly growing emerging economy, is confronted with the challenge of implementing effective monetary policies to achieve its dual mandate of price stability and sustainable economic growth. At the same time, currency hoarding, the propensity of economic agents to hold physical cash outside of formal financial institutions, has persisted as a notable economic phenomenon with implications for monetary policy transmission.

Despite various studies carried out, there still exists a dearth of empirical evidence on the transmission mechanisms through which currency hoarding and monetary policy affect consumption, taking into account the peculiarities and challenges facing the country. This study aims to address this gap in the literature by providing empirical evidence on the variables or mechanisms through which currency hoarding and monetary policy impacts consumption in Nigeria.

1.3: Research Questions

By answering these questions, this study aims to provide insights into the factors contributing to economic stagnation in Nigeria and identify potential policy solutions to address this issue.

1. What is the relationship between currency hoarding and aggregate consumption in Nigeria?
2. Does monetary policy affect aggregate consumption in Nigeria?
3. How does currency hoarding influence the effect of monetary policy on aggregate consumption in Nigeria?

1.4: Objectives of the Study:

1. To determine the extent to which currency hoarding affects aggregate consumption in Nigeria.

2. To assess the impact of monetary policy on aggregate consumption in Nigeria.

3 To analyze the impact of currency hoarding of the effect of monetary policy on aggregate consumption in Nigeria.

1.5: Research Hypotheses

Considering the objective of the study, the following null hypotheses are tested in the study:

1: There's no relationship between currency hoarding and aggregate consumption.

2: currency hoarding does not affect monetary policy.

3: Currency hoarding has no influence on the effect of monetary policy on aggregate consumption.

1.6 Scope of the Study

This study will focus on currency hoarding, monetary policy, and aggregate consumption. It will examine the relationship between these three factors and their implications for economic growth and stability. This study was carried out in Nigeria, using data from CBN statistical bulletin, The period covered in this study is 30 years (1981-2022)

1.7 Significance of the Study

2This study is significant because it will provide insights into the impact of currency hoarding on the aggregate consumption of households in the economy. findings of this study will be useful to policymakers, economists, and researchers who are interested in understanding the relationship

between currency hoarding, monetary policy, and aggregate consumption. The study will also contribute to the existing literature on currency hoarding and its implications for economic growth and stability.

1.8 LIMITATIONS OF THE STUDY

This study was limited by so many factors, the study relies on secondary data sources which may have limitations in terms of accuracy and completeness, the data also be subject to sampling biases or data gaps which could impact the validity of the findings. It is also affected by causality, there may be difficulty in establishing a causal relationship between currency hoarding monetary policy and aggregate consumption. This study will also be limited by time, Long term effects of currency hoarding, monetary policy and aggregate consumption may not be captured accurately.

1.9 Structure of the Study

The study is organized into four chapters in addition to this introductory chapter. Chapter 2 reviews the relevant literature on the relationship between monetary policy and currency hoarding on Aggregate consumption in developing countries, with a focus on Nigeria. Chapter 3 presents the theoretical framework and methodology.

CHAPTER TWO

REVIEW OF LITERATURE

The relevant literature associated with this study will be reviewed from the standpoint of a conceptual clarifications, theoretical literature and empirical literature reviews.

2.1 Conceptual Framework

The conceptual framework of this study was based on the variables identified in the study.

2.1.1 Currency hoarding

Currency hoarding is the practice of holding a significant amount of currency without investing or spending it.. Currency hoarding reduces the amount of money in circulation, which can lead to a decline in spending and investment. This reduction in spending can negatively impact economic growth and employment opportunities.

The literature suggests several reasons why currency hoarding occurs. First, it may be a response to economic uncertainty. In times of economic instability, individuals and firms may prefer to hold cash as a form of insurance against future uncertainty (Chamley, 2012).

2.1.2 Monetary policy

Monetary policy can be defined as the process by which a central bank, such as the Federal Reserve in the United States or Central bank of Nigeria(CBN), manages the supply and demand of money in the economy to achieve specific macroeconomic goals. such as price stability, full employment, and sustainable economic growth, the tools used to implement monetary policy include interest rate adjustments, open market operations, and reserve requirements. The goal of monetary policy is to maintain a stable and predictable monetary environment that fosters economic growth and stability. The literature suggests that monetary policy can influence currency hoarding and aggregate consumption through various channels.

2.1.3 Open market operations: Open market operations refer to the sale and purchase of securities in the money market by the Central bank. When prices are rising and there is no need to control them the Central bank sells securities, the reserves community. By purchasing

government securities, the central bank injects money into the economy, which can increase the supply of money and lower interest rates (Bernanke & Gertler, 1995).

2.1.4 Changes in Reserve Ratio: The reserve ratio is the percentage of deposits that banks are required to hold in reserve, either in their vaults or on deposit at the central bank, to ensure that they can meet the demands of depositors for withdrawals" (Mishkin & Eakins, 2015, p. 451).

When prices are rising, the Central bank raises the reserve ratio. Banks are required to keep more with the Central bank. their reserves are reduced and they lend less. The volume of investment, output and employment are adversely affected.

2.1.5 Bank Rate Policy: According to Jhingan (2016) the bank rate is the minimum lending rate of the Central bank at which it rediscounts first class Bills of exchange and government securities held by the commercial banks (Jhingan, 2016). When the Central bank finds that inflationary pressures have started emerging within the Economy, it raises the bank rate.

Borrowing from the Central bank becomes costly and commercial banks borrow less from it. The commercial banks in turn raise their lending rates to the business community and borrowers borrow less from the commercial banks.

2.1.6 Aggregate consumption: Aggregate consumption refers to the total amount of goods and services that are purchased by households in an economy over a given period of time. It is a critical component of aggregate demand, which represents the total level of spending in an economy. Aggregate consumption is affected by a variety of factors, including income, interest rates, consumer confidence, and government policies.

According to Dornbusch et al. (2013), "aggregate consumption is a function of disposable income, wealth, expectations about future income and prices, and the level of interest rates." As disposable income and wealth increase, households are more likely to increase their consumption,

as they have more resources available to them. However, if households are pessimistic about future income or expect prices to rise, they may reduce their consumption. Additionally, higher interest rates can discourage borrowing and spending, leading to a decrease in aggregate consumption.

2.1.7 Inflation: Inflation is the continuous increase in the prices of goods and services resulting in the decline in the purchasing power of country currency. In other words Inflation is the decrease in the value of money overtime. This can occur due to various factors such as an increase in the supply of money, an increase in demand for goods and services, or a decrease in the supply of goods and services.

2.1.8 Money supply: The supply of money refers to the total amount of money in circulation in an economy. This includes physical currency, such as coins and banknotes, as well as digital forms of money, such as bank deposits and electronic transfers. The supply of money is controlled by the central bank of a country through monetary policy, which involves actions such as setting interest rates, regulating the money supply, and conducting open market operations. According to the Central Bank of Nigeria (CBN), "the supply of money in Nigeria is determined by a number of factors, including the level of government spending, the rate of inflation, and the level of economic activity in the country" (CBN, 2022). The CBN also uses various monetary policy tools to regulate the money supply and ensure that it is consistent with the country's macroeconomic objectives, such as maintaining price stability and promoting economic growth.

2.1.9 Interest rate: Interest rates refer to the percentage of the amount borrowed that a lender charges as compensation for the use of their funds. In Nigeria, interest rates are a critical tool used by the Central Bank of Nigeria (CBN) to implement monetary policy and influence economic growth.

According to a report by the Nigerian Economic Summit Group (NESG), interest rates have been a major concern for the Nigerian economy, as high rates have discouraged borrowing and investments. The CBN has been taking measures to reduce interest rates, such as lowering the monetary policy rate and introducing various intervention programs to boost credit availability to key sectors of the economy.

2.2 Theoretical Literature Review

There are three theories that determine and explain a relationship between currency hoarding monetary policy and aggregate consumption, they are

The permanent income hypothesis.

Greshams law of money

the monetarist theory by Milton Friedman.

2.2.1 The permanent income hypothesis.

The permanent income hypothesis provides valuable insights into the consumption behaviors of individuals.

It was developed by Milton Friedman in 1957, it posits that individuals base their consumption decisions on their expected long term income, rather than their current income. According to the theory, individuals adjust their consumption levels in response to changes in their income; if individuals expect a sustained increase in their income, their consumption is expected to increase; if they expect a decrease in their income, their consumption is also expected to decline.

Assumptions of the permanent income hypothesis.

1. Perfect Capital Markets: The PIH assumes that individuals have access to perfect capital markets, meaning they can borrow and lend money at the same interest rate without any transaction costs. This assumption allows individuals to smooth out their consumption patterns

over time by borrowing during low-income periods and repaying the debt during high-income periods. Rational Expectations:

2. The PIH assumes that individuals have rational expectations about their future income. They form their consumption decisions based on an accurate estimation of their permanent or long-term income rather than reacting solely to current income fluctuations. Rational expectations imply that individuals have unbiased and efficient forecasts of future income, which they use to guide their consumption choices. Consumption-Smoothing Behavior: The PIH assumes that individuals aim to smooth out their consumption over time. They prefer to maintain a stable level of consumption, even if their income varies in the short term. In other words, individuals strive to allocate their consumption expenditures in a way that minimizes fluctuations and maintains a relatively steady standard of living.

3. No Liquidity Constraints: The PIH assumes that individuals do not face liquidity constraints. They have easy access to credit markets, allowing them to borrow or save as needed to support their desired consumption levels. This assumption implies that individuals can freely adjust their consumption to align with their permanent income, regardless of their current wealth or income situation

2.2.2 Gresham law of money:

Gresham's Law of Money is a well-known principle in monetary economics that describes the tendency of bad money to drive out good money from circulation. This law is named after Sir Thomas Gresham, a 16th-century financial advisor to Queen Elizabeth I, who observed the phenomenon in the context of debased coins in circulation. According to Gresham's Law, when two forms of money with different intrinsic values are used interchangeably at a fixed exchange

rate, the money with higher value tends to be hoarded or exported, while the money with lower value circulates more freely

Assumptions

1. There are two or more forms of currency in circulation.
2. The different forms of currency are of equal denomination.
3. The different forms of currency have different intrinsic values.

The currency with the lower intrinsic value will be hoarded or taken out of circulation, while the currency with the higher intrinsic value will remain in circulation.

, Gresham's Law can help explain why currency hoarding occurs. When individuals or businesses perceive that one form of currency (e.g. paper notes) has a lower intrinsic value than another form of currency (e.g. coins), they may choose to hoard the lower-valued currency and use the higher-valued currency for transactions. This can lead to a decrease in the supply of the lower-valued currency, which can in turn affect monetary policy and aggregate consumption. For example, if people start hoarding paper notes and using coins instead, there will be fewer paper notes in circulation. This can lead to a situation where the central bank has to print more paper notes to maintain the money supply, which can increase inflation. Additionally, if there is a shortage of paper notes, businesses may have to adjust their prices and payment methods, which can impact aggregate consumption.

Therefore, by understanding Gresham's Law, policymakers can develop strategies to mitigate the effects of currency hoarding on monetary policy and aggregate consumption

2.2.3 monetarist theory of money

Monetarist theory of money By Milton Friedman is This theory assumes that money velocity is stable over time and that changes in the money supply have a direct and proportional impact on nominal income.

Friedman argued that the role of the central bank is to control the money supply in order to stabilize the economy, with a particular focus on maintaining a low and stable rate of inflation. He advocated for a rules-based approach to monetary policy, where the central bank would target a fixed rate of growth in the money supply, which would allow individuals and businesses to plan and make decisions with greater certainty.

Friedman's Monetarist theory of money can be used to provide insights on the impact of changes in the money supply on inflation and economic activity. Additionally, it highlights the importance of maintaining stable and predictable monetary policy, which can help to reduce uncertainty and encourage consumption and investment.

The monetarist theory asserts that changes in the money supply, particularly if not properly managed, can have significant effects on inflation, purchasing power, and ultimately, aggregate consumption. By understanding and applying the principles of the monetarist theory, policymakers can strive to maintain stable and predictable growth in the money supply, thus promoting a conducive environment for sustainable consumption patterns.

2.3 Empirical literature Review.

Omodero (2019) investigates the effect of money supply in enhancing economic growth in Nigeria and Ghana. The study employs data from 2009 to 2018 and uses Ordinary Least Squares regression technique for analysis of the data the findings reveal that broad money supply (M2) has an insignificant negative influence on RGDP in Nigeria, but in Ghana the impact is significant and positive. Broad money supply (M3) exerts insignificant positive influence on

RGDP in Nigeria, but significant negative impact on RGDP in Ghana while credit to private sectors (CPS) has insignificant positive influence on RGDP in both Nigeria and Ghana. The study among others suggests that the Monetary Authorities in the two countries should come up with monetary policy strategies that will help drive the economy better and such policies should consider M2 and CPS more as their contributions are necessary for economic expansion that lead to more output and employment. Although, The study also found that monetary policy, which refers to the actions taken by the Central Bank of Nigeria to control the money supply and interest rates, has a significant impact on currency hoarding and aggregate consumption. Specifically, the study found that contractionary monetary policy, which involves increasing interest rates and reducing the money supply, leads to an increase in currency hoarding and a decrease in aggregate consumption.

The study concludes that policies aimed at reducing currency hoarding and increasing the effectiveness of monetary policy can have a positive impact on aggregate consumption (Onyeiwu, 2012) examined the impact of monetary policy on the Nigeria economy using Ordinary Least Squares (OLS) method. The result showed that monetary policy represented by money supply exert a positive impact on GDP growth and balance of payment but negative impact on rate of inflation and he concluded that CBN monetary policy is effective in regulating the liquidity of the economy which affects some macroeconomic variables such as output, employment and prices.

(Adegbite, Alabi, 2013) examined the impact of monetary policy on economic growth in Nigeria, using secondary data from central bank of Nigeria statistical bulletin covering the period of 1970 to 2010. Multiple regressions were

employed to analyze data on such variable money supplies; inflation, exchange rate, interest rate and gross domestic product were all found to have significant effects on the Economics Growth with the Adjusted R2 of 58%. Following the outcome of this study, it is, therefore, concluded that exchange rate stability has played a key role in keeping inflation low for most of the transition period, and that the range of monetary policy instruments available to the authorities has widened in recent years and this has been associated with more stable and predictable changes in money supply and the price level. Several studies have examined the relationship between monetary policy, currency hoarding, and aggregate consumption in Nigeria.

Adofu and Aminu (2018) found that changes in monetary policy variables such as the cash reserve ratio and the monetary policy rate had a significant impact on inflation in Nigeria.

Another study by Ogunmuyiwa and Ekpo (2017) found that changes in the monetary policy rate had a significant effect on the Nigerian stock market.

Gul, Mughal, Rahim (2012) reviewed how the decisions of monetary authorities influence the macro variables such as GDP, money supply, interest rates, exchange rates and inflation. The method of least squares is used in the data. The sample was taken from 1995-2010 and included observations are 187. Result shows that interest rate has negative and significant impact on output. Tight monetary policy in term of increase interest rate has significant negative impact on output. Money supply has strongly positive impact on output that is positive inflation and output is negatively correlated, exchange rate also have negative impact on output which is show from the values.

Abdulazeez (2016) using time series data covering 1990 to 2010, investigated the impact of monetary policy on economic growth in Nigeria. With the aid of multiple regressions analysis

technique on money supply, interest rate, and financial deepening on gross domestic product, the study found that all the variables have marginal impact on the economic growth of Nigeria.

Nasko (2016) examines the impact of monetary policy on economic growth in Nigeria using multiple regression on time-series data covering the range of 1990 to 2010. All the variables employed which include money supply, interest rate, financial deepening and gross domestic product were all found to have marginal impact on the economic growth of Nigeria. In summary, the study found marginal impact on growth due to change in monetary policy application. The study recommends that to fasten up the rate of growth of the Nigerian economy, the government needs to initiate and push forward effective and efficient monetary policy measures via money supply, interest rate and financial deepening in order to adequately stabilize prices, reduce poverty and inequality there by encouraging holistic macroeconomic growth.

Asuquo (2012) investigated the impact of monetary policy on price stability in Nigeria. He examined shocks in monetary policy and its responses on inflation, market interest rate and exchange rate. Monetary policy rate was used as a proxy for monetary policy indicators. Secondary data were collected from December 2006 to February 2012. 2006 was chosen because it was when the monetary policy rate was introduced. Structural VAR framework was used to estimate the model. Results from the study revealed that market interest rate and exchange rate were more responsive to shocks in monetary policy rate than inflation in Nigeria. Furthermore, expected changes in inflation cannot be guaranteed by variations in the monetary policy rate.

Nwoko and Ihemeje (2016) examine the impact of monetary policy as conducted by the Central Bank of Nigeria towards accelerating rapid and sustainable economic growth using the annual data covering the period of 1990 to 2011. The conventional multiple regression technique is adopted as an instrument of analysing the coefficient. Results indicate that monetary policy measures are

effective in regulating both the monetary and real sector aggregates such as employment, prices, level of output and the rate of economic growth. In the same vein, Anowor and Okorie (2016) examine the impact of monetary policy on the economic growth of Nigeria by applying the error correction mechanism and the Johansen cointegration test on the annual data covering the sample period of 1982 to 2013.

CHAPTER THREE.

Theoretical framework and methodology.

3.1. Theoretical framework

The theoretical framework on which this study is based is the monetarist theory by prof milton Friedman. The monetarist theory associated with Friedman emphasizes the role of money supply in influencing economic outcomes. According to the monetarist, changes in the money supply has a direct impact on aggregate demand, which affects overall economic activity, including household spending and investment.

If the money supply grows rapidly it can lead to inflationary pressures, therefore reducing the purchasing of individual's money and spending. Conversely if money supply is tight or in this case being hoarded, it can result in deflationary pressures and discourage spending. Monetarist argue that maintaining stable and predictable growth in the money supply is crucial for fostering stable growth in the economy. Monetarists strongly believe that monetary policy exact greater impact on economic activity as unanticipated change in the stock of money affects output and growth, that is, the stock of money must increase unexpectedly for central bank to promote economic growth. In fact, they are of opinion that an increase in government spending would crowd out private sector and such can outweigh any short-term benefits of an expansionary fiscal policy [Adefeso & Mobolaji, 2010]. It's. Mathematical form is $M * V = P * Y$

Where:

M represents the money supply

V represents the velocity of money (the average number of times a unit of currency is spent in a given period)

P represents the price level (measured by an appropriate price index)

Y represents real output or real GDP (the total value of goods and services produced in an economy)

3.2.: Empirical model:

The model for this study is created with the intent of catching the capability, extent and direction of the relationship between currency hoarding, monetary policy and aggregate consumption in Nigeria. The study underseeks the relationship between aggregate consumption with proxy (PCE) the (dependent variable) and monetary policy with proxy interest rate(int) currency hoarding with proxy (m1) and (m2), disposable income (disin), Population (pop) and Inflation(inf)

$$FCE=(CH-GDP, MPR, GDPPC, CH-MS, INF).....1$$

Where:

FCE= final consumption expenditure

MPR= Monetary policy rate .

CH-GDP= The ratio of currency in circulation to Nominal Gnp

GDPPC = disposable income

CH-MS= The interaction of currency hoarding and monetary policy.

Inflation =inf

Econometric model

$$PCE = \beta + \beta_1 Ch-gdp + \beta_2 MPR + \beta_3 GDPPC + \beta_4 CH-MS + \beta_5 INF + \mu \dots \dots \dots 3$$

$$M216.6593.GDP + \beta_2 INF + \mu \dots \dots \dots 4$$

Where

β the Intercept

β_1 = the parameter for Ch-gdp

β_2 = the Parameter for MPR

β_3 = the parameter for GDPPC

β_4 = the parameter for The interaction of currency hoarding and monetary policy.

β_5 = the parameter for Inflation

μ = the stochastic term

3.2.1 APRIORI EXPECTATIONS

$$\beta_1 < 0, \beta_2 > 0, \beta_3 < 0, \beta_4 > 0, \beta_5, \dots \dots \dots 4$$

In line with the Economic theory adopted at our theoretical framework there's a positive or negative relationship between Aggregate consumption and Monetary policy rate this could be

according to the policy adopted by the CBN(Contractionary or Expansionary), according to Economic theory aggregate consumption is positively related to the ratio of currency in circulation to interest rate and Inflation, while aggregate consumption is positively related to the interaction of currency hoarding and monetary policy and disposable income.

In order to minimize spurious results in the study, we normalized the data of our variables by converting the data into their Natural log form(Ln) rewriting the equation of the model above in a linear estimation we have

$$LFCE = \beta_0 + \beta_1 \text{LogCH-GDP} + \beta_2 \text{LM} + \beta_3 \text{GDPPC} + \beta_4 \text{CHMS} + \beta_5 \text{INF} + \mu \dots \dots \dots 5$$

In order to establish a relationship between variables, this study uses the Autoregressive Distributed lag (ARDL) for it's parameter in order to examine both the Short run and long run Impacts of the explanatory factors on the explained variable. Pesaran, shin and Smith (2001) developed the ARDL model technique when each variable is level integrated, i.e integrated at first difference or 1(0) is expressed as (1) or a mixture of the two. ARDL yields reliable estimation of the parameters (Pesaran, shin, Smith, 2001).

As a result, the ARDL modelling approach can be illustrated by a simple two variable model, ARDL (1,1)

$$Y_t = \alpha_0 + \beta_1 Y_{t-1} + \delta_0 X_t + \delta_1 X_{t-1} + V_t$$

Where V_t is the random error term. The error correction model can be derived as follows:

$$\text{set } X_t = X_{t-1} + \Delta X_t \text{ and } Y_t = Y_{t-1} + \Delta Y_{t-1}$$

Replacing these in the above equation yields:

$$\Delta Y_t = \alpha_0 - (1-\beta_1)Y_{t-1} + \delta_0 \Delta X_t + (\delta_0 + \delta_1)X_{t-1} + V_t$$

We can $f_t - (1 - \beta_1)[Y_{t-1} - (\alpha_0/1 - \beta_1) - (\delta_0 + \delta_1/1 - \beta_1)X_{t-1}] + V_t$

Where the terms in brackets are the error correction terms, and the coefficients $\alpha_0/1 - \beta_1$ and $\delta_0 + \delta_1/1 - \beta_1$ are the long run coefficients.

There are two stages to the ARDL method. The first stage involves doing a co-integration analysis using the bounds testing method established by Pesaran and Shin (1999) and Pesaran et al (2001). The long-run link inferred by the model and revealed by co-integration analysis is estimated in the second stage. At this point, an error correction model depicting short-run dynamics is also estimated.

To do the bounds testing the following co-integration equation is used:

$$\Delta LFCE_t = \beta_0 + \sum_{i=1}^p \delta_i \Delta LFCE_{t-1} + \sum_{i=1}^p \gamma_i \Delta LCH-GDP_{t-1} + \sum_{i=1}^p \theta_i \Delta LMPR_{t-1} + \sum_{i=1}^p \sigma_i \Delta Inf_{t-1} + \sigma_i \Delta DISIN + \sigma_i \Delta LPOP + \sigma_i \Delta LINF + \mu_1 CH-GDP_{t-1} + \mu_2 LMPR_{t-1} + \mu_3 LINT_{t-1} + \mu_4 LGDPPC_{t-1} + \mu_1 Lpop + \mu_1 LINF + \varepsilon_t \dots \dots \text{Model 1}$$

$$\Delta LEYS_t = \beta_0 + \sum_{i=1}^p \delta_i \Delta LFCE_{t-1} + \sum_{i=1}^p \gamma_i \Delta LCH-GDP_{t-1} + \sum_{i=1}^p \theta_i \Delta LMPR_{t-1} + \sum_{i=1}^p \sigma_i \Delta MPR_{t-1} + \mu_1 LGDPPC_{t-1} + \mu_2 LCHMS_{t-1} + \mu_3 LINF_{t-1} + \mu_4 LCHMS_{t-1} + \varepsilon_t \dots \dots \text{Model 2}$$

$$\Delta FCEF_t = \beta_0 + \sum_{i=1}^p \delta_i \Delta LINF_{t-1} + \sum_{i=1}^p \gamma_i \Delta GDPPC_{t-1} + \sum_{i=1}^p \theta_i \Delta LMPR_{t-1} + \sum_{i=1}^p \sigma_i \Delta LINF_{t-1} + \mu_1 LFCE_{t-1} + \mu_2 LM2_{t-1} + \mu_3 LDISN_{t-1} + \mu_4 LINT_{t-1} + \varepsilon_t \dots \dots \text{Model 3}$$

Where β_0 is the drift component of the model; the ε_t is the stochastic error term; Δ is the first difference operator; all variables are expressed in natural logarithms; the terms with summation signs $\sum_{i=1}^p$ represents the error correction dynamics while the second part of the equation with μ_i is the long run relationship of the model.

The test has the null hypothesis of

$$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = 0$$

Against the alternate hypothesis

$$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq 0$$

The null hypothesis states that there is no long-term link. Critical values provided by (Pesaran et al, 2001) are utilized to run the test, which is a well-known coefficient restriction test (F- test).

Furthermore, in order to estimate the short-run relationship between the variables, the corresponding error correction equation was would be estimated as:

$$\Delta LFCE_t = \beta_0 + \sum_{i=1}^p \delta_i \Delta LMPR_{t-1} + \sum_{i=1}^p \gamma_i \Delta LCHMS_{t-1} + \sum_{i=1}^p \theta_i \Delta LGDPPC_{t-1} + \sum_{i=1}^p \mu_i ECM_{t-1} + \varepsilon_t \dots \dots \dots \text{Model 1}$$

$$\Delta LFCE_t = \beta_0 + \sum_{i=1}^p \delta_i \Delta LINT_{t-1} + \sum_{i=1}^p \gamma_i \Delta LMPR_{t-1} + \sum_{i=1}^p \theta_i \Delta LCHMS_{t-1} + \sum_{i=1}^p \mu_i ECM_{t-1} + \varepsilon_t \dots \dots \dots \text{Model 2}$$

The ECM_{t-1} is the Error Correction Model.

To evaluate the speed of adjustment to equilibrium, the ECM version of ARDL was used. The goal here is to estimate the coefficients of the long run correlation, followed by the assessment of the variables' short run elasticity.

3.2.2 DESCRIPTION OF VARIABLES OF THE STUDY

Consumption expenditure: consumption expenditure refers to the total value of goods and services purchased by households and government for final use. It is a key component of a

country's Gross Domestic Product (GDP) calculation and represents the total spending on consumption by these two sectors of the economy.

The ratio of currency in circulation to nominal Gdp: economy. Nominal gnp is given as output (it is taken as transactionary demand for money) Money spent on total output in an economy The ratio of money in circulation The ratio will show other motives, such as Speculative and Precautionary (IDLE CASH LYING AROUND)

Monetary policy rate: policy interest rate is an interest rate that the monetary authority (i.e. the central bank) sets in order to influence the evolution of the main monetary variables in the economy (e.g. consumer prices, exchange rate or credit expansion, among others).

Disposable income : Disposable income refers to the amount of money an individual or household has available for spending and saving after deducting taxes and other mandatory deductions.

Interaction of currency hoarding and monetary policy: It involves how the actions and tools of a central bank, which constitute monetary policy, can influence the behavior of individuals, businesses, and financial institutions regarding holding and using physical cash.

Inflation: Inflation is the rate at which the general level of prices for goods and services in an economy rises, resulting in a decrease in the purchasing power of a currency

3.3 DATA AND ESTIMATION.

the data for the dependent variable were gotten from the world bank, between (1981-2022) the data for the independent variable monetary policy rate (MPR) were gotten from the Central bank of Nigeria (1981-203), The data for currency hoarding was computed using the ratio of currency in circulation to nominal GDP (1981-2022), the study still made use of the interaction of

currency hoarding to monetary policy using figures from (1981-2022), GDPPC was gotten from the CBN(1981-2022) and Inflation.

3.3.2: ESTIMATION METHODOLOGY.

Autoregressive Distributed Lag Model was the econometric method of choice for this study. However, in order to avoid issues that may develop when performing our analysis with clearly non-stationary series, which leads to erroneous results, this study applied the Augmented Dickey Fuller (ADF) test for unit root to determine if the data series has a unit root. To analyse the variables' long-term connection, the Autoregressive Distributed Lag Model Bound Test for co-integration was also performed. However, we will elaborate on the procedures that were employed in this study.

3.3.2.1 Test for Unit Root

At this first stage, we verify the sequence of integration within each series and determine whether or not they are stationary. Researchers have devised a plethora of techniques for ensuring the right order of integration. Dickey (1979) and Fuller (1983) created the Augmented Dickey-Fuller (ADF) test, which is currently the gold standard (1981). The augmented Dickey-Fuller test is predicated on rejecting the unit root null hypothesis (that the series are not stable) in favour of the alternative hypothesis of no unit root (the series are stationary). Each series is analysed in both the presence and absence of a deterministic trend (t). To be stated to have a unit root, $y(t)$ must have a non-stationary first difference between $y(t)$ and $y(t-1)$. A series is said to be integrated of order I if it can become stationary with just one shift (1). A stationary $I(2)$ series, which also needs two differences, follows the same pattern. If it's already at 0 ($I(0)$), there's no use in doing any additional differentiation.

3.3.2.2 The Co-Integration Test

The second stage involves testing for co-integration between series with the mix order of integration. The theory of co-integration emerges as a natural extension of the analysis and testing for unit roots. Non-stationary time series variables are the focus of this methodology test. The theory of co-integration, as stated by Iyoha (2004), "explains how to analyse the inter-relationships between the long term trend in the variables that are differenced away in the Box-Jenkins technique." This statement is based on the work of Maddala (1992), who was referenced in that work. Co-integration assumes that the difference between two series that are trended but otherwise move closely together in the long run is constant. If there is a long-term correlation between two variables, we say that they are co-integrated. In the absence of co-integration, the two variables in question are free to deviate from each other indefinitely (Dickey et.al., 1991). The results of co-integration experiments reveal situations in which two or more non-stationary time series are combined in such a way that, they are unable to depart from equilibrium over the long run. For this research, the Autoregressive Distributed Lag Model Bound Test for co-integration is used for this study.

3.3.2.3 Autoregressive Distributed Lag Model (ARDL)

Autoregressive distributed lag (ARDL) models are types of models used in analysing dynamic relationships of a time series data in a single-equation model. In such models, the present value of the regressand is allowed to depend on its own past values as well as the current and past values of the predetermined variables. Moreover, variables in ARDL models can be stationary, non-stationary, or of a mix order. The ARDL model can be used to separate the long-run and short-run effects in an econometric analysis, and to test for the existence of a long-run relationship among the variables of interest.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF RESULTS

4.1 Introduction

In this section, the various variables employed in this study are tested, their parameters estimated, presented and results interpreted in line with economic theorising as it relates to their policy implications. The section start with descriptive statistics, followed by the unit root test, Johansen co-integration test and then the long run and short run regression estimates of the models. Finally, the chapter ends with a summary of the results and its policy implications.

4.2 Descriptive Statistics and Graphical Exposition

The summary statistics of all the series employed in this study are presented and discussed below. Specifically, we have Measures of Central tendencies and Variability. The mean of each of the series is a pointer to the average of the respective variable. The standard deviation shows how distributed the variable is from the mean. The summary statistics are given in Table 4.1 below.

Table 4.1: Descriptive Statistics

	LNFCF	LNCHMS	LNCH	LNGDPP	LNMPR	LNINF

				C		
Mean	3.991409	11.87786	5.007495	7.519391	2.518816	2.680525
Median	4.131202	13.30122	5.405115	7.434698	2.564949	2.555410
Maximum	4.464983	15.88572	6.206970	7.893406	3.258097	4.288203
Minimum	2.451910	6.112859	3.252149	7.250074	1.791759	1.684176
Std. Dev.	0.442485	3.494401	1.035216	0.237360	0.313887	0.675849
Skewness	-1.791647	-0.562422	-0.727017	0.323283	-0.434278	0.883065
Kurtosis	6.430063	1.753194	1.833155	1.442663	3.513716	2.997121
Jarque-Bera	42.03411	4.817155	5.937723	4.857385	1.739587	5.328677
Probability	0.000000	0.089943	0.051362	0.088152	0.419038	0.069645
Sum	163.6478	486.9922	205.3073	308.2950	103.2715	109.9015
Sum Sq. Dev.	7.831731	488.4335	42.86686	2.253597	3.940992	18.27088
Observations	41	41	41	41	41	41

Source: Author → Computation Using Eviews 9.0

Table 4.1 above shows LFCE has a mean of 58.36610 while LCHMS has a mean of 1746935, LCH has a 218.6018 and LGDPPC has a mean of 1895.734 and LMPR has a mean of 13.00000 and LINF has a mean of 18.94905.

It also shows that LFCE has a standard deviation of 19.01853, LCHMS standard deviation of 2308697 LCH a standard deviation of 144.1309 GDPPC standard deviation of 461.2519 LMPR a standard deviation of 3 959167 and LINF a standard deviation of 16.6593. It also showed that all the variables except LFCE are positively skewed.

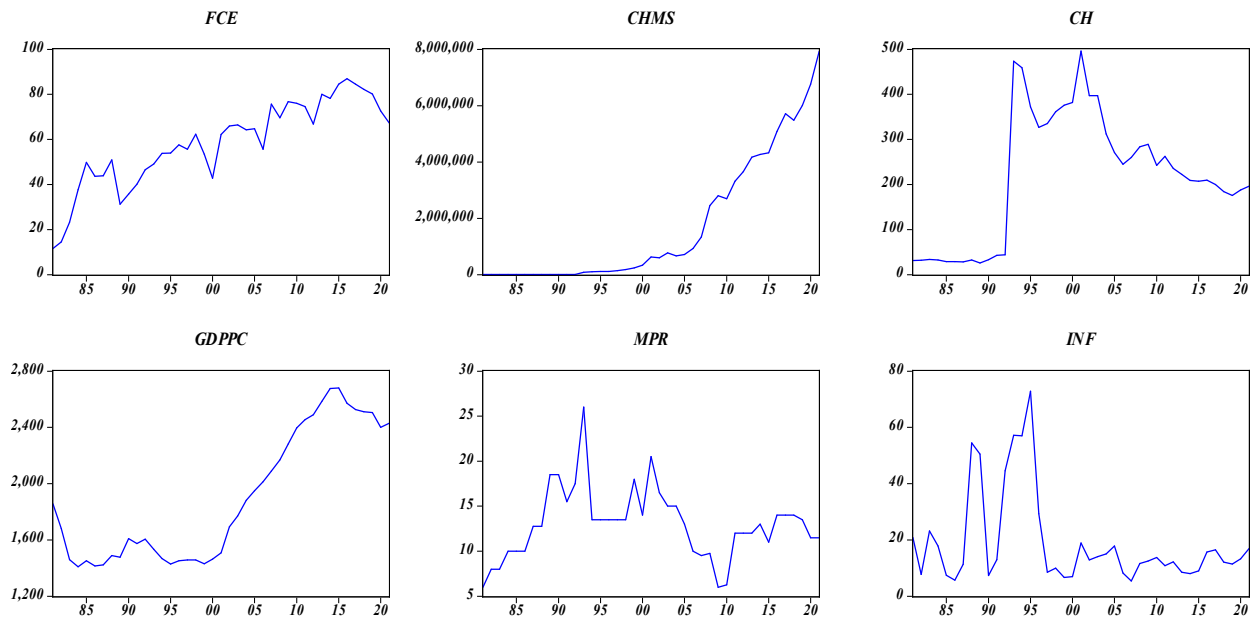


Fig. 1 Graphical trend of variables values of overtime.

Fig. 2 Graphical trend of logged variables values of overtime.

4.3 PRELIMINARY TESTS RESULTS

4.3.1 TEST FOR STATIONARITY/ UNIT ROOT TEST

THE AUGMENTED DICKEY FULLER TEST

AT LEVEL

TABLE 4.2

Variables	ADF Test Statistics	Prob (At level) at 5 percent sig. level.	Order of Integration	Remarks
LNFCF	-4.377819	0.0012	I(0)	Stationary
LNCHMS	-1.311604	0.6149	I(0)	Not Stationary
LNCH	-1.693171	0.4269	I(0)	Not Stationary
LNGDPPC	-1.172652	0.6762	I(0)	Not Stationary
LNMPR	-3.222497	0.0259	I(0)	Stationary
LNINF	-3.497206	0.0132	I(0)	Stationary

Source: Author → Computation Using Eviews 9.0

AT FIRST DIFFERENCE

TABLE 4.3

Variables	ADF Test Statistics	Prob (At level) at 5 percent sig. level.	Order of Integration	Remarks
LNFCF	-5.569812	0.0000	I(0)	Stationary
LNCHMS	-5.380921	0.0001	I(1)	Stationary
LNCH	-6.186235	0.0000	I(1)	Stationary
LNGDPPC	-4.044723	0.0032	I(1)	Stationary
LNMPR	-7.730128	0.0000	I(0)	Stationary
LNINF	-7.090114	0.0000	I(0)	Stationary

Source: Author's Computation Using Eviews 9.0

From the ADF results in table 4.2.1, LNFCF, LNMPR and LNINF were stationary at level while others were stationary at first difference. This result justifies the use of the Autoregressive Distributed Lag Model as the estimating technique for this analysis. As a result of the stationarity of the variables, we now proceed to conduct the ARDL Co-Integration Bounds testing and the estimation of the short and long run models.

4.3.2 Cointegration Test

It is important that we examine the possibility of having a co-integrating relationship amongst the variables of our study; this is in light of the different levels of stationarity of our variables, some at level and some at the first difference. To do this, Pesaran recommended using the ARDL bound cointegration test, and the results are shown below.

ARDL BOUND COINTEGRATION TEST

Table 4.4 MODEL 1

Test Statistic	Value	K
F-statistic	6.369388	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Author's computation using EViews

From table 4.4 above, it is evident that the estimated F-statistic of the model surpassed the upper bound limit even at the 1% level of significance. As a consequence, the findings indicate a long-term link between the variables in the model.

4.4 MODEL ESTIMATES

SHORT-RUN AND LONG-RUN ESTIMATION

MODEL 1

TABLE 4.5: Short-run Result

Dependent Variable: LNFCE

Variable	Coefficients	Std. Error.	t-Statistics	P-values
D(LNCHMS)	-0.590728	0.192707	-3.065418	0.0079
D(LNCHMS(-1))	0.124443	0.072959	1.705654	0.1087
D(LNCHMS(-2))	-0.117120	0.061182	-1.914282	0.0749
D(LNCH)	0.807228	0.215596	3.744167	0.0020
D(LNMPR)	0.071768	0.114541	0.626575	0.5404
D(LNMPR(-1))	-0.232322	0.127760	-1.818424	0.0890
D(LNMPR(-2))	0.057712	0.106059	0.544153	0.5943
D(LNMPR(-3))	-0.207591	0.110636	-1.876334	0.0802
D(LNGDPPC)	3.886385	0.981079	3.961335	0.0013
D(LNGDPPC(-1))	0.992066	1.008840	0.983373	0.3410

D(LNGDPPC(-2))	-2.444609	0.591535	-4.132651	0.0009
D(LNINF)	0.055052	0.045507	1.209742	0.2451
D(LNINF(-1))	0.071014	0.061839	1.148370	0.2688
D(LNINF(-2))	-0.083281	0.049626	-1.678167	0.1140
D(LNINF(-3))	0.043547	0.041923	1.038727	0.3154
ECM(-1)	-0.844846	0.201532	-4.192114	0.0008

Source: Author → Computation Using Eviews 9.0

Discussion of Findings

The error correction term (ECM) which represents the speed of adjustment needed to restore equilibrium in the dynamic model after a disturbance appropriately explains the model as both its sign and significance level meets theoretical and statistical expectations. The implication of this is that a shock to Aggregate consumption as proxied by LFCE in the current period will be restored at a speed of adjustment of about 84.4% in the next period. Put differently, the rate of adjustment of a short-run disequilibrium in LFCE is about 84.4% of the divergence as a result of a current period shock will converge towards long-run equilibrium in the next period. Thus, confirming the adequacy and statistically efficiency of the model.

The Coefficient of LNCHMS explains that a one percentage increase in the period level of the interaction variable of currency hoarding to monetary policy as proxies by LNCHMS, will decrease Aggregate consumption by 59%, this relationship is significant at the 5% level. The

relationship is also significant at the 2% level in a two period lag, while it is insignificant at a one period lag.

The coefficient of LCH explains that a one percentage increase in period of currency hoarding as proxied by the ratio of currency in circulation to nominal GDP(LCH), will increase aggregate consumption by 80%, this relationship is significant at the 5% level.

The coefficient LNMPR explains that one percentage increase in period level of monetary policy measured by monetary policy rate (MPR) will increase aggregate compensation by 71%, this relationship is only significant at the 10% level.

A further analysis shows that at a one period and three period lag.

The coefficient of GDPPC explains that a one percentage increase in Disposable income as measured by LGDPPC, will result in a astronomic value of above 100% increase in aggregate consumption, this relationship is significant at the 5% level, a one period lag is also significant at the 10%level. But it decreases consumption at a two period lag

The coefficient of LINF explains that a one percentage increase in inflation measured as inf will result in a 55% increase in aggregate consumption, though the relationship is insignificant, the relationship was still proven to be insignificant at both the one two and three period lag.

TABLE 4.6: Long-run Result

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-statistic</i>	<i>Prob.</i>
LNCHMS	-0.246016	0.099053	-2.483689	0.0253

LNCH	0.617118	0.201406	3.064057	0.0079
LNMPR	0.300433	0.189136	1.588450	0.1330
LNGDPPC	2.792123	0.855057	3.265423	0.0052
LNINF	-0.118185	0.085287	-1.385731	0.1861
C	-17.338524	6.440111	-2.692271	0.0167

Source: Author → Computation Using Eviews 9.0

For the long run, it shows that most of the variable significantly impacted aggregate consumption at the 5% level.

The coefficient of the interaction between currency hoarding and monetary policy proxied by (LNCHMP) show that a one percent increase in the long will lead to a reduction of aggregate consumption by 24%, this relationship is significant at the 5% level

The coefficient of currency hoarding proxies by the ratio of currency in circulation to nominal GDP (LNCH), shows that a in the long run a percent increase in Currency hoarding will positively increase consumption by 61%

The coefficient of disposable income proxied by LNGDPPC showed that in the long run a one percent increase will increase aggregate consumption by above 100% percent, this relationship is significant at the 5% level.

While the coefficient of Inflation shows a that a one percent increase in Inflation proxied by LNINF will decrease aggregate consumption by 11% in the long run, however this relationship is significant at the 10% level.

4.5 DIAGNOSTIC RESULTS

MODEL 1

Dependent Variable: LGNIPC

R-squared	Adj R-squared	F-Stat	Prob(F-Stat)	DW Stat	Ramsey RESET F.(Prob)	Breusch -Pagan- Godfrey F.(Prob)	Breusch - Godfrey F.(Prob)	Jarque-Bera Prob.
0.950487	0.881169	13.71202	0.0000	2.357241	0.1072	0.5866	0.1545	0.820701

Source: Author → Computation

The R-squared value of 0.950487 indicates that approximately 95.05% of the variation in the dependent variable (LNFCE) can be explained by the model's set of explanatory variables.

Moreover, its adjusted counterpart which takes into consideration the loss of degrees of freedom suggests that the explanatory variable of the model accounts for about 88.12% of the changes in the dependent variable.

There is little to no strong evidence of autocorrelation in the model residuals, as indicated by the Durbin-Watson value of about 2.36 and the Breusch-Godfrey F-probability value of 0.1545 (its greater than the 0.05 threshold for rejecting the null hypothesis of serial correlation). This means that the model reflects the temporal dynamics accurately, as there is no substantial correlation between the residuals and their lagged values.

With a p-value of 0.1072, the Ramsey RESET test concludes that the model does not suffer from omitted variable bias. This indicates that the existing regressors of the model provide a satisfactory explanation for the changes in the dependent variable.

With a p-value of 0.5866, the Breusch-Pagan-Godfrey test indicates that there is no statistically significant evidence of heteroscedasticity in the model residuals. This suggests that the residuals' variance is stable across the range of measured values.

Jarque-Bera p-value of over 0.05 suggests that the residuals are normally distributed. This implies that the model's normalcy assumptions are not seriously affected.

Lastly, the Prob(F-Stat) value of 0.0000 indicates the goodness of fit of the entire model.

POLICY IMPLICATIONS

The findings of the study showed that in the short run, the interaction of currency hoarding and monetary policy has a positive impact to the dependent variable aggregate consumption proxied by (FCE), the findings also showed that currency hoarding positively impact aggregate consumption, which was the opposite our hypothesis . This is against our first hypothesis which state that there is no relationship between currency hoarding and aggregate consumption, what this implies is that currency hoarding does not necessarily reduce consumption, rather it might be associated with higher consumption.

The result is in accordance with our second hypothesis that said that currency hoarding does not affect monetary policy, the result should that monetary policy is independent of currency hoarding and therefore there is no link between them.

The study also showed a positive relationship between monetary and aggregate consumption, in accordance to the study carried out by IHUGBA, AMAKA(2021), which found that monetary policy positively impacts household consumption especially if its expansionary. While both currency hoarding and monetary policy rate show a positive relationship with consumption, it's essential to note that these variables might be influencing consumption independently, in other words they might have a separate impact on consumption rather than one affecting the effectiveness of the other this is in accordance with our third hypothesis, that currency hoarding does not affect the effectiveness of monetary policy on aggregate consumption, rather they are both independent on the other

The study also found that there exist a positive relationship between disposable income(GDPPC) and aggregate consumption which is in accordance with the study carried out by Tokoya, aiyeku(2022). In the income and household relationship in Nigeria both in the long and short run

The study found a positive relationship between currency hoarding and economic growth in accordance with the study carried out by yizhen, shifzhing and quinqang(2021).

In the long run all variable affected the variable under study, this is not in accordance with the hypothesis that shows no relationship between variables and independent variable.

CHAPTER 5

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This section contains the summary of findings of the analyses carried out in the previous section. Based on these findings, recommendations are given for policy implementation. Afterwards, the entire project is concluded.

5.2. Summary of findings.

The result of the analysis revealed that most of the explanatory variables in the short run were significant to a large degree in explaining the dependent variable(aggregate consumption) proxied by final consumption expenditure (FCE), however in the long run all the variables significantly impacted aggregate consumption.

In the short run currency hoarding proxied by the ratio of currency in circulation to nominal GDP positively impacted aggregate consumption, monetary policy impacted aggregate consumption positively both in the short and long run, Disposable income also positively impacted aggregate consumption.

Inflation was insignificant in the short run but significant in the long run at the 10% level and was negatively related to aggregate consumption.

5.3. POLICY RECOMMENDATIONS.

Given the findings of this study, the following feasible policy recommendations are provided;

1. Expansionary monetary policy: given the positive relationship between monetary policy and aggregate consumption, policy makers should consider the use of expansionary monetary policy during economic downturns such as lowering interest rate and increasing money supply, this can stimulate consumption by reducing the cost of borrowing and increasing available funds.

2. Communications strategies: the Central bank should effectively communicate their policies decision and intentions to the public and financial markets, clear and transparent communication can enhance the effectiveness of monetary policy

3. Digital payments promotion: Given the positive relationship between cash hoarding and consumption, policy makers should consider promoting digital payment methods and electronic transactions.

And Encourage financial institutions and governments to invest in the development and adoption of secure and user-friendly digital payment platforms

4. Financial Literacy Programs: policymakers and financial institutions should integrate information about the impact of cash hoarding on personal finances into financial literacy programs, and Educate the public on the advantages of digital banking, saving, and investment over hoarding cash.

5. Cash Handling Costs: Policy makers should consider initiatives that reduce the costs associated with cash transactions, such as lowering ATM fees and promoting cashless payment options.

6. Data-Driven Decision-Making: policy makers should Base monetary policy decisions on data-driven analysis of economic indicators, including inflation rates, unemployment, and economic growth, to ensure effective policy responses.

5.4. Conclusion.

Using annual time series data from 1981 to 2022, this study examined the long and short run impact of currency hoarding, monetary policy and aggregate consumption in Nigeria.

Extensive reviews of diverse literature and existing impact of currency hoarding and monetary policy and aggregate consumption were undertaken, it is hard of Friedman Friedman monetarist theory.

The study utilized components of currency hoarding and monetary policy such as ratio of currency hoarding to nominal GDP and monetary policy rate and the interaction of currency hoarding to monetary policy.

The independent variable are currency hoarding to nominal GDP, monetary policy rate, disposable income (GDPPC) and Inflation rate.

The descriptive analyses of the variables were carried out, with its summary values interpreted.

The Augmented dickey fuller (ADF) test was used in checking for stationarity among the variables. Moreover, the Autoregressive Distributed Lag Model was used as the technique of analysis. The ARDL Bounds Test was conducted to ascertain the existence of a long run relationship among the variables employed. The long run and short run models were thereafter estimated, and its results interpreted.

The results obtained suggests that most of the explanatory variables of the model were significant to a large extent in explaining development as measured by the components of the currency hoarding and monetary policy in the short run. While the all significantly impacted the variable under study in the long run.

Finally, the study recommends expansionary monetary policy to help stimulate consumption, and that the Central bank should be transparent in their policies with the public, and the shou promote cash management among the public.

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APPENDIX

DESCRIPTIVE STATISTICS AND GRAPHICAL EXPOSITION

SUMMARY STATISTICS OF RAW VALUES

	FCE	CHMS	CH	GDPPC	MPR	INF
Mean	58.36610	1746935.	218.6018	1895.735	13.00000	18.94905
Median	62.25269	597926.1	222.5418	1693.746	13.00000	12.87658
Maximum	86.91956	7926467.	496.1955	2679.555	26.00000	72.83550
Minimum	11.61051	451.6280	25.84583	1408.209	6.000000	5.388008
Std. Dev.	19.01853	2308697.	144.1309	461.2519	3.959167	16.65937
Skewness	-0.593337	1.130365	0.043990	0.442931	0.734305	1.854161
Kurtosis	2.796533	2.977112	1.943610	1.543951	4.542775	5.306526
Jarque-Bera	2.476389	8.732023	1.919655	4.962421	7.750652	32.58085
Probability	0.289907	0.012702	0.382959	0.083642	0.020748	0.000000
Sum	2393.010	71624346	8962.676	77725.12	533.0000	776.9110
Sum Sq. Dev.	14468.18	2.13E+14	830948.9	8510131.	627.0000	11101.39
Observations	41	41	41	41	41	41

SUMMARY STATISTICS OF LOGGED VALUES

	LNFCF	LNCHMS	LNCH	LNGDPPC	LNMPR	LNINF
Mean	3.991409	11.87786	5.007495	7.519391	2.518816	2.680525
Median	4.131202	13.30122	5.405115	7.434698	2.564949	2.555410
Maximum	4.464983	15.88572	6.206970	7.893406	3.258097	4.288203
Minimum	2.451910	6.112859	3.252149	7.250074	1.791759	1.684176
Std. Dev.	0.442485	3.494401	1.035216	0.237360	0.313887	0.675849
Skewness	-1.791647	-0.562422	-0.727017	0.323283	-0.434278	0.883065
Kurtosis	6.430063	1.753194	1.833155	1.442663	3.513716	2.997121
Jarque-Bera	42.03411	4.817155	5.937723	4.857385	1.739587	5.328677
Probability	0.000000	0.089943	0.051362	0.088152	0.419038	0.069645
Sum	163.6478	486.9922	205.3073	308.2950	103.2715	109.9015

Sum Sq. Dev.	7.831731	488.4335	42.86686	2.253597	3.940992	18.27088
Observations	41	41	41	41	41	41

TREND OF RAW DATA

TREND OF LOGGED VALUES

UNIT ROOT TEST

Level
LNFCE

Null Hypothesis: LNFCE has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic				
			-4.377819	0.0012
Test critical values:	1% level		-3.605593	
	5% level		-2.936942	
	10% level		-2.606857	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNFCE)				
Method: Least Squares				
Date: 10/01/23 Time: 12:27				
Sample (adjusted): 1982 2021				
Included observations: 40 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFCE(-1)	-0.236048	0.053919	-4.377819	0.0001
C	0.984799	0.216232	4.554361	0.0001
R-squared	0.335261	Mean dependent var		0.043918
Adjusted R-squared	0.317768	S.D. dependent var		0.182121
S.E. of regression	0.150427	Akaike info criterion		-0.901973
Sum squared resid	0.859873	Schwarz criterion		-0.817529
Log likelihood	20.03946	Hannan-Quinn criter.		-0.871441
F-statistic	19.16530	Durbin-Watson stat		2.121481
Prob(F-statistic)	0.000091			

LNCH

Null Hypothesis: LNCH has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.693171	0.4269
Test critical values:	1% level		-3.605593	
	5% level		-2.936942	
	10% level		-2.606857	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNCH)				
Method: Least Squares				
Date: 10/01/23 Time: 12:29				
Sample (adjusted): 1982 2021				
Included observations: 40 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCH(-1)	-0.100512	0.059363	-1.693171	0.0986
C	0.548638	0.303138	1.809861	0.0782
R-squared	0.070150	Mean dependent var		0.046011
Adjusted R-squared	0.045681	S.D. dependent var		0.397505
S.E. of regression	0.388320	Akaike info criterion		0.994731
Sum squared resid	5.730102	Schwarz criterion		1.079175
Log likelihood	-17.89462	Hannan-Quinn criter.		1.025263
F-statistic	2.866828	Durbin-Watson stat		1.978092
Prob(F-statistic)	0.098607			

LNCHMS

Null Hypothesis: LNCHMS has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.311604	0.6149
Test critical values:	1% level		-3.605593	
	5% level		-2.936942	
	10% level		-2.606857	

*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNCHMS)				
Method: Least Squares				
Date: 10/01/23 Time: 12:32				
Sample (adjusted): 1982 2021				
Included observations: 40 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCHMS(-1)	-0.027168	0.020714	-1.311604	0.1975
C	0.564297	0.254122	2.220578	0.0324
R-squared	0.043310	Mean dependent var		0.244321
Adjusted R-squared	0.018134	S.D. dependent var		0.454136
S.E. of regression	0.450000	Akaike info criterion		1.289568
Sum squared resid	7.694995	Schwarz criterion		1.374012
Log likelihood	-23.79135	Hannan-Quinn criter.		1.320100
F-statistic	1.720305	Durbin-Watson stat		1.781798
Prob(F-statistic)	0.197523			

LNGDPPC

Null Hypothesis: LNGDPPC has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.172652	0.6762
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNGDPPC)				
Method: Least Squares				
Date: 10/01/23 Time: 12:34				
Sample (adjusted): 1984 2021				
Included observations: 38 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

LNGDPPC(-1)	-0.028321	0.024151	-1.172652	0.2491
D(LNGDPPC(-1))	0.214032	0.145304	1.472986	0.1500
D(LNGDPPC(-2))	0.236650	0.142101	1.665368	0.1050
C	0.222345	0.181244	1.226769	0.2283
R-squared	0.221613	Mean dependent var		0.013407
Adjusted R-squared	0.152932	S.D. dependent var		0.036657
S.E. of regression	0.033738	Akaike info criterion		-3.841105
Sum squared resid	0.038700	Schwarz criterion		-3.668728
Log likelihood	76.98100	Hannan-Quinn criter.		-3.779775
F-statistic	3.226690	Durbin-Watson stat		1.960386
Prob(F-statistic)	0.034493			

LNINF

Null Hypothesis: LNINF has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.497206	0.0132
Test critical values:	1% level		-3.605593	
	5% level		-2.936942	
	10% level		-2.606857	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNINF)				
Method: Least Squares				
Date: 10/01/23 Time: 12:35				
Sample (adjusted): 1982 2021				
Included observations: 40 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINF(-1)	-0.484047	0.138410	-3.497206	0.0012
C	1.290557	0.382104	3.377502	0.0017
R-squared	0.243487	Mean dependent var		-0.005128
Adjusted R-squared	0.223578	S.D. dependent var		0.671001
S.E. of regression	0.591251	Akaike info criterion		1.835554
Sum squared resid	13.28395	Schwarz criterion		1.919998
Log likelihood	-34.71109	Hannan-Quinn criter.		1.866087
F-statistic	12.23045	Durbin-Watson stat		1.586675
Prob(F-statistic)	0.001215			

LNMPR

Null Hypothesis: LNMPR has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.222497	0.0259
Test critical values:	1% level		-3.605593	
	5% level		-2.936942	
	10% level		-2.606857	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNMPR)				
Method: Least Squares				
Date: 10/01/23 Time: 12:37				
Sample (adjusted): 1982 2021				
Included observations: 40 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNMPR(-1)	-0.344386	0.106869	-3.222497	0.0026
C	0.884367	0.271465	3.257752	0.0024
R-squared	0.214624	Mean dependent var		0.016265
Adjusted R-squared	0.193957	S.D. dependent var		0.236127
S.E. of regression	0.211995	Akaike info criterion		-0.215806
Sum squared resid	1.707784	Schwarz criterion		-0.131362
Log likelihood	6.316114	Hannan-Quinn criter.		-0.185273
F-statistic	10.38449	Durbin-Watson stat		2.139599
Prob(F-statistic)	0.002608			

FIRST DIFFERENCE

LNFCE

Null Hypothesis: D(LNFCE) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.569812	0.0000
Test critical values:	1% level		-3.610453	
	5% level		-2.938987	
	10% level		-2.607932	
*MacKinnon (1996) one-sided p-values.				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFCE(-1))	-0.905559	0.162583	-5.569812	0.0000
C	0.034980	0.030415	1.150096	0.2575
R-squared	0.456065	Mean dependent var		-0.007589
Adjusted R-squared	0.441364	S.D. dependent var		0.245974
S.E. of regression	0.183846	Akaike info criterion		-0.499520
Sum squared resid	1.250572	Schwarz criterion		-0.414209
Log likelihood	11.74064	Hannan-Quinn criter.		-0.468911
F-statistic	31.02281	Durbin-Watson stat		1.984594
Prob(F-statistic)	0.000002			

LNCH

Null Hypothesis: D(LNCH) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.186235	0.0000
Test critical values:	1% level		-3.610453	
	5% level		-2.938987	
	10% level		-2.607932	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNCH,2)				
Method: Least Squares				
Date: 10/01/23 Time: 12:30				
Sample (adjusted): 1983 2021				
Included observations: 39 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCH(-1))	-1.016793	0.164364	-6.186235	0.0000
C	0.047542	0.065772	0.722829	0.4743

R-squared	0.508433	Mean dependent var	0.000763
Adjusted R-squared	0.495147	S.D. dependent var	0.574247
S.E. of regression	0.408020	Akaike info criterion	1.094918
Sum squared resid	6.159764	Schwarz criterion	1.180229
Log likelihood	-19.35090	Hannan-Quinn criter.	1.125527
F-statistic	38.26950	Durbin-Watson stat	1.999395
Prob(F-statistic)	0.000000		

LNCHMS

Null Hypothesis: D(LNCHMS) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.380921	0.0001
Test critical values:	1% level		-3.610453	
	5% level		-2.938987	
	10% level		-2.607932	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNCHMS,2)				
Method: Least Squares				
Date: 10/01/23 Time: 12:33				
Sample (adjusted): 1983 2021				
Included observations: 39 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCHMS(-1))	-0.877215	0.163023	-5.380921	0.0000
C	0.217664	0.084209	2.584802	0.0138
R-squared	0.439006	Mean dependent var	0.001410	
Adjusted R-squared	0.423844	S.D. dependent var	0.608827	
S.E. of regression	0.462130	Akaike info criterion	1.343978	
Sum squared resid	7.901862	Schwarz criterion	1.429289	
Log likelihood	-24.20757	Hannan-Quinn criter.	1.374587	
F-statistic	28.95431	Durbin-Watson stat	2.024036	
Prob(F-statistic)	0.000004			

LNGDPPC

Null Hypothesis: D(LNGDPPC) has a unit root				
Exogenous: Constant				

Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.044723	0.0032
Test critical values:	1% level		-3.610453	
	5% level		-2.938987	
	10% level		-2.607932	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNGDPPC,2)				
Method: Least Squares				
Date: 10/01/23 Time: 12:34				
Sample (adjusted): 1983 2021				
Included observations: 39 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPPC(-1))	-0.534802	0.132222	-4.044723	0.0003
C	0.006383	0.006213	1.027369	0.3109
R-squared	0.306594	Mean dependent var		0.002852
Adjusted R-squared	0.287853	S.D. dependent var		0.045522
S.E. of regression	0.038415	Akaike info criterion		-3.630809
Sum squared resid	0.054602	Schwarz criterion		-3.545498
Log likelihood	72.80078	Hannan-Quinn criter.		-3.600200
F-statistic	16.35978	Durbin-Watson stat		2.304427
Prob(F-statistic)	0.000256			

LNINF

Null Hypothesis: D(LNINF) has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.090114	0.0000
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNINF,2)				

Method: Least Squares				
Date: 10/01/23 Time: 12:37				
Sample (adjusted): 1984 2021				
Included observations: 38 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNINF(-1))	-1.387464	0.195690	-7.090114	0.0000
D(LNINF(-1),2)	0.466580	0.136875	3.408798	0.0017
C	-0.016795	0.092845	-0.180889	0.8575
R-squared	0.609809	Mean dependent var		-0.022553
Adjusted R-squared	0.587513	S.D. dependent var		0.890685
S.E. of regression	0.572044	Akaike info criterion		1.796454
Sum squared resid	11.45320	Schwarz criterion		1.925738
Log likelihood	-31.13263	Hannan-Quinn criter.		1.842452
F-statistic	27.34988	Durbin-Watson stat		1.860828
Prob(F-statistic)	0.000000			

LNMPR

Null Hypothesis: D(LNMPR) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.730128	0.0000
Test critical values:	1% level		-3.610453	
	5% level		-2.938987	
	10% level		-2.607932	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNMPR,2)				
Method: Least Squares				
Date: 10/01/23 Time: 12:38				
Sample (adjusted): 1983 2021				
Included observations: 39 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMPR(-1))	-1.217618	0.157516	-7.730128	0.0000
C	0.012936	0.037284	0.346944	0.7306
R-squared	0.617590	Mean dependent var		-0.007376
Adjusted R-squared	0.607255	S.D. dependent var		0.370612
S.E. of regression	0.232260	Akaike info criterion		-0.031996

Sum squared resid	1.995959	Schwarz criterion	0.053315
Log likelihood	2.623918	Hannan-Quinn criter.	-0.001387
F-statistic	59.75488	Durbin-Watson stat	2.077215
Prob(F-statistic)	0.000000		

CO-INTEGRATION

ARDL BOUNDS TEST

ARDL Bounds Test				
Date: 10/01/23 Time: 12:53				
Sample: 1985 2021				
Included observations: 37				
Null Hypothesis: No long-run relationships exist				
Test Statistic	Value	k		
F-statistic	6.369388	5		
Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
10%	2.26	3.35		
5%	2.62	3.79		
2.5%	2.96	4.18		
1%	3.41	4.68		
Test Equation:				
Dependent Variable: D(LNFCE)				
Method: Least Squares				
Date: 10/01/23 Time: 12:53				
Sample: 1985 2021				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCHMS)	-0.590728	0.192707	-3.065418	0.0079
D(LNCHMS(-1))	0.007322	0.066352	0.110355	0.9136
D(LNCHMS(-2))	-0.117120	0.061182	-1.914282	0.0749
D(LNCH)	0.807228	0.215596	3.744167	0.0020
D(LNMPR)	0.071768	0.114541	0.626575	0.5404
D(LNMPR(-1))	-0.382201	0.135328	-2.824251	0.0128
D(LNMPR(-2))	-0.149879	0.117973	-1.270449	0.2233
D(LNMPR(-3))	-0.207591	0.110636	-1.876334	0.0802
D(LNGDPPC)	3.886385	0.981079	3.961335	0.0013
D(LNGDPPC(-1))	-1.452543	0.760521	-1.909931	0.0755
D(LNGDPPC(-2))	-2.444609	0.591535	-4.132651	0.0009

D(LNINF)	0.055052	0.045507	1.209742	0.2451
D(LNINF(-1))	0.031279	0.060811	0.514368	0.6145
D(LNINF(-2))	-0.039735	0.039922	-0.995318	0.3354
D(LNINF(-3))	0.043547	0.041923	1.038727	0.3154
C	-14.64839	3.815801	-3.838876	0.0016
LNCHMS(-1)	-0.207846	0.060276	-3.448244	0.0036
LNCH(-1)	0.521370	0.121764	4.281805	0.0007
LNMPR(-1)	0.253820	0.142967	1.775368	0.0961
LNGDPPC(-1)	2.358915	0.506419	4.658029	0.0003
LNINF(-1)	-0.099849	0.070595	-1.414389	0.1777
LNFCE(-1)	-0.844846	0.201532	-4.192114	0.0008
R-squared	0.859272	Mean dependent var		0.015625
Adjusted R-squared	0.662254	S.D. dependent var		0.153969
S.E. of regression	0.089481	Akaike info criterion		-1.703269
Sum squared resid	0.120102	Schwarz criterion		-0.745426
Log likelihood	53.51047	Hannan-Quinn criter.		-1.365584
F-statistic	4.361379	Durbin-Watson stat		2.357241
Prob(F-statistic)	0.002634			

MODEL ESTIMATE

Raw Output

Dependent Variable: LNFCE				
Method: ARDL				
Date: 10/01/23 Time: 12:49				
Sample (adjusted): 1985 2021				
Included observations: 37 after adjustments				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): LNCHMS LNCH LNMPR				
LNGDPPC LNINF				
Fixed regressors: C				
Number of models evaluated: 12500				
Selected Model: ARDL(1, 3, 1, 4, 3, 4)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNFCE(-1)	0.155154	0.201532	0.769871	0.4533
LNCHMS	-0.590728	0.192707	-3.065418	0.0079
LNCHMS(-1)	0.390204	0.215614	1.809733	0.0904
LNCHMS(-2)	-0.124443	0.072959	-1.705654	0.1087
LNCHMS(-3)	0.117120	0.061182	1.914282	0.0749
LNCH	0.807228	0.215596	3.744167	0.0020
LNCH(-1)	-0.285857	0.207294	-1.378999	0.1881
LNMPR	0.071768	0.114541	0.626575	0.5404
LNMPR(-1)	-0.200150	0.118608	-1.687494	0.1122
LNMPR(-2)	0.232322	0.127760	1.818424	0.0890

LNMPR(-3)	-0.057712	0.106059	-0.544153	0.5943
LNMPR(-4)	0.207591	0.110636	1.876334	0.0802
LNGDPPC	3.886385	0.981079	3.961335	0.0013
LNGDPPC(-1)	-2.980013	1.330645	-2.239526	0.0407
LNGDPPC(-2)	-0.992066	1.008840	-0.983373	0.3410
LNGDPPC(-3)	2.444609	0.591535	4.132651	0.0009
LNINF	0.055052	0.045507	1.209742	0.2451
LNINF(-1)	-0.123621	0.053759	-2.299550	0.0363
LNINF(-2)	-0.071014	0.061839	-1.148370	0.2688
LNINF(-3)	0.083281	0.049626	1.678167	0.1140
LNINF(-4)	-0.043547	0.041923	-1.038727	0.3154
C	-14.64839	3.815801	-3.838876	0.0016
R-squared	0.950487	Mean dependent var		4.101320
Adjusted R-squared	0.881169	S.D. dependent var		0.259576
S.E. of regression	0.089481	Akaike info criterion		-1.703269
Sum squared resid	0.120102	Schwarz criterion		-0.745426
Log likelihood	53.51047	Hannan-Quinn criter.		-1.365584
F-statistic	13.71202	Durbin-Watson stat		2.357241
Prob(F-statistic)	0.000002			
*Note: p-values and any subsequent tests do not account for model selection.				

Short and Long Run Model

ARDL Cointegrating And Long Run Form				
Dependent Variable: LNFCE				
Selected Model: ARDL(1, 3, 1, 4, 3, 4)				
Date: 09/30/23 Time: 20:28				
Sample: 1981 2021				
Included observations: 37				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCHMS)	-0.590728	0.192707	-3.065418	0.0079
D(LNCHMS(-1))	0.124443	0.072959	1.705654	0.1087
D(LNCHMS(-2))	-0.117120	0.061182	-1.914282	0.0749
D(LNCH)	0.807228	0.215596	3.744167	0.0020
D(LNMPR)	0.071768	0.114541	0.626575	0.5404
D(LNMPR(-1))	-0.232322	0.127760	-1.818424	0.0890
D(LNMPR(-2))	0.057712	0.106059	0.544153	0.5943
D(LNMPR(-3))	-0.207591	0.110636	-1.876334	0.0802
D(LNGDPPC)	3.886385	0.981079	3.961335	0.0013
D(LNGDPPC(-1))	0.992066	1.008840	0.983373	0.3410
D(LNGDPPC(-2))	-2.444609	0.591535	-4.132651	0.0009
D(LNINF)	0.055052	0.045507	1.209742	0.2451
D(LNINF(-1))	0.071014	0.061839	1.148370	0.2688
D(LNINF(-2))	-0.083281	0.049626	-1.678167	0.1140
D(LNINF(-3))	0.043547	0.041923	1.038727	0.3154
CointEq(-1)	-0.844846	0.201532	-4.192114	0.0008

Cointeq = LNFCE - (-0.2460*LNCHMS + 0.6171*LNCH + 0.3004*LNMPR + 2.7921*LNGDPPC -0.1182*LNINF -17.3385)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCHMS	-0.246016	0.099053	-2.483689	0.0253
LNCH	0.617118	0.201406	3.064057	0.0079
LNMPR	0.300433	0.189136	1.588450	0.1330
LNGDPPC	2.792123	0.855057	3.265423	0.0052
LNINF	-0.118185	0.085287	-1.385731	0.1861
C	-17.338524	6.440111	-2.692271	0.0167

DIAGNOSTIC TESTS

MODEL 1

BREUSCH-GODFREY SERIAL CORRELATION LM TEST:

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	2.163657	Prob. F(2,13)	0.1545	
Obs*R-squared	9.240358	Prob. Chi-Square(2)	0.0099	
Test Equation:				
Dependent Variable: RESID				
Method: ARDL				
Date: 10/01/23 Time: 13:00				
Sample: 1985 2021				
Included observations: 37				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFCE(-1)	0.085042	0.244196	0.348252	0.7332
LNCHMS	-0.009622	0.204894	-0.046959	0.9633
LNCHMS(-1)	0.078212	0.219353	0.356558	0.7271
LNCHMS(-2)	-0.006380	0.068493	-0.093148	0.9272
LNCHMS(-3)	-0.013943	0.057446	-0.242712	0.8120
LNCH	-0.002141	0.223175	-0.009592	0.9925
LNCH(-1)	-0.106257	0.210561	-0.504640	0.6223
LNMPR	-0.018380	0.107743	-0.170591	0.8672
LNMPR(-1)	0.021366	0.111185	0.192163	0.8506
LNMPR(-2)	-0.024390	0.119618	-0.203897	0.8416
LNMPR(-3)	-0.002471	0.099044	-0.024946	0.9805
LNMPR(-4)	-0.020449	0.106331	-0.192318	0.8505
LNGDPPC	-0.143310	0.916675	-0.156336	0.8782
LNGDPPC(-1)	-0.208189	1.255050	-0.165881	0.8708
LNGDPPC(-2)	0.113533	0.940515	0.120714	0.9058

LNGDPPC(-3)	-0.202239	0.559442	-0.361502	0.7235
LNINF	0.014022	0.043308	0.323785	0.7513
LNINF(-1)	-0.009157	0.050216	-0.182354	0.8581
LNINF(-2)	0.027878	0.060994	0.457064	0.6552
LNINF(-3)	-0.004764	0.046286	-0.102932	0.9196
LNINF(-4)	0.005800	0.039110	0.148299	0.8844
C	2.945084	3.846914	0.765571	0.4576
RESID(-1)	-0.500595	0.351598	-1.423770	0.1781
RESID(-2)	-0.480895	0.315257	-1.525406	0.1511
R-squared	0.249739	Mean dependent var		1.03E-14
Adjusted R-squared	-1.077645	S.D. dependent var		0.057759
S.E. of regression	0.083255	Akaike info criterion		-1.882495
Sum squared resid	0.090108	Schwarz criterion		-0.837576
Log likelihood	58.82616	Hannan-Quinn criter.		-1.514112
F-statistic	0.188144	Durbin-Watson stat		2.351004
Prob(F-statistic)	0.999745			

HETEROSKEDASTICITY TEST: BREUSCH-PAGAN-GODFREY

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	0.911298	Prob. F(21,15)		0.5866
Obs*R-squared	20.74211	Prob. Chi-Square(21)		0.4748
Scaled explained SS	2.596779	Prob. Chi-Square(21)		1.0000
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 10/01/23 Time: 13:01				
Sample: 1985 2021				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.218034	0.177872	1.225792	0.2392
LNFCE(-1)	0.004918	0.009394	0.523555	0.6082
LNCHMS	0.006628	0.008983	0.737829	0.4720
LNCHMS(-1)	-0.003317	0.010051	-0.330063	0.7459
LNCHMS(-2)	0.001058	0.003401	0.311226	0.7599
LNCHMS(-3)	-0.000454	0.002852	-0.159249	0.8756
LNCH	-0.009928	0.010050	-0.987854	0.3389
LNCH(-1)	0.001806	0.009663	0.186849	0.8543
LNMPR	-0.000930	0.005339	-0.174162	0.8641
LNMPR(-1)	0.001537	0.005529	0.277948	0.7848
LNMPR(-2)	0.002194	0.005955	0.368462	0.7177
LNMPR(-3)	0.004786	0.004944	0.968010	0.3484
LNMPR(-4)	-0.004085	0.005157	-0.792062	0.4407
LNGDPPC	-0.034055	0.045733	-0.744656	0.4680
LNGDPPC(-1)	0.002234	0.062027	0.036019	0.9717
LNGDPPC(-2)	0.033225	0.047027	0.706516	0.4907
LNGDPPC(-3)	-0.034551	0.027574	-1.253011	0.2294

LNINF	0.000685	0.002121	0.322817	0.7513
LNINF(-1)	-0.004206	0.002506	-1.678508	0.1140
LNINF(-2)	0.006303	0.002883	2.186541	0.0450
LNINF(-3)	-0.006119	0.002313	-2.645139	0.0184
LNINF(-4)	0.002573	0.001954	1.316562	0.2077
R-squared	0.560597	Mean dependent var		0.003246
Adjusted R-squared	-0.054566	S.D. dependent var		0.004062
S.E. of regression	0.004171	Akaike info criterion		-7.834955
Sum squared resid	0.000261	Schwarz criterion		-6.877111
Log likelihood	166.9467	Hannan-Quinn criter.		-7.497270
F-statistic	0.911298	Durbin-Watson stat		2.516862
Prob(F-statistic)	0.586597			

NORMALITY TEST

RAMSEY RESET TEST

Ramsey RESET Test				
Equation: UNTITLED				
Specification: LNFCE LNFCE(-1) LNCHMS LNCHMS(-1) LNCHMS(-2)				
LNCHMS(-3) LNCH LNCH(-1) LNMPR LNMPR(-1) LNMPR(-2)				
LNMPR(-3) LNMPR(-4) LNGDPPC LNGDPPC(-1) LNGDPPC(-2)				
LNGDPPC(-3) LNINF LNINF(-1) LNINF(-2) LNINF(-3) LNINF(-4) C				
Omitted Variables: Squares of fitted values				
	Value	df	Probability	
t-statistic	1.721091	14	0.1072	
F-statistic	2.962155	(1, 14)	0.1072	
F-test summary:				
	Sum of Sq.	df	Mean Squares	
Test SSR	0.020974	1	0.020974	
Restricted SSR	0.120102	15	0.008007	
Unrestricted SSR	0.099128	14	0.007081	
Unrestricted Test Equation:				
Dependent Variable: LNFCE				
Method: ARDL				
Date: 10/01/23 Time: 13:02				
Sample: 1985 2021				
Included observations: 37				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic):				
Fixed regressors: C				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*

LNFC(-1)	0.863600	0.453159	1.905733	0.0774
LNCHMS	-3.473781	1.684905	-2.061708	0.0583
LNCHMS(-1)	2.356662	1.160416	2.030877	0.0617
LNCHMS(-2)	-0.722386	0.354131	-2.039885	0.0607
LNCHMS(-3)	0.651349	0.315688	2.063266	0.0581
LNCH	4.668213	2.252479	2.072478	0.0572
LNCH(-1)	-1.713906	0.852326	-2.010858	0.0640
LNMPR	0.485977	0.263671	1.843122	0.0866
LNMPR(-1)	-1.179453	0.579830	-2.034135	0.0613
LNMPR(-2)	1.342409	0.656084	2.046092	0.0600
LNMPR(-3)	-0.328355	0.186213	-1.763336	0.0996
LNMPR(-4)	1.202450	0.587328	2.047322	0.0599
LNGDPPC	22.27610	10.72467	2.077089	0.0567
LNGDPPC(-1)	-16.65688	8.044539	-2.070582	0.0574
LNGDPPC(-2)	-5.959166	3.037947	-1.961577	0.0700
LNGDPPC(-3)	13.99379	6.733402	2.078265	0.0566
LNINF	0.297596	0.147279	2.020627	0.0629
LNINF(-1)	-0.695408	0.336048	-2.069372	0.0575
LNINF(-2)	-0.411194	0.206031	-1.995789	0.0658
LNINF(-3)	0.465747	0.227070	2.051115	0.0595
LNINF(-4)	-0.240566	0.121072	-1.986967	0.0669
C	-94.30972	46.42425	-2.031475	0.0616
FITTED^2	-0.589813	0.342697	-1.721091	0.1072
R-squared	0.959134	Mean dependent var		4.101320
Adjusted R-squared	0.894916	S.D. dependent var		0.259576
S.E. of regression	0.084146	Akaike info criterion		-1.841142
Sum squared resid	0.099128	Schwarz criterion		-0.839761
Log likelihood	57.06113	Hannan-Quinn criter.		-1.488108
F-statistic	14.93554	Durbin-Watson stat		2.093401
Prob(F-statistic)	0.000003			
*Note: p-values and any subsequent tests do not account for model selection.				

RAW DATA

Year	FCE	CH	MPR	GDPPC	INF	CHMS
1981	11.61051	31.20881	6	1856.07	20.81282	451.628
1982	14.45852	31.72694	8	1680.336	7.697747	500.865
1983	23.22474	33.38142	8	1459.738	23.21233	590.448
1984	37.7316	32.24118	10	1408.209	17.82053	648.2393
1985	49.80746	28.6163	10	1451.369	7.435345	638.1218
1986	43.68708	28.75177	10	1414.698	5.717151	684.4761
1987	43.81231	28.01578	12.75	1422.826	11.29032	772.4953

1988	50.9581	32.35061	12.75	1488.177	54.51122	1240.866
1989	31.19238	25.84583	18.5	1477.612	50.46669	1186.398
1990	35.78851	32.77636	18.5	1608.78	7.3644	1554.363
1991	40.12215	42.92987	15.5	1573.703	13.00697	3236.963
1992	46.4985	43.84516	17.5	1605.548	44.58884	4871.737
1993	49.09782	473.722	26	1533.184	57.16525	78324.6
1994	53.87712	459.0373	13.5	1467.092	57.03171	105712.9
1995	53.97708	372.3988	13.5	1429.012	72.8355	107657.2
1996	57.58277	326.7776	13.5	1451.82	29.26829	113017.3
1997	55.68404	334.9879	13.5	1457.228	8.529874	138443.8
1998	62.37548	361.6306	13.5	1457.701	9.996378	176528.4
1999	53.44736	376.1668	18	1429.406	6.618373	236590.9
2000	42.83953	381.7828	14	1462.536	6.933292	335379.9
2001	62.25269	496.1955	20.5	1508.554	18.87365	629831.7
2002	65.97322	397.0389	16.5	1693.746	12.87658	597926.1
2003	66.4454	397.27	15	1769.883	14.03178	775837
2004	64.2703	312.1787	15	1882.182	14.99803	665508.4
2005	64.80196	271.0216	13	1950.123	17.86349	714931.3
2006	55.66872	244.6703	10	2013.274	8.225222	929235.5
2007	75.61965	260.1771	9.5	2088.605	5.388008	1334032
2008	69.55969	283.566	9.75	2170.059	11.58108	2450983
2009	76.74849	289.4079	6	2281.387	12.53783	2803641
2010	76.00683	242.5309	6.25	2397.324	13.74005	2692448
2011	74.60001	262.4948	12	2455.747	10.82614	3314869

2012	66.82338	235.9959	12	2490.214	12.22424	3658741
2013	80.04514	222.5418	12	2585.648	8.495518	4171117
2014	78.21224	208.8953	13	2677.494	8.047411	4264726
2015	84.50993	207.1267	11	2679.555	9.009435	4325950
2016	86.91956	209.5415	14	2570.96	15.69681	5083267
2017	84.53015	199.9011	14	2527	16.50227	5718064
2018	82.20028	184.1898	14	2512.081	12.09511	5484145
2019	80.16613	175.4237	13.5	2505.463	11.39642	6009649
2020	72.61845	187.7169	11.5	2401.184	13.24602	6764945
2021	67.26493	196.5973	11.5	2429.586	16.95285	7926467