CHAPTER ONE

INTRODUCTION

1.1 Background to The Study

Over the years, a significant argument across separate nations has been the research on the stability of demand for actual cash. When the connection between demand for cash and the factors that determine it breaks down, policymakers are uncertain about future demand for cash. A stable money demand function serves monetary authorities as a stabilization policy that relies on the government's capacity through the central bank's impact to adjust money supply to its demand in any economy to avoid financial inequalities from fluctuating actual production (Nduka, 2014).

Tejvan (2018) describes money demand as how much money people want to keep (as compared to illiquid physical resources) in the form of money. Sometimes it is called preferential liquidity. It is asserted that the connection between on the one hand cash supply and on the other hand rates, earnings, and balance of payment is determined by demand for cash, and such connection plays an significant part in macroeconomic theory.

Thus, confronted with one of the primary determinants of demand for cash, inflation, Nigeria's Central Bank (CBN) strives to encourage and sustain financial stability through effective debt and exchange rate stability management. Essentially, the CBN's suitable demand and supply management strategies required for economic development require that cash be stable and functional (Nwafor, Nwakanma, Nkansah, and Thompson, 2007). Inflation therefore refers to the continuous rise in the economy's overall price level of goods and services. Inflation shows the tendency to reproduce from one era to the next even in the lack of financial shocks (Novaes 1993, Durevall 1999, and Campêlo and Cribari-Neto 2003).

Since the 1986 Structural Adjustment Program (SAP), Nigeria's Central Bank has directed at regulating money demand as a monetary policy tool through interest rate. In this respect, by assigning more weight to the longer-term connection between cash development and inflation, the Central Bank of Nigeria retains price stability. This emphasis represents the opinion of the CBN that inflation is a financial phenomenon and that price stability enhances financial development potential (Rao & Kumar, 2007).

1.2 Statement of Research Problem

Over the years, the Central Bank of Nigeria has been seeking a predictable and stable demand function for money. This is because a stable demand function for money contributes to wider economic growth and increasing living standards. (2014, Nduka). Inflation, however, has been seen as a periodic event in many countries ' economies. In the face of inflation (Baumohl Bernard) relative to the Nigerian economy, the United States economy continues to develop and prosper. While both nations face the same inflationary situation, the growth and prosperity rate in the U.S. is incomparable with the prosperity and development pace in Nigeria. Evidence from both countries ' inflationary patterns indicates that the U.S. had an average inflation rate of 2.7% in the 1960s, 7.1% in the 1970s, and 4.9% in the 1980s, 2-3% in the 1990s, compared to Nigeria’s double-digit inflation rate 15.03%, 20.16% in the 1980s and 30.65% in the 1990s, began in the 1970s (Central Bank of Nigeria (CBN) Statistical Bulletin 1994, Nigeria Development Report 2001). In any nation, during a period of inflation, individuals want to hold more cash to fulfill their operations without associated manufacturing rise. This is because there was a reduction in the value of cash. Reducing the value of cash is having an effect on investment as manufacturing is going to be significantly impacted. The economic growth of such

a nation will be impacted as a consequence of this impact on productivity (Oladeji Tolulope, 2014).

Recent studies on Nigerian industry, however, report stable demand for money. The question is, if the demand for money function in Nigeria is really stable, why can't the CBN predict the demand for large money correctly? This is because none of the past study studies on Nigerian demand for money used all the prospective determinants and also some did not use the methodology needed. If the role of money demand is volatile and suffers significant instability as Keynes believed, then speed is unpredictable and the amount of money may not be directly related to aggregate expenditure as it is in the theory of contemporary quantities. In latest years, the fast pace of financial innovations has resulted in the money demand function being substantially unstable and this challenges whether the theories and empirical analysis are sufficient. It also has significant consequences for how monetary policy should be performed as it casts doubt on the usefulness of the function of money demand as an instrument for providing policymakers with guidance (Mishkin, 2004). Thus, what is needed in a stable demand for money function is a set of needed circumstances for money to exert a predictable impact on the economy so that the control of the money supply by the Central Bank can be a helpful financial policy tool (Tahir, 1995).

This research therefore contributes to the body of knowledge and therefore tries to enhance on other research as this research use more latest information to discuss latest events within the economy, also taking into account modifications in existing research. The methodology used was quite distinct from what had been adopted by previous research. Although many trials were conducted on demand for money, there were no conclusive results as the data setting was

changing so the methodology as well as variables based on the assessment of the macroeconomic position and developments in the financial system were also evolving.

1.3 Research Questions

The following research questions shall be answered:

1. What is the effect of inflation on money demand?
2. What is the causal relationship between inflation and money demand?

1.4 Objective of the Study

The broad objective is to analyze the stability of money demand function in Nigeria. The specific objectives are:

1. To investigate the effect of inflation on money demand
2. To examine the causal relationship between inflation and money demand

1.5 Research Hypothesis

The study hypotheses are:

1. Ho_1: Inflation has no effect on stable money demand.
2. Ho_2: There is no causal relationship between inflation and money demand

1.6 Significance of the Study

This study will be relevant to the Central Bank of Nigeria (CBN), policy makers and researchers. This is because; the study differs significantly from most research work along that it studies the relationship between inflation rate and real money demand in Nigeria. If it happens that the demand for money balances is stable or has a persistence relationship with its

determinants, the changes in real money stock would have more predictable effects on output and income and the suppose change in the real money stock to restore the equilibrium in the economy. The outcome of this research will be of great help, in the sense that it would improve the knowledge base of academics in this sector, would be of excellent assistance to Academia. It would also assist the general public to make informed choices, in the sense that it will assist them. It would also broaden their understanding of Nigeria's inflation rate and real demand for money. The outcome of this research would assist the government make informed decisions and appropriate policies to achieve a low inflation rate and elevated economic growth in the nation in order to allow the nation to move forward.

Scope of the Study

This research uses data from the 1970-2018 annual series. This period was selected primarily through the accessibility of CBN and IMF information. Money demand, real income, real domestic interest rate, real exchange rate, inflation rate, and overseas interest rate were the factors used.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter is made up of four primary parts, namely the research overview, the theoretical section, the empirical section, and the study gap. The overview of the study examines the Nigeria's inflation trend and demand for money from 1970-2018. The theoretical chapter contains theories on demand for money that include the classical approach [Irving Fisher's Version of Quantity Theory and Cash Balance Approach (Cambridge Approach to Quantity Theory)], the Keynesian Approach (Transaction Motive, Precautionary Motive and Speculative Motive) and finally the Post-Keynesian Approach (Tobin's Portfolio Balance Approach). The empirical chapter then includes past research performed both globally and locally by past academics. Finally, the gap in the research includes the study's primary goal that reveals the gap in past research.

2.1 Overview of Inflation and Stability of Money Demand in Nigeria.

This section provides an overview of inflation and stability of money demand in Nigeria during the period of 1970-2018.

2.2 General Nigeria’s Inflation Experience

Since the 1970s, Nigeria has been defined by elevated inflation rate volatility. During this era, Nigeria's inflation rate exceeded 30 percent. In 1969, Nigeria's inflation rate was 10.36 percent, which was then a source of interest to the military government because of a civil war that did not end but caused the nation to experience double-digit inflation for the first moment in exchange for a policy that should be enacted by the federal government. In 1971, inflation risen

to 16.0 percent as a consequence of the wage and wage assessment commission's rise in workers' wages, which resulted in a rise in demand resulting in the economy's excess demand. The government lifted import constraints on various products and services to react to this elevated level of inflation while reducing the excise duties on certain products and services. They established a credit policy to encourage food production, along with the establishment of the domestic supply corporation NNSC, which was exclusively liable for the supply of products throughout the nation, leading to a rise in the supply of products and services that could not fulfill the excess demand in circulation. This resulted in a dramatic decline in the inflation amount in 1972 to 3.2%.

In 1973-1985, Nigeria experienced elevated inflationary pressure with an average inflation rate of 17.96%. The 1971 anti-inflation measures were implemented in 1973 and the inflation rate recorded was 5.4 percent, but the tale was distinct in 1974. Inflation rose as high as 13.4 percent, resulting from an intervention that enhanced the overall wage increase expectation. The same increase in wages was also acknowledged by private parastatals and the armed forces. April 1974's arrears resulted in excess demand in the nation, resulting in a elevated inflation rate reported in 1975 at 33.9 percent. This era led to the imported inflation phenomenon in Nigeria (Olubusoye O. E. & Rasheed O., 2008). Despite the different public policies in 1972-1974, the rate of inflation in 1975-1974 was not substantially decreased. The federal military government set up a unique anti-inflation task force in late 1975, which identified both demand and factor costs in Nigeria and suggested the establishment of the Productivity, Prices and Income Board (PPIB). The PPIB came into being in early 1976, and the price control system was restructured leading to a low level of consumer price development by the end of 1970. However, the nation registered a high inflation rate of 20.9 percent in 1981, and the government stepped up attempts

to import and distribute significant commodities in reaction to this high rise. They had the Green Revolution Campaign during this era. This resulted to a decrease in the inflation rate in 1982 to 7.7%. In 1983, the inflation rate was 23.2% and 39.6% showed that the decrease in the inflation rate in 1982 did not last long. It fell to 5.5 percent in 1985 as a consequence of the then military government's forced supported price control scheme (Olubusoye O. E. & Rasheed O., 2008).

In 1986 the level of inflation was 5.4% and in 1987 the level of inflation was 10.2%. This is due to an enhancement in food production in 1986. In 1988, the inflation rate was 38.3% and 40.9% in 1989. In 1990, the inflation rate was suppressed and registered at 7.5% as a consequence of an rise in food production development. This also did not last long since domestic prices have risen since 1991. In 1992, the rate of inflation was 44.6%, 57.2% in 1993, 57.0% in 1994 and 72.8% in 1995. In 1996, stability measures consisting of fiscal and monetary discipline were implemented, resulting in a decline in inflation to 29.3 percent in 1996. Inflation fell dramatically to a single figure of 8.5 percent in 1997, which was heavily affected by falling food prices, continuous fiscal and monetary discipline, and excellent harvest as a consequence of excellent rainfall or climatic circumstances. In 1998, the inflation increased from 8.5% in 1997 to 10% in 1998. The era of democracy was 1999-2007. In 1999, the inflation rate was 6.6 percent, which rose in the early months of 2001 to 18.9 percent, but declined at year-end to 12.9 percent. In 2005 inflation risen to 17.9 percent but decreased by 53.1 percent to 8.4 percent in 2006 but there was a decrease in 2007 to 5.4 percent. Between the phases of 2008-2011 inflation rates improved and as a consequence of the advent of the global financial crisis were averaged at 11.8 percent. (Maku A. O. & Adelowokan O. A., 2013) noted that the country's inflation rates are strongly correlated in Nigeria. Looking at the overtime inflation cycle, they discovered that Nigeria's inflation rate has vibrant overtime patterns.

The Nigerian government hopes to decrease the inflation rate to less than 10 percent in 2013, although the inflation rate declined from 13.7 percent respectively to 10.2 percent in 2010 and 2011 as a consequence of tightening currency insurance and replacing the Leontyne Price food. Inflation will fall to 10.1% in 2012 and 8.4% in 2013 in 2012 and 2013. Inflation declined from 13.7% in 2010 to 10.2% in 2011, as a consequence of tightening financial insurance and easing food toll. Inflation is forecast to decline from 10.1% to 8.4% in 2013 by 2012 and also to decline to 8.06% in 2014, to 9.01% in 2015 and to rise again in 2016 from 15.7% to 16.52% in 2017 (WDI, 2018).

2.3 Monetary Policy Management Framework in Nigeria

Developments in the worldwide and national economies are the primary goal of monetary policy in Nigeria. The main developments on the worldwide front were: enhanced monetary policy divergence among developed countries; ongoing uncertainty surrounding the BREXIT negotiations; growing trade war between the US and other main economies of the globe; continuous monetary policy normalization in the US with consequences for capital reversals from emerging markets and developing countries; The moderating developments included the apparent return of peace to the Korean peninsula following the US-North Korean leadership meeting, and the beginning of trade talks between China and the US to prevent the looming trade war (CBN 2018).

On the national scene, monetary policy's main difficulties were: ongoing liquidity surface in the banking system; fragile financial recovery; elevated but moderating inflationary stress; and foreign-exchange pressures. However, headline inflation gradually decreased from 15.13% in January to 11.23% in June 2018. Food inflation has been the main driver of overall consumer price moderation over the period, though core inflation has also contributed (CBN 2018).

2.3.1 Output in the Domestic Economy

The national economy proceeded on the growth path in 2018, but it remained fragile. The growth was mainly due to enhanced fiscal income and reserve accretion as a consequence of continuous oil and other commodity prices recovery, enhanced oil production, and processing execution of the Economic Recovery and Growth Plan (ERGP).

The National Statistics Bureau (NBS) information observed that true Gross Domestic Product (GDP) growth in the first quarter of 2018 was moderated to 1.95% (year-on-year) from 2.11% in the previous quarter. The growth in the respective quarter of 2017 was in comparison to the contraction of 0.91 percent. The petroleum industry stayed the primary driver of development as it rose by 14.77% compared to 11.20% in the previous quarter and 15.60% in the respective period of 2017. The oil sector's continuous development was traceable to the ongoing peace in the Niger Delta area, which had a beneficial effect on oil manufacturing. Similarly, in the first quarter of 2018, the non-oil industry rose by 0.76 percent compared to the development of 0.45 and 0.72 percent respectively in the previous and corresponding quarters of 2017. Non-oil industry development reflected industry performance (3.52%), agriculture (3.0%) and services (0.59%). However, in the first quarter of 2018, the construction and trade industries contracted by 1.54% and 2.57% respectively (CBN 2018).

Real GDP also rose by 1.50 percent (year-on-year) in 2018, down by 0.45 percentage point from 1.95 percent in the previous quarter. However, it was an increase of 0.78 percentage point compared to 0.72 percent development in the respective 2017 era. The petroleum industry was the primary driver of the decrease as it declined by 3.96% in Q2 2018 compared to the 14.11 and 3.53% development in the previous quarter and the respective 2017 period. However, the

non-oil sector grew by 2.05 per cent compared to the growth of 0.76 and 0.45 per cent respectively in the previous quarter and the corresponding 2017 period. Growth in the non-oil industry reflected building output (7.66%), services (4.19%) and agriculture (1.19%), although in the second quarter of 2018 the trade sector contracted by 2.14% (CBN 2018).

2.3.2 Price Development

Inflationary pressure declined during the review period, mainly due to the Bank's continued tight monetary policy position. All inflation measures, namely headline, core and food, retained a downward path, although headline inflation remained above the Bank's upper target range of 6-9 percent. Developments in domestic prices usually reflected the interplay between the forces of supply and demand. On the supply side, the pressure on the foreign exchange market fell, with a beneficial impact in the review period on the domestic price level. The naira has improved in all market segments, reflecting the effect of the Bank's latest reforms and interventions, including stepping up initiatives to boost capital inflows and enhance foreign exchange liquidity (CBN 2018).

The important increase in the accretion of external reserves on the back of the worldwide crude oil market's price recovery primarily helped promote the appreciation of the naira. In addition, the Bank has continued to implement existing measures, including the Investors & Exporters window, restricting access to foreign exchange for some 41 items, using Bank Verification Number (BVN) in BDC transactions, and selling foreign exchange to BDCs by the Bank and International Money Transfer Operators (IMTOs). The Bank also stepped up its current policy on export repatriation as well as returning unused foreign exchange from CBN auctions to the Bank. On the demand side, price developments were also affected by money

market operations, where prices fluctuated extensively without a definite path outside the Standing Facilities area, suggesting a large degree of market uncertainty. The uncertainties were mainly due to low fiscal operations as reflected in the postponed 2018 budget of the Federal Government, the government's latest preference for borrowing from the global market, delays in disbursements from the Federation Account Allocation Committee (FAAC) and the execution of extra measures to handle demand stress on the foreign exchange market. Continued execution of the 2017 capital budget, Joint Venture Cash (JVC) calling payments, CBN actual estate measures and maturing CBN bills and public securities included the main sources of liquidity over the period. In order to reduce inflationary pressures (CBN 2018), these advances made the Monetary Policy Committee (MPC) maintain its monetary policy tightening position over the era.

2.3.3 Historical Evolution of the Current Monetary Policy in Nigeria

The CBN's focus on price stability goal reflects a paradigm shift from previous methods in which the overriding goals of monetary policy were promoting fast and sustainable economic growth and jobs. Before 1986, the CBN relied on the use of direct (non-market) monetary policy instruments, such as Deposit-Money of Banks (DMBs) credit ceilings, administered interest and exchange rates, and the prescription of cash reserve requirements, to achieve its objective of sustainable growth and employment. Fixing objectives for aggregate credit to the national economy and prescribing low interest rates were the most common monetary policy tools. With these tools, the CBN hoped to guide the flow of loanable funds with a perspective to encouraging fast growth by providing finance to preferred economic industries (agriculture, manufacturing, and housing) (Onafowora and Owoye, 2007).

Despite the enormous oil profits since the 1970s, government spending has been reckless. A specific head of state army once exclaimed that Nigeria's issue is not cash, but how to spend it. Thus, in 1977, the state spent and invited the entire world to the Festival of Arts and Culture (FESTAC). As a consequence, the economy was plunged into a twin-deficit quackmire. The govt has resorted to CBN, the International Monetary Fund (IMF), and the World Bank borrowing to finance the deficits.

Also in 1982 the government took austerity steps. The austerity policies accomplished some success in 1985, with inflation falling to a single digit, the internal present account moving from deficit to balance and actual GDP rising by 9.5%. Improvements in fiscal and external roles in 1985 were transitory, however, and did not provide a foundation for continuous financial development (Onafowora and Owoye, 2007). However, the government embraced the Comprehensive Structural Adjustment Program (SAP) sponsored by the IMF in July 1986 as a policy choice to bring the Nigerian economy back on the road of sustainability. The SAP engaged reforms of both structural and sectoral policy. The SAP's primary policies were the liberalization of the external trade and payment system, the introduction of the national currency (Naira) market-based exchange rate in 1985, the elimination of price and interest rate controls, and the dependence on market forces as the primary determinant of financial activity. The implementation of SAP marked the beginning of a financial industry reform system characterized by the free entry and exit of banks and the use of indirect (market-based) monetary control tools for monetary policy implementation in Nigeria (Nnanna, 2001).

The developments in the Nigerian economy since 1986, and most importantly, the CBN's adoption of M2 as an intermediate financial strategy goal, raise two key questions: Is the real demand for money M2 stable as an intermediate goal? Is the CBN justified in choosing M2 as a

goal? Recent innovations in financial schemes and enhanced openness may have resulted in unstable money demand function. It is impossible to overemphasize the financial consequences inherent in these issues. If the role of money demand is volatile and experiences significant changes over time, then the velocity of revenue of money will be unpredictable and the amount of cash may not be a good predictor of financial activity. In other words, if the demand function of M2 is discovered to be volatile, the selection of M2 as an intermediate goal poses a severe economic problem for Nigerian monetary authority (Onafowora and Owoye, 2007).

2.4 Conceptual Framework

Money demand refers to individuals ' willingness to hold money as money balances. Such demand comes from money's fundamental uses (Umo, 1986). Money demand refers to the desire of people to hold cash in liquid cash. Keynes used a new term "Liquidity preference" for the demand for money in his general theory. Liquidity preference refers to the demand for money by individuals such as income earners, businessmen and wealth holders to carry out their domestic and business functions. Moser (1997) added that demand for money is commonly described in terms of their ability to facilitate transactions (medium of exchange) and store of wealth. Sriram (2001) affirms that demand for money plays a major role in macroeconomic analysis especially in selecting appropriate monetary policy actions. Boughrara (2001) views demand for money as the link between monetary policy and the rest of the economy. Money can be defined as anything which is acceptable by the people in the payment for the goods and services and the discharge of debts (Vaish 2000). Liquidity is the most significant characteristic of cash that distinguishes it from other types of property, be it economic assets such as shares, bonds and stocks or actual resources such as property, house, vehicle and machine.

Money demand is obtained from two significant cash features. They are an exchange medium and a value store. Individuals want to keep money in liquid cash as an exchange medium. As a value shop, people want to carry cash in the form of assets that may be economic assets such as bonds, corporate debentures, or actual resources such as houses, vehicles, and property hectares. As an exchange medium, cash has helped to ease society by barter from trade inconveniences. It has helped remove the double-coincidence issue associated with the trade in barter. The money economy enables people to deal with the separate problem of buying and selling at a time. The use of money is time and effort saving. Money decreases the number of transactions needed to achieve a given degree of specialization. It enables people to buy from one person at a place and time and sell at another place and time to another person. Money has made multilateral trade possible. As a store of value, money helps individual to guide against the eroding tendency of inflation. Money held in liquid money can easily lose its value compared with money held in form of asset. A rise in the general price level will pay off for an individual that has his money stored up in asset form. Such an individual tends to achieve more during an inflationary period. Inflation is a worldwide situation, the most important in history being the hyperinflation of the Germany in the 1930's.

Inflation can be described as the constant rise in a country's overall price rate of products and services. It is a continuous price increase that leads to a reduction in the buying power of a specified nominal amount of cash. Umo (1986) describes inflation as a generalized rise in a long-term economy's price point. Inflation is viewed by Afolabi (1991) as a continuous increase in the overall price level. This perspective shows that inflation is characterized by the incidence of price rises, usually not only by rises in one or a few commodities ' prices, and this rise must be maintained and not merely a temporary fluctuation. Neo-classical economists described inflation

as a galloping price rise due to excessive increase in the amount of cash (Jhingan 1997). The overall price level of products and services can also be described as a continuous increase. If too much cash is chasing too few products and services, inflation happens. Inflation indicates a state of imbalance between aggregate supply and aggregate demand at the present or existing price, leading in an increase in the economy's overall price rate.

2.5 Theoretical Framework

Inflation leads to a general loss of trust in money, and one of its worst evils is that it deprives money as a store of value from its services. Inflation is a financial phenomenon, it is asserted. This therefore requires a check, using suitable currency measures. Open Market Operation is a significant tool available to the central bank under the monetary policy to influence the loan supply and price. This includes the purchase and sale of open market securities. Government requires boosting its securities sales to the public during inflation, such as bonds, treasury bills, and treasury certificates e.t.c. This can lead to the withdrawal of surplus money balance from the public. The method includes the sale of open market securities. This method will assist to reduce people's purchasing power and reduce the cash that circulates in the economy. Bank rate is another financial instrument as well. Increasing the bank rate raises the expense of resources, thus promoting borrowing for speculative purposes in particular. However, the bank rate must be used with caution. Hubbard (2000) believes inflation can be considered a continuous rate of price-level rise. Most economies have been characterized by inflation since World War II. Sustained currency expansion can trace inflation. From all of the inflation opinions so far, most economists believe that inflation is not a sudden price increase, but a process of increasing prices (Oladeji Tolulope, 2014).

2.5.1 Monetarist Theory of Inflation

Milton Friedman advocated this concept and it is called the quantity theory of cash (QTM). Monetarists said money supply is the primary determinant of an economy's price point. Once the amount of money provided in an economy is changed, it will lead to a direct and proportional shift in the price level. The quantity theory of money can be written as follows using the exchange equation of Irving Fishers;

$MV=PQ$

Where:

M= Money Supply in an economy

V= Velocity of Money in Circulation

Q= Volume of transactions

P= General Price Level

Monetarists stressed that an economy's inflation is the result of a change in money supply or quantity of money in circulation, which affects the level of prices but does not affect the rate of output growth in the economy. They thought that the amount of inflation significantly impacts investment, exports, and capital accumulation, and thus long-term effects on an economy's growth rate. In an economy, they put more emphasis on the long-run than on the short-run dynamics. Dornbusch et al (1996) indicated that, in the long run, money supply impacts prices but has no true impact on growth rate, whereas in a scenario where money supply is higher than production development, inflation will occur in the economy.

2.5.2 Keynesian Theory of Inflation

This theory was put forward in a book entitled "The General Theory of Employment, Interest and Money" by John Maynard Keynes in 1936. The Keynesians think in public involvement in an economy's affairs through expansionary and contractionary financial policies that will increase investment and push demand into the economy's complete output. The Keynesians came up with a model consisting of Dornbusch et al. (1996) aggregate demand and supply curves arguing that there is a favorable connection between inflation and economic growth, but this connection becomes negative owing to the adjustment route of the AS and AD curves. Another factor leading to a favorable growth-inflation relationship is firms ' agreement to deliver products at an agreed cost. When prices rise, companies generate more and purchase less that results in a adverse connection between development and inflation (Gokal V. & Hanif S, 2004).

2.5.3 Classical Theory of Inflation

Adam smith is the father of the classical economist; he developed a supply-side development model where he pointed out three significant variables of manufacturing, land, labour, and capital. He advocated a function of manufacturing in which output is a function of land, capital and land which is:

$Y=f(L, K, T)$

Y= Output K= Capital L= Labour T= Land

According to Adam Smith, savings lead to investment leading to economic growth. He said production growth is the outcome of growth in investment, population growth, land and overall productivity growth. The connection between inflation and economic growth is negative in

reducing the amount of corporate profit and saving by greater salary expenses (Gokal V. & Hanif S, 2004). This theory has been criticized because it gives no immediate reason for inflation and the tax impact on profit and production levels.

2.5.4 Neo Classical Growth Theory

Solow and Swan advocated this hypothesis. The neo-classicals claimed that technology, labor and capital are the main determinants of production development, and they developed a growth model that states that technological change or science innovation replaces investment as the main factor that explains long-term development. The neo-classicals indicated that exogenously determines the amount of technological change, i.e. it is autonomous of all other variables including inflation. (Gokal V. & Hanif S, 2004) stated that the neoclassical financial development theory is based on the concept of decreasing labor yields and decreasing capital yields individually and continuous returns on both variables together.

(Mundell R, 1963) believes that inflation leads to a steady rise in the pace of development of production by stimulating capital accumulation, as families would prefer to hold less cash and more resources in response to inflation. Mundell stated that there is an increase in the intensity of capital that encourages economic growth, and this is due to inflation that makes people convert their cash into other resources. (Tobin J. et alle, 1965) also shares Mundell's view that economic growth has a positive influence on inflation. (Stockman A. C., 1981) developed a model demonstrating that inflation and economic growth have a adverse connection. The model of Stockman demonstrates that the welfare of people reduces as a consequence of a reduced steady state level triggered by an increase in inflation rate. (Sidrauski M, 1967) argued that an economy's inflation rate does not necessarily lead to an adjustment of the unwavering capital stock and economic growth.

2.6 Theories on Demand for Money

In the demand for money theory, the stud will begin with the classical theories refined by economists like Fisher, Marshall, and Pigou at the beginning of the twentieth century, then move on to the Keynesian theories and end it with the post Keynesian theories.2.6.1 The Classical Approach

2.6.1 The Classical Approach

The classical approach is divided into two: (i) Quantity theory made famous by Irvin Fisher and (ii) cash balance theory associated with the Cambridge school and pioneered by Marshall and Pigou. These theories are together referred to as the monetarist approach.

Irving Fisher's Version of Quantity Theory

This was developed in the nineteenth and early twentieth centuries. The modern development theories of money demand have their foundation on Fisher's identity. They assume that the demand for money is rather the transaction velocity of circulation of money. Money serves many functions (medium of exchange, store of value, unit of account, and means of deferred payment). Economist limited their view of money to its function as a medium of exchange and proposed that the main reason why household and businesses demand for is for the use in making transactions. The duration of time lag between receiving payments from the sale of goods and services and then making payments for goods and services purchased necessitated the holding of cash balances the intervening period. Therefore, in the classical approach, all money held is in transactions balances, were kept to finance future transactions.

Fisher's analysis begins with a simple identity. Every transaction has both a buyer and a seller. Hence, for the aggregate economy, the value of sales must equal the value of receipts. The

value of sales must equal to the number of transactions conducted over anytime period multiplied by the average price at which they take place. The value of purchases must equal to the amount of money in circulation in the economy times the average number of times it changes hands over the same period. Hence $M_sV=PY$ (equation of exchange). M_s, the quantity of money, is determined independently of any of the three other variables and at any given time can be taken as given. T, the volume of transactions, can also be taken as determined independently of the other variables in the identity. They believed that output would correspond to the full employment level.

These considerations permit the identity, which is the equation of exchange to be transformed into a version of the quantity theory of money. If $\Delta V = \Delta T = 0$ then $\Delta M_s = \Delta P$. Implying that P would vary proportionately with any change in M_s. If $M_d = M_s$ then $M_d = {}^{1}/_{V} PY$, or $M_d = KPY$. Therefore, the value of money balances adjusted for changes in purchasing power is $\frac{Md}{P} = KY = V^{1}$. This shows that, the demand for real money depends on the current value of the transactions to be conducted in the economy and is equal to a constant fraction of those transactions.

Cash Balance Approach (The Cambridge Approach to Quantity Theory).

The cash balance approach is associated with Pigou (1917), Marshall (1923), and Robertson (1922). The Cambridge cash balance approach views the demand for money as a store of value. According to the cash balance approach, the value of money is determined by the demand for and supply of money. The Cambridge story is fundamentally different from the Fisher. In Fisher, money is desired by agents in some fixed amount solely because it happens to be the medium of exchange. Fisher noted that money yields no gain to the holder. However, the

Cambridge approach postulated that, money does increase utility by enabling the divorce of sale and purchase as well as a hedge against uncertainty.

The demand for money is a certain portion of the annual national income that people want to hold for the transaction in cash or in the form of money and precautionary reasons, since the supply of money at a particular time is therefore fixed, the price level changes depend on the changes in the demand for holding money or cash balances. This money portion is frequently depicted as K, a nominal revenue portion (P*Y). The economists of Cambridge (Alfred Marshall, A.C. Pigou, and John Maynard Keynes) also thought wealth would play a role, but wealth is often omitted for simplicity. The Cambridge equation is thus $M^d = K.P.Y$.

Assuming that the economy is at equilibrium $(M^d = M)$, Y is exogenous, and K is fixed in the short run, the Cambridge equation is equivalent to the equation of exchange with velocity equal to the inverse of K: $M \cdot \frac{1}{K} = P.Y$

2.6.2 The Keynesian Approach.

Keynes (1936) abandoned the classical perspective of constant velocity and emphasized on the relevance of interest rates**.** In his famous book titled "The General Theory of Employment, Interest and Money". John Maynard Keynes abandoned the classical view that, velocity was a constant and developed a theory of money demand that emphasized the importance of interest rates. Keynes distinguished 3 main motives for holding money, namely, the transactions, precautionary and speculative motives. The transactions and precautionary motives are derived from money's use in facilitating exchanges, while the speculative motive is derived from money's use as assets, as a store of value.

The Transaction Motive.

In the classical theory, individuals are assumed to hold money because it is a medium of exchange that can be used to carry out everyday transactions. Keynes emphasized that the transactions demand for money is primary determined by the level at which individual transact, this because; he believed that these transactions were proportional to income. This transaction demand for money can be expressed as $L_1 = K_1Y$.

The Precautionary Motive.

Keynes went beyond the classical analysis by recognizing that in addition to holding money to carry out current transactions, people hold money as a cushion against an unexpected need. There is a precautionary demand for money because people do not know exactly what their consumption expenditure in the current period will be. Keynes believed that the amount of money people want to hold for precautionary motive is determined primarily by the level of transactions that they expect to make in the future and that these transactions are proportional to income. The precautionary demand for money can be expressed as $L_2 = K_2Y$. Therefore, the demand for money for both transaction and precautionary motives are: $L_1 + L_2 = K_1Y + K_2Y = F(Y)$.

The Speculative Motive.

Keynes examine how expectations about interest rate would affect the demand for money. This need arises from uncertainty about future interest rate. Keynes emphasized risk and the uncertainty of expectations as the reasons behind the negative relationship between the interest rate and the speculation demand for money. Keynes divided the assets that can be used to

store wealth into two categories: money and bonds. Money is a financial asset that is perfectly liquid but earns no interest rate. A bond on the other hand, is a financial asset that attracts a fixed rate of interest per annum. He assumed that an individual would want to hold money if its expected return was greater than the expected return from holding bonds. Keynes assumed that individuals believe that interest rate gravitate to some normal value. If interest rates are below this normal value, individuals expect the interest on bonds to rise in the future and so expect to suffer capital losses on them. As a result, individuals will be more likely to hold their wealth as money rather than bonds and the demand for money will be high. From Keynes reasoning, it is concluded that as interest rates rise, the demand for money falls, and therefore money demand is negatively related to the level of interest rates.

2.6.3 The Post-Keynesian Approach

Tobin (1956) and Baumol (1952) provided the theory that explains why the transactions demand and even the precautionary demand depends on the interest rate.

Tobin's Portfolio Balance Approach

Tobin's main focus for this approach was to show how people's desire to hold money may be derived from their appearance towards holding bonds which might as well result into risk bearing. People holding bonds are consequently unsure whether they will make a capital gain or loss. Tobin started that the demand for money diminishes as the number of transfers between money and securities increases.

Individual has a savings balance which he can keep in the form of money or invest in bonds, if he keeps it in form of money, then on the assumption of a stable price level there is no risk attached. But while there is no risk attached to the money holding there is no possibility of

an income either, if the individual invest his savings balance in bonds, then he does have a money income in the form of the interest the bond will earn him.

Baumol's Approach

Baumol called his approach the "inventory – theoretical approach". Baumol applied optimizing techniques in order to find the optimal quantity of transactions balances that an individual should hold. In his analysis, the demand for transactions balance depends on the brokerage costs and the opportunity cost of deposits. The transaction demand is directly proportional to the square root of the quantity of transactions and inversely proportional to square root of the opportunity cost. In other words, if the opportunity cost increases it will be profitable to invest in bonds and the optimal cash balance will decrease.

2.7 Empirical Framework

2.7.1 International Evidence

Khan and Ali (1997) investigate the presence in Pakistan of a long-run relationship between money, income, price, and interest rate. Using annual information from 1972 to 1992, the research uses Engle-Granger's strategy cointegration and error correction. The research claims that changes in the economic industry have made the tight monetary aggregate unstable and in the long run unpredictable. On the other side, there was a stable long-run connection with real income, real interest rate, and inflation in the wide monetary aggregate. Furthermore, the research demonstrates that structural modifications in the economic industry after 1989 did not

influence the stability of the wide monetary aggregate in Pakistan, in particular interest rate liberalization.

Meanwhile, Samara (n.d) empirically examines the demand for money function in Syria in a comparable research for Syria. The research uses cointegration tests from Engle-Granger, Vector Error Correction Model (VECM), and stability tests from CUSUM and CUSUMSQ. From 1990Q1 to2009Q4, the research utilizes quarterly information on demand for cash (M1 and M2), real income, price level, foreign exchange rate, foreign interest rate and oil prices. From 1990Q1 to2009Q4, the study uses quarterly data on demand for money (M1 and M2), real income, price level, foreign exchange rate, foreign interest rate and oil prices. The findings indicate that there is a weak co-integrationof actual cash demand (M2 and M1) and its determinants. In addition, both the stability tests and the Error Correction Model demonstrate unstable functioning of money demand in Syria. The research concludes that it could be fruitless in the Syrian economy to use cash supply to regulate inflation.

Sterken (1999) examines the Ethiopian economy's monetary demand equation (M1) with quarterly information from 1996Q1to1999Q4. This period is described by both climate disasters and political breaks: two political regime changes in 1974 and 1991 as well as two severe drought periods in 1975 and 1985. As the model's main endogenous factors, the research utilizes true demand for narrow money, real income, shortage, and a real alternative yield. The research uses an unrestricted strategy to VAR. The findings indicate a long-run situation of equilibrium, referring to true demand for cash per capita, true GNP per capita, shortage and true coffee export price. During the first break between 1974 and 1975, the model also demonstrates some instability. The research concludes that the model's true endogenous factors are real income and the real price of coffee, while exogenous variables are weak actual cash holdings and shortages.

Watson (2001) studies Jamaica's demand for cash with quarterly information from 1976Q1 to 1998Q4 in a comparable research. The research uses limited and unrestricted VAR models as well as structural cointegration. The factors used are money supply, national income, level of deposit prices, interest rate, base money, interest rate and interest on loans. Over the era studied, the findings indicate that there is a stable long-run demand for cash feature in Jamaica. The research concludes that there was a satisfactory diagnosis of the Error Correction type while the Persistence Profiles, a helpful instrument for policy analysis purposes, are not at odds with economic theory projections.

Nachega (2001) uses VAR model analysis to explore Cameroon's behavior of demand for money (M2) from 1963/64 to 1993/94. The co-integrated VAR assessment first defines an open-economy model of money, price, income, and a vector of return rates in which three stable state relationships are recognized: a stable function of money demand, an excess aggregate demand relationship, and an uncovered interest rate relationship under fixed exchange rates and ideal mobility of capital. Over the era studied, the findings indicate a stable short-run demand for money in Cameroon. Using comparable methodology, Adam, Kessy, Nyella and O'Connell (2011) use annual information from 1998Q1 to 2011Q4 to explore the demand for cash (M2) function in Tanzania. The research uses the strategy of VAR and VEC.

The factors used are wide demand for money (M2), real GDP, interest rate, inflation rate, and nominal depreciation rate. The study reports that the disaggregation of currency and deposits, currency, is more responsive to expected inflation, and the spread of interest rate deposits vis-à-vis T-bills than does M2 as a whole. The findings indicate that a stable co-integrating connection exists in Tanzania between actual cash balances and their determinants.

Halicioglu and Ugur (2005) evaluate the stability of the narrow money (M1) demand function in Turkey with annual national income, interest rate and exchange rate information for the period between 1950 and 2002. The research uses ARDL strategy for stability testing with CUSUM and CUSUMSQ. The findings indicate that there is a stable demand function for money and suggest that the small aggregate of money can be used as a monetary policy goal in Turkey. Similarly, for the period 1994:12 to 2006:12, Sovannroeun (2008) estimates the demand for money function in Cambodia with monthly information. The variables used are M1, real income, inflation rate, and exchange rate demand for money balances. The research uses ARDL cointegration strategy created for stability testing by Pesaran et al. (1996, 2001), CUSUM and CUSUMSQ. The estimated error correction coefficient term shows that the function of money demand is co-integrated among factors. The findings also show that the projected real income and inflation elasticity coefficients are positive and negative as anticipated, respectively. The coefficient of exchange rate is negative, supporting the symptom of currency replacement in Cambodia. The research concludes that over the period covered in Cambodia, demand for cash feature is stable. In another research, Dritsakis (2011) uses quarterly information from 1995Q1 to 2010Q1 to examine the demand for cash in Hungary. The research utilizes variables; demand for money (M1), actual earnings, rate of inflation, and nominal exchange rate. ARDL co-integrating framework and stability tests for CUSUM and CUSUMSQ are used in the research. The findings indicate that M1, real income, inflation rate, and nominal exchange rate, have a unique co-integrated and stable long-run connection. Real elasticity of revenue is positive, while negative is the elasticity of inflation rate and nominal exchange rate. Real elasticity of revenue is positive, while negative is the elasticity of inflation rate and nominal exchange rate. The CUSUM and

CUSUMSQ studies indicate that during the period covered in Hungary, narrow money demand function is stable.

Dagher and Kovanen (2011), with quarterly information from 1990Q1 to 2009Q4, explore the long-run stability of money demand for Ghana. The research adopts the strategy and boundary test procedure established by Pesaran et al. (2001) and the stability tests of CUSUM and CUSUMSQ. The factors used are broad money, real income, nominal effective exchange rate, national deposit interest rate, interest rate of cedi treasury bill, interest rate of US treasury bill And the Libor interest rate of the US dollar. The findings indicate that main determinants of money demand are real income and exchange rate, while the estimate finds other economic factors insignificant. The research reported a stable demand function for long-run cash in Ghana. Baba, Kenneth and Williams (2013) examine in a comparable research the dynamics of money demand in Ghana with annual information from 1980 to 2010.

Dynamic Ordinary Least Squares (DOLS) are employed in the research. Narrow demand for money, GDP as a proxy for revenue, consumer price index and nominal exchange rate are the factors used. The findings indicate that in addition to revenue, the elasticity of inflation and exchange rates is negative. The research reports a stable demand feature for cash and concludes that changes in past and present macroeconomic activity have a significant impact on Ghana's money supply.

In other Indian economy research, Das and Mandal (2000) consider M3 money supply and conclude that the role of money demand in India is stable. For the period April 1981 to March 1998, the research utilizes monthly information. Industrial manufacturing, short-term interest rates, wholesale prices, share prices, and efficient exchange rates are the variables used. The

findings indicate that M3 and the other variables co-integrate vectors. In comparison, Inoue and Hamori (2008) evaluate India's demand function for cash empirically for the 1980-2007 period with monthly and annual information for the 1976-2007 period. The study employs dynamic OLS (DOLS) and carries out cointegration tests. The factors used as independent variables are actual demand for cash balances (M1, M2, and M3) as dependent variable, interest rates, and production. The findings indicate that when money supply is represented by M3, there is no long-term equilibrium, whereas long-term equilibrium exists when money supply is represented by M1 and M2 and interest rate and yield coefficients are compatible with economic theory, whereas Hamori (2008) analyzes demand for money function in 35 sub-Saharan African nations respectively. For the period 1980 to 2005, including Nigeria, and adopts a non-stationary information panel analysis. The factors used are the balance of actual cash (M1); the balance of money (M2); real GDP; the rate of interest and inflation. The empirical findings show that there is a co-integrating relationship in the Sub-Saharan African region with regard to money demand over the period studied, regardless of whether M1 or M2 is used as the measure of money supply.

Felmingham and Zhang (2000) investigate the long-run demand for broad money in Australia subject to regime shifts with monthly data over the period of 1976(3) to 1998(4). The study employs Gregory Hansen cointegration. It reveals some evidence for the presence of cointegration between broad money, non-money assets, and GDP. The results show a break date in 1991 coinciding with a deep recession and policy induced interest rate reductions in Australia during the period. The income elasticity of demand exceeds one, reacts positively to the interest spread and negatively to inflation.

Lungu, Simwaka, and Chiumia (2012) study the demand for money function in Malawi using monthly data for the period of 1985 to 2010. The variables used are real money balances, prices, income, exchange rate, treasury bill, and financial innovation. The study employs VAR, VEC, and Granger causality approaches. The results show that the model is stable and adequate. It further shows that in the long-run real GDP, inflation, exchange rate, treasury bill rate, and financial depth all have significant impact on the demand for money, while in the short-run, it is financial innovation, exchange rate movements, and lagged money supply that display causality in money demand.

Suliman and Dafaalla (2011) investigate the existence of a stable money demand function in Sudan using annual data for the period of 1960 to 2010. They employ the Johansen Maximum Likelihood procedure using real money balances, real GDP (as a scale variable), the rate of inflation and exchange rate (as opportunity cost of holding money balances variables). All variables are in logarithmic form, except inflation rate. The results reveal that there is a long-run relationship between real money balances and the explanatory variables.

The study further shows that money demand function is stable between 1960 and 2010 in Sudan. The study concludes that it is possible to use the narrow money aggregate as target of monetary policy in Sudan. Similarly, Dahmardeh, Pourshahabi, and Mohmoudinia (2011) empirically study the long-run relationship between money demand and its determinants in Iran with annual data for the period of 1976 to 2007. The study employs conditional ARDL model with economic uncertainty, money demand, real income, and real interest rate as the variables. The results show that economic uncertainty has a significant negative effect on money demand; real income has a positive and significant effect on money demand, while interest rate has a negative effect on money demand. Moreover, economic uncertainty measured by EGARCH (1,1) model of

inflation rate, exchange rate, growth of GDP and terms of trade, has a negative and significant effect on money demand in Iran. The study, therefore reports that there exists a long-run relationship between M1 and its determinants in Iran.

2.7.2 Nigerian Evidence

Anoruo (2002) investigates the stability of demand for money in Nigeria during the SAP period. Results from Johansen and Juselius (1990) cointegration tests show that real broad money, economic growth, and real discount rate have a long-run relationship. The study employs Hansen (1992) stability test and reports that demand for broad money is stable in Nigeria during the SAP period from 1986Q2 to 2000Q1.

In another study, Akinlo (2006) examines the cointegrating property and stability of M2 money demand in Nigeria. The results reveal that M2 is cointegrated with income, interest rate and exchange rate. Moreover, the results show that income is positively related to demand for money, while interest rate is negatively related to demand for money.

Nwafor et al. (2007) examine the quantity theory of money via Keynesian liquidity preference theory in Nigeria using quarterly data from 1986Q3 to 2005Q4. The variables used are demand for money (M2), real income, real interest rate, and expected inflation rate. The study employs the ADF unit root and Johansen-Juselius cointegration tests. The results show that demand for money is positively related to real income, real interest rate, and expected inflation rate, respectively in Nigeria. The study therefore concludes that there exists a longrun relationship among aggregate demand for money in accordance with the Keynesian liquidity preference theory. However, the finding is in contrast with Akinlo (2006), Nwafor et al. (2007), Chukwu, Agu and Onah (2010). Similarly, Onafowora and Owoye (2007) investigate the stability of the

demand for money in Nigeria for the period of 1986Q1 to 2001Q4.The study employs VEC analysis and Johansen Maximum likelihood cointegration approach in order to ascertain whether recent macroeconomic developments such as the implementation of the structural adjustment programme (SAP) in 1986; the liberalization of the exchange rate; changes in monetary policy regimes; and increased integration of the economy with the rest of the world may have caused the real broad money demand function to become structurally unstable. The results show that there exists a long-run relationship between the real broad money aggregate, real income, inflation rate, domestic nominal interest rate, foreign interest rate and expected exchange rate. The CUSUM and CUSUMSQ tests indicate stability of the short-run and long-run parameters of the real money demand function in Nigeria.

Gbadebo (2010) examines whether financial innovation affects the demand for money in Nigeria for the period from 1970 to 2004. The study employs OLS and Engle-Granger cointegration techniques. The variables used are broad money, nominal interest rate on time deposit, real GDP, nominal rate on treasury bills, dummy variable to capture SAP period, consumer price index and lag of broad money. The results suggest that financial innovations have not significantly affected the demand for money in Nigeria during the period studied.

Omanukwue (2010) investigates the modern quantity theory of money with quarterly time series data from Nigeria for the period of 1990Q1 to 2008Q4. The study employs EngleGranger two-stage approach for cointegration to examine the long-run relationship between money, prices, output, interest rate and ratio of demand deposits/time deposits. It employs also the granger causality to examine the causality between money and price. The study establishes the existence of weakening uni-directional causality from money supply to core consumer prices in Nigeria. The study also reports evidence of a long-run relationship between the variables. In all, the

results indicate that monetary aggregates still contain significant, albeit weak, information about developments in core prices in Nigeria.

Kumar, Webber and Fargher (2010) investigate the level and stability of money (M1) demand in Nigeria for the period of 1960 to 2008 with annual data. In addition to estimating the canonical specification, alternative specifications are presented that include additional variables to proxy for the cost of holding money. Results of Gregory-Hansen cointegration tests suggest that the canonical specification is well determined. The money demand relationship went through regime shift in 1986 and 1992 respectively, which slightly improved the scale of economies of money demand. The results further show that there is a cointegrating relationship between narrow money, real income and nominal interest rate after allowing for a structural break. The study concludes that the demand for money was stable in Nigeria between 1960 and 2008 although there is evidence to suggest that it may have declined by a small amount around 1986. Similarly, Chukwu, Agu and Onah (2010) examine the evidence in the money demand function in the structural break framework with unknown break point for the period of 1986Q1 to 2006Q4 in Nigeria. The variables used are real money demand (M2) as dependent variable, real income, interest rate proxied by interest swap spread, and expected rate of inflation proxied by CPI as independent variables. The study employs the Gregory-Hansen approach for cointegration. The results show that real income and interest rate are positively related to real demand for money, whereas expected rate of inflation is inversely related to money demand. The results further show that there exists structural breaks in the cointegrating vectors of the Nigerian long-run money demand function in 1994, 1996, and 1997. Omotor (2011) estimates an endogenous structural break date of the money demand for Nigeria for the period from 1960 to 2008 with GregoryHansen cointegration approach. The variables employed are broad money, real GDP and

nominal interest rate. The results suggest that there exists a stable long-run demand for money function in Nigeria during the period reviewed.

Bitrus (2011) examines the demand for money in Nigeria with annual data on both narrow and broad money, income, interest rate, exchange rate, and the stock market for the period of 1985 to 2007. The study employs OLS technique and CUSUM stability test. The results show that money demand function is stable in Nigeria for the sample period and that income is the most significant determinant of the demand for money. It further shows that stock market variables can improve the performance of money demand function in Nigeria.

Similarly, Bassey et al. (2012) investigate the effect of monetary policy on demand for money in Nigeria with annual data for the period of 1970 to 2007. The study employs OLS multiple regression technique and finds inverse relationship between money, domestic interest rate, expected rate of inflation and exchange rate. Nduka, Chukwu and Nwakaire (2013) examine stability of demand for money function in Nigeria for the period of 1986 to 2011. The study uses CUSUM and CUSUMSQ tests for stability and reports that demand for money function is stable during the period reviewed.

Yamden Pandok Bitrus (2011) examined the determinants of the demand for money in developing and the developed countries. The study employed a comparative analysis of the effectiveness of the determinants of the demand for money in both developing and developed countries. It was found out that income related factors or the scale variables are more effective in the developing countries while factors that work through the financial system are more effective in the developed economies and that stock market variables should not be ignored in modeling demand for money even in emerging economies since they constitute an alternative to holding cash.

Aiyedogbon, Ibeh and Edafe (2013) investigates the role of monetary authority in its control of real cash balances through money supply. If money demand in Nigeria is stable the Central Bank of Nigeria can predict the level of money supply and there will be no inflationary pressure in the economy. The empirical analysis of the study involves application of tests for co-integration and vector error correction model. A test of stability was also conducted. The variables of the study are real money demand function (MD), gross capital formation (GCF), interest rate (INT), inflation rate (INF), exchange rate (EXR), government expenditure (GEX) and openness of the economy (OPE)) and cointegration test revealed long run equilibrium relationship**.**

NDUKA, ELEANYA KALU (2014) examines the long-term demand for true wide-ranging cash feature and its stability in Nigeria from 1970 to 2012 inclusive. The study uses the Augmented Dickey Fuller and Phillips-Perron unit root tests, the Gregory-Hansen (1996a, b) cointegration test to capture endogenous structural breaks in Nigerian long-run money demand cointegrating vectors, cumulative sum of recursive residuals (CUSUM) and cumulative sum of recursive residual squares (CUSUMSQ) structural stability tests proposed by Brown, Durbin and Evans (1975).

2.8 Gaps in the Study

There have been a number of studies on the demand for money in Nigeria, but most of them have used traditional estimating methods-by applying the partial adjustment model. For instance, Nwafor et al. (2007) omitted both foreign interest rate and exchange rate depreciation. Bassey et al. (2012) excluded income and foreign interest rate. Bitrus (2011) excluded foreign interest rate. Thus, these studies treat Nigeria as a closed economy which is erroneous. While,

Onafowora and Owoye (2007) and Kumar et al. (2010) included both nominal interest rate and inflation rate at the same time in their models as independent variables respectively. These two variables are highly correlated due to the fact that nominal interest rate contains inflation. Chukwu, Agu and Onah (2010) and Bassey et. al. (2012) failed to examine whether the demand for money function is stable or not, which should have been the core of their studies. Kumar et. al, (2010) used narrow money (M1), whereas it is broad money (M2) the CBN targets. Again, some of the studies such as Akinlo (2006); Nwafor et al. (2007); Gbadebo (2010); Bitrus (2011); Bassey et. al. (2012); Nduka, Chukwu and Nwakaire (2013) failed to account for structural breaks which is the most appropriate cointegration technique in this type of study, while Omotor (2011) did not estimate all the four models in the Gregory-Hansen (1996a, b) cointegration test.

Therefore, this study adds to the body of knowledge and therefore, it attempts to improve on other studies by including more recent data to discuss recent developments within the economy. And more also, the methodology used was quite different from past studies. Furthermore, some studies conducted in Nigeria used expected rate of inflation. This is not correct due to the fact that the expected future rate of inflation is used in computing real interest rate, while the current rate of inflation is the rate at which the price level is actually changing over time (Baily and Friedman, 1991: 300-301).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

This study used a multiple regression analysis to assess the model to reflect on the nature of the variables. Two major assessment measures were used to check the validity of this model which are; the statistical theory which in other words is referred to as the First Order Least Square (OLS) and the the a-priori expectation measure which is based on signs and magnitude of the coefficient of the variables under investigation. A vector autoregressive (VAR) model is intended to evaluate the models estimated. The VAR model is a very common model used to explore the connection between macroeconomic variables as we intend to do for this study. We also use other sophisticated time series techniques such as the Causality of Granger, Impulse Response, and then the Model of Error Correction. Before formulating the VAR equation systems, we carry out various series stationary tests and then check for long-term variables co-integration.

3.2 Theoretical Framework

The Keynesian theory stated an easy monetary policy which main objective is to keep interest rates as low as possible in order to stimulate the investment to reduce the shortages of money demand. Post Keynesian developments showed that, contrary to the Keynesian postulates that transaction demand for money is a function of current income (Dwinvedi, 2008), the transaction demand for money is also a function of interest rate and its elasticity.

Keynes postulated that people want to hold a certain amount of real money balances (the quantity of money in real terms) – an amount that his three motives indicated would be related to real income (Y) and to interest rates (i). Keynes wrote the following demand for money equation,

known as the liquidity preference function, which says that the demand for real money balances $M^{d}/_{p}$ is a function of (related to) I and y (Mishkin, 2004).

$$M^{d}/_{p} = f(i, y)$$

Where fi < o, fy > 0

The theory of asset demand (portfolio theories of money) indicates that the demand for money should be a function of the resources available to individuals (their wealth) and the expected returns on other assets relative to the expected return on money to hold a certain amount of real money balances (Mishkin, 2004).

3.3 Model Specification

The study adopted the model originally proposed by Mundell (1963) as follows:

$$M_2{}^{d}/_{p} = \alpha_0 + \alpha_1 RY_t + \alpha_2 RIR_t + \alpha_3 R_t^f + \alpha_4 RI + \alpha_5 REX_t + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Taking the natural logarithm of the model in order to estimate elasticity and semi-elasticity of the variables, the study now specified the equation (1) as follows:

$$\ln M_2{}^{d}/_{p} = \alpha_0 + \alpha_1 \ln RY_t + \alpha_2 RIR_t + \alpha_3 R_t^f + \alpha_4 INF + \alpha_5 REX_t + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(2)$$

Where α_0 is the constant term, μ_t is the error term,

$$\alpha_1 > 0, \alpha_2 < 0, \alpha_3 < 0, \alpha_4 < 0, \alpha_5 < 0 or > 0.$$

$M_2{}^{d}/_{p}$ = real money balances

P = Consumer Price Index

RY = scale variable proxied by Real Gross Domestic Product (RGDP)

RIR = opportunity cost variable proxied by real interest rate.

R^f = foreign interest rate proxied by US interest rate

INF = Inflation Rate

REX = exchange rate depreciation proxied by real exchange rate.

3.4 Estimation Procedure

In this study, the first objective is to examining the effect of inflation on money demand. The inflation rate as the independent variable and the real money demand as the dependent variable, the model can be expressed as:

$$M_2{}^d/_p = f(INF) \ldots\ldots(3)$$

According to this equation, the money demand depends on the inflation rate. Based on the theoretical and empirical literature review, econometric literature points out more long term variables which include the scale variable proxied by Real Gross Domestic Product (RGDP) foreign interest rate and exchange rate. However, the model can be estimated as:

$$\ln M_2{}^d/_p = \alpha_0 + \alpha_1 \ln INF + \alpha_2 \ln RY_t + \alpha_3 \ln R_t^f + \alpha_4 \ln REX_t + \mu_t \ldots\ldots(4)$$

The equation 4 shows that inflation rate is a function of money demand, price, foreign interest rate and real exchange rate.

To separate and differentiate the short run contributions of independent variable from the long run contribution, equation 4 is modified as dynamic Autoregressive Distributed Lag (ADRL). To include the lag, dependent and independent variables are as follows:

$$\Delta \ln M_t^d = \alpha_0 + \sum_{i=1}^{a} \alpha_{1i} \Delta \ln M_{t-1}^d + \sum_{i=0}^{b} \alpha_{2i} \Delta \ln INF_{t-1} + \sum_{i=0}^{c} \alpha_{3i} \Delta \ln RY_{t-1} + \sum_{i=0}^{d} \alpha_4 \Delta \ln R_{t-1}^f + \sum_{i=0}^{e} \alpha_{5i} \Delta \ln REX_{t-1} + \alpha_1 (\ln INF)_{t-1} + \alpha_2 (\ln M^d)_{t-1} + \alpha_3 (\ln RY)_{t-1} + \alpha_4 (\ln R^f)_{t-1} + \alpha_5 (\ln REX)_{t-1} + \mu_t$$

(5)

To examine the causal relationship between inflation rate and the money demand which was viewed in the objective (2), the Toda and Yamamoto (1995) and Dolado and Lutkepoh (1996), TYDL, approach to Granger causality test will be applied. Specifically, equation (4) is modified and re-specified thus as follows:

$$\ln INF_t = \theta_0 + \sum_{i=1}^{k} \theta_{1i} \ln INF_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \theta_{2j} \ln INF_{t-j} + \sum_{i=1}^{k} \theta_{3i} \ln M_{t-1}^d + \sum_{j=k+1}^{k+d_{\max}} \theta_{4j} \ln M_{t-j}^d + \sum_{i=1}^{k} \theta_{5i} \ln RY_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \theta_{6j} \ln RY_{t-j} + \sum_{i=1}^{k} \theta_{7i} \ln R_{t-i}^f + \sum_{j=k+1}^{k+d_{\max}} \theta_{8j} \ln R_{t-j}^f + \sum_{i=1}^{k} \theta_{9i} \ln REX_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \theta_{10j} \ln REX_{t-j} + \varepsilon_t$$

(6)

$$\ln M_t^d = \lambda_0 + \sum_{i=1}^{k} \lambda_{1i} \ln M_{t-i}^d + \sum_{j=k+1}^{k+d_{\max}} \lambda_{2j} \ln M_{t-j}^d + \sum_{i=1}^{k} \lambda_{3i} \ln INF_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \lambda_{4i} \ln INF_{t-j} + \sum_{i=1}^{k} \lambda_{5i} \ln RY_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \lambda_{6j} \ln RY_{t-j} + \sum_{i=1}^{k} \lambda_{7i} \ln R_{t-i}^f + \sum_{j=k+1}^{k+d_{\max}} \lambda_{8j} \ln R_{t-j}^f + \sum_{i=1}^{k} \lambda_{9i} \ln REX_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \lambda_{10j} \ln REX_{t-j} + \varepsilon_t$$

(7)

$$\ln RY_t = \varpi_0 + \sum_{i=1}^{k} \varpi_{1i} \ln RY_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \varpi_{2j} \ln RY_{t-j} + \sum_{i=1}^{k} \varpi_{3i} \ln INF_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \varpi_{4j} \ln INF_{t-j} + \sum_{i=1}^{k} \varpi_{5i} \ln M_{t-1}^d + \sum_{j=k+1}^{k+d_{\max}} \varpi_{6j} \ln M_{t-j}^d + \sum_{i=1}^{k} \varpi_{7i} \ln R_{t-i}^f + \sum_{j=k+1}^{k+d_{\max}} \varpi_{8j} \ln R_{t-j}^f + \sum_{i=1}^{k} \varpi_{9i} \ln REX_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \varpi_{10j} \ln REX_{t-j} + \varepsilon_t$$

(8)

$$\ln R_t^f = \beta_0 + \sum_{i=1}^{k} \beta_{1i} \ln R_{t-i}^f + \sum_{j=k+1}^{k+d_{\max}} \beta_{2j} \ln R_{t-j}^f + \sum_{i=1}^{k} \beta_{3i} \ln INF_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \beta_{4j} \ln INF_{t-j} + \sum_{i=1}^{k} \beta_{5i} \ln M_{t-1}^d + \sum_{j=k+1}^{k+d_{\max}} \beta_{6j} \ln M_{t-j}^d + \sum_{i=1}^{k} \beta_{7i} \ln RY_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \beta_{8j} \ln RY_{t-j} + \sum_{i=1}^{k} \beta_{9i} \ln REX_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \beta_{10j} \ln REX_{t-j} \varepsilon_t$$

(9)

$$\ln REX_t = \delta_0 + \sum_{i=1}^{k} \delta_{1i} \ln REX_{t-1} + \sum_{j=k+1}^{k+d_{\max}} \delta_{2j} \ln REX_{t-1} + \sum_{i=1}^{k} \delta_{3i} \ln INF_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \delta_{4j} \ln INF_{t-j} + \sum_{i=1}^{k} \delta_{5i} \ln M_{t-1}^d + \sum_{j=k+1}^{k+d_{\max}} \delta_{6j} \ln M_{t-j}^d + \sum_{i=1}^{k} \delta_{7i} \ln RY_{t-i} + \sum_{j=k+1}^{k+d_{\max}} \delta_{8j} \ln RY_{t-j} + \sum_{i=1}^{k} \delta_{9i} \ln R_{t-i}^f + \sum_{j=k+1}^{k+d_{\max}} \delta_{10j} \ln R_{t-j}^f + \mu_t$$

(10)

The equations above (6-10) will be estimated to determine the causal relationship between the variables under consideration. If the null hypothesis of $\theta_{3i} = 0$, is rejected, then it is concluded that money demand Granger cause of inflation, respectively. Similarly, the rejection of the null hypothesis of $\lambda_{3i} = 0$ implies that inflation Granger cause money demand.

3.5 Sources of Data Collection

The study employed annual data from Central Bank of Nigeria (CBN) statistical bulletin of various years and World Development Index (WDI). During the course of this study, data collection was done through secondary data.

CHAPTER FOUR

ANALYSIS AND INTERPRETATION OF DATA

4.1 Results of Unit Root Test, Lag Length Selection Criteria, and Cointegration Test

4.1.1 Unit Root Tests Results

To examine the time series characteristics of the model variables, the Augumented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests were conducted. The results of the ADF and PP unit root tests are presented in table 1 and table 4.1 respectively.

Table 4.1 Result for the Augmented Dickey-Fuller Unit Root Test

Augmented Dickey-Fuller (ADF) Test with Intercept only												
Variable	Level						1st Diff					
	Test Statistic	Critical Values			P-Values	Remarks	Test Statistic	Critical Values			P-Values	Remarks
		1%	5%	10%				1%	5%	10%		
RMD	-1.818286	-3.574446	-2.92378	-2.599925	0.3675	NS	-5.722912	-3.577723	-2.925169	-2.600658	0.0000	1(1)
INF	-3.411377	-3.574446	-2.92378	-2.599925	0.0153	1(0)	***	***	***	***	***	1(0)
RY	-5.437359	-3.574446	-2.92378	-2.599925	0.0000	1(0)	***	***	***	***	***	1(0)
RIR	-5.44338	-3.574446	-2.92378	-2.599925	0.0000	1(0)	***	***	***	***	***	1(0)
RF	-1.647479	-3.574446	-2.92378	-2.599925	0.4510	NS	-4.991271	-3.588509	-2.929734	-2.603064	0.0002	1(1)
REX	-0.521852	-3.577723	-2.925169	-2.600658	0.8775	NS	-3.777616	-3.577723	-2.925169	-2.600658	0.0058	1(1)
PI	6.504150	-3.581152	-2.926622	-2.601424	1.0000	1(0)	***	***	***	***	***	1(0)
PCI	1.497364	-3.574446	-2.92378	-2.599925	0.5264	NS	-8.527619	-3.577723	-2.925169	-2.925169	0.0000	1(1)
Augmented Dickey-Fuller (ADF) Test with Trend and Intercept												
Variable	Level						1st Diff					
	Test Statistic	Critical Values			P-Values	Remarks	Test Statistic	Critical Values			P-Values	Remarks
		1%	5%	10%				1%	5%	10%		
RMD	-1.97266	-4.161144	-3.506374	-3.183002	0.6010	NS	-5.695527	-4.165756	-3.508508	-3.18423	0.0001	1(1)
INF	-3.977768	-4.165756	-3.508508	-3.18423	0.0163	1(0)	***	***	***	***	***	1(0)
RY	-5.443909	-4.161144	-3.506374	-3.183002	0.0002	1(0)	***	***	***	***	***	1(0)
RIR	-6.022415	-4.211868	-3.529758	-3.196411	0.0001	1(0)	***	***	***	***	***	1(0)
RF	-3.786962	-4.165756	-3.508508	-3.18423	0.0261	NS	-5.00395	-4.180911	-3.515523	-3.188259	0.0010	1(1)
REX	-1.685363	-4.165756	-3.508508	-3.18423	0.7421	NS	-3.733534	-4.165756	-3.508508	-3.18423	0.0297	1(1)
PI	5.163538	-4.170583	-3.51074	-3.185512	1.0000	1(0)	***	***	***	***	***	1(0)
PCI	-2.061643	-4.161144	-3.506374	-3.183002	0.5534	NS	-8.430203	-4.165756	-3.508508	-3.18423	0.0000	1(1)

Table 4.1.1 Result for the Philips-Peron (PP) Unit Root Test

Philips-Peron (PP) Test with Intercept only												
Variable	Level						1st Diff					
	Test Statistic	Critical Values			P-Values	Remarks	Test Statistic	Critical Values			P-Values	Remarks
		1%	5%	10%				1%	5%	10%		
RMD	-1.92195	-3.574446	-2.92378	-2.599925	0.3198	NS	-5.645718	-3.577723	-2.925169	-2.600658	0.0000	1(1)
INF	-3.245847	-3.574446	-2.92378	-2.599925	0.0233	1(0)	***	***	***	***	***	1(0)
RY	-5.459682	-3.574446	-2.92378	-2.599925	0.0000	1(0)	***	***	***	***	***	1(0)
RIR	-5.453866	-3.574446	-2.92378	-2.599925	0.0000	1(0)	***	***	***	***	***	1(0)
RF	-1.543565	-3.574446	-2.92378	-2.599925	0.5032	NS	-6.169018	-3.577723	-2.925169	-2.600658	0.0000	1(1)
REX	-0.521852	-3.577723	-2.925169	-2.600658	0.8775	NS	-3.777616	-3.577723	-2.925169	-2.600658	0.0058	1(1)
PI	26.65992	-3.574446	-2.92378	-2.599925	1.0000	1(0)	***	***	***	***	***	1(0)
PCI	-1.331631	-3.574446	-2.92378	-2.599925	0.6074	NS	-8.614871	-3.577723	-2.925169	-2.600658	0.0000	1(1)
Philips-Peron (PP) Test with Trend and Intercept												
Variable	Level						1st Diff					
	Test Statistic	Critical Values			P-Values	Remarks	Test Statistic	Critical Values			P-Values	Remarks
		1%	5%	10%				1%	5%	10%		
RMD	-1.97266	-4.161144	-3.506374	-3.183002	0.6010	NS	-5.612592	-4.165756	-3.508508	-3.18423	0.0002	1(1)
INF	-3.233642	-4.161144	-3.506374	-3.183002	0.0902	NS	-15.04485	-4.165756	-3.508508	-3.18423	0.0000	1(1)
RY	-5.445639	-4.161144	-3.506374	-3.183002	0.0002	1(0)	***	***	***	***	***	1(0)
RIR	-6.315499	-4.161144	-3.506374	-3.183002	0.0000	1(0)	***	***	***	***	***	1(0)
RF	-2.406486	-4.161144	-3.506374	-3.183002	0.3717	NS	-6.466593	-4.165756	-3.508508	-3.18423	0.0000	1(1)
REX	-1.59914	-4.161144	-3.506374	-3.183002	0.7787	NS	-3.726522	-4.165756	-3.508508	-3.18423	0.0302	1(1)
PI	27.92320	-4.161144	-3.506374	-3.183002	1.0000	1(0)	***	***	***	***	***	1(0)
PCI	-1.957961	-4.161144	-3.506374	-3.183002	0.6088	NS	-8.509216	-4.165756	-3.508508	-3.18423	0.0000	1(1)

The testing for unit root is necessary to avoid the risk of the second difference 1(2) variables. This is because, if 1(2) variables are included in our model the computed F-statistics provided by (Pesaran and Shin, 1999; Pesaran, Smith and Shin 2001) becomes invalid since they are established on the assumption that the variables are at level 1(0) or at first difference 1(1). Also, testing for the unit root helps to know the maximal order of integration, *dmax*, entering the augmented VAR model.

Therefore, this study applied two types of formal test (the Augmented Dickey-Fuller test (ADF) and the Phillips-Perron test (PP) test.) in order to view the order of integration of the series under consideration. The two tests statistics were done for two alternative specifications at 5% level of significance. It was tested with intercept only, and then it was tested with both intercept and trend. The null hypothesis for the test (in both ADF and PP) claims that the data series under examination has unit root while the alternative hypothesis claims that the series is stationary.

As observed from the tables 4.1 above and 4.1.1, both tests for objective one and two. The table suggest that, inflation rate, scale variables, real interest rate, and consumer price index are stationary at level, all other variables (the natural log of real money demand, foreign interest rate, exchange rate, and per capita income) become stationary when converted to first differences, suggesting that each is integrated of order one 1(1).

4.2 Lag Length Selection Criteria Results

To evaluate the specified ARDL model (4) and the TYDL models (6-10), the newly proposed ARDL co-integration technique was used to test the possible existence of long-run relationship among variables. This is because, the ARDL representation does not require symmetry of lag lengths; each variable can have a different number of lag terms. However, it was necessary to determine the appropriate lag length in order to avoid the problem of misspecification and los of the degrees of freedom before the test was applied. The test results are presented in the table 4.3 below.

The objective one as depicted in table 4.2 the optimal maximum lag length incorporated for each variable in model (4) is one. Also, as observed from the same table 4.3, for objective

two the the Akaike's Information Criteria (AIC) of lags (p) of VAR, Schwarz Bayesian Criteria (SBC) of lags (p) of VAR and others incorporated for each variable in ARDL model (5) and TYDL models (6-10) selected the lag length of two.

Table 4.2 Optimal Lag Length Selection Criteria

Lag Length Selection Criteria Results for Model 9

Lag	LR	FPE	AIC	SC	HQ	
0	NA	309583.0	26.83233	27.03307	26.90716	
1	301.5212*	416.0186*	20.21213*	21.41657*	20.66113*	Lag 1
2	24.94869	633.0699	20.58945	22.79760	21.41263	

Lag Length Selection Criteria Results for Model 10

Lag	LR	FPE	AIC	SC	HQ	
0	NA	3.51e+09	44.68275	45.00077	44.80188	
1	519.0929*	47747.80*	33.43582	36.29804*	34.50802*	Lag 2
2	71.99862	82980.93	33.73571	39.14213	35.76099	

Lag Length Selection Criteria Results for Model 11

Source: Author's computation using E-view 10 (2018)

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

4.3 Cointegration Test Results

A cointegration test is carried out to establish the long-run convergence of the series. However, there are various techniques of conducting cointegration analysis among time-series variables. . The well-known methods are: the residual-based approach proposed by Engle and Granger (1987) and the maximum likehood-based approach proposed by Johansen and Julius (1990) and Johansen (1992). This study employs the recently developed econometric technique of bound testing approach to co-integration in analyzing the data. One of the main advantages of

the technique includes that the inability to test hypotheses on the estimated coefficients in the long-run and also the endogeneity problems associated with the Engle-Granger (1987) method are avoided, the long and short-run parameters of the model under study are estimated simultaneously. It also allows the mixture of 1(0) and 1(1) variables as regressor with the implication that the order of integration of variables may not essentially be the identical.

Table 4.3 Results of Bound Test Approach to Cointegration for Objective one

Level of Significance $(\alpha\%)$	**Critical value**		**F-calculated / Computed F-statistic**
	Lower bound I(0)	**Upper bound I(1)**	
10	2.2	3.09	***1.411041***
5	**2.56**	**3.49**	
2.5	2.88	3.87	
1	3.29	4.37	

Source: Author's computation using E-view 10 (2019)

Table 4.3.1 Results of Bound Test Approach to Cointegration for Objective two

Level of Significance $(\alpha\%)$	**Critical value**		**F-calculated / Computed F-statistic**
	Lower bound I(0)	**Upper bound I(1)**	
10	1.92	2.89	***1.463022***
5	**2.17**	**3.21**	
2.5	2.43	3.51	
1	2.73	3.9	

Source: Author's computation using E-view 10 (2019)

To check the existence of long-run relationship among variables of interest bounds, testing approach was employed by conducting an F-test for the joint significance of the co-efficient of the lagged level variables of the models (4, 6-10). Due to the limitations of the conventional Wald-test F-statistic, Pesaran and Shin (1995, 1998) suggested two critical values (lower and upper bound) to examine the relationship. The computed *F*-test is however compared

with the critical values provided by Pesaran and Shin (1995, 1998) for the hypothesis testing. Therefore, the null is not rejected if the computed *F*-statistic is less than the lower bound value. On the contrary, it implies existence of long-run relationship among the variables if the computed *F*-statistics is greater than the upper bound value, Finally, it becomes inconclusive if the computed *F*- statistics lies between the lower bound and upper bound, long run association between the variables.

Having, estimated the unrestricted error correction ARDL models (4, 5-10), the results are presented in the tables 4.3 and 4.3.1 above for objective one and two respectively. As observed in the table 4.3, the computed F-statistic (***1.411041)*** is lesser than upper bound value of (***3.09***) at five per cent (**5%**) level of significant. Thus, the null hypotheses of no cointegration relationship among Real demand for money, inflation rate, scale variables, real interest rate, foreign exchange rate and real exchange rate is accepted.

Also, the results in table 4.3.1 shows that the calculated F-statistic ***(1.463022)*** of the Wald-test is lesser than upper bound value of (**3.21)** at five per cent (**5%**) level of significance, which interprets that the null hypotheses of no cointegration relationship among Real demand for money, inflation rate, scale variables, real interest rate, foreign exchange rate and real exchange rate, scale variables (proxied by real gross domestic product), opportunity cost (proxied by real interest rate) and income (proxied by per capital income) are not cointegrated.

4.4 Empirical Result on The Impact of Inflation on Economic Growth

The research shows the stationary position of the variables to determine their order of inclusion in order to perform the model assessment. This is done to prevent false results and to ensure that none of the variables of order two, I(2), are integrated. This was followed by the

application of Augmented Dickey-Fuller (ADF) and Philips-Peron (PP). Two alternative requirements were conducted for both test statistics. First, it was only trendlessly tested with intercept, and then tested with both intercept and trend. Following Granger's proposal (1988), a test was performed on the likely co-integrating relationship between the series. Basically, the newly suggested ARDL model is used in this research to verify co-integration and assess short-term and long-term interactions between variables. This is because, on the one hand, unlike other approaches to estimating cointegrating relationships, the representation of ARDL does not require symmetry of lag lengths and, on the other hand, the boundary test allows a mixture of variables I(1) and I(0) as regressors, i.e. the order of integration of appropriate variables may not necessarily be the same.

Thus, we estimated the equation (4,6-10) using the suitable selection criteria for the lag-length in the next step. A maximum lag order of two was selected for the ARDL model based on the outcomes submitted in Tables 4.. Those two lags were therefore chosen for this study's ARDL assessment. The next experiment was the "Bounds Test" of cointegration to verify the coefficients ' joint meaning. The null hypothesis is that there is no long-run connection. Therefore, we dismiss the "no long-term relationship" theory. Consequently, the results verify that the model justifies the cointegration or long-term relationship criterion. The long-run coefficients and short-run coefficients are estimated after determining the existence of a long-run.

4.4.1 Long Run Effect of Inflation on Demand for Money

An examination of the outcomes described in table 4.4 below shows that the value of inflation statistics appearing below 0.05 is insignificant, i.e. the long-term impact of inflation on economic growth. This implies that inflation does not boost economic growth in Nigeria effectively. As observed, as shown by the t-statistics and p-value, there is no statistically long-run equilibrium relationship between inflation and demand for money. As it were, the ratio is (-0.007997) and statistically substantial with the likelihood value p= 0.1609 exceeding 0.05 (5 percent) meaning level and t-statistic t=-1.427296. Specifically, a one percent change in inflation will bring about the same percent change in real demand money in the long run, keeping other varaibles constant. This outcome is inconsistent with the expectations of the study and this could be due, among many others, to policy failures.

Table 4.4: Estimated Long Run Dynamics Results for the Selected ARDL Model (5)

Regressand: DLNRDM				
Panel A: Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRDM(-1)	-0.146988	0.079155	-1.856967	0.0703
INF	-0.007997	0.005603	-1.427296	0.1609
RY	0.010104	0.016305	0.619720	0.5388
RF	0.045972	0.033574	1.369249	0.1782
LNEXC	0.074469	0.050648	1.470326	0.1489
C	0.497953	0.638957	0.779322	0.4402
Panel B: Goodness-of-fit Measures				
R^2		0.821705		
Adjusted R^2		0.800479		
F-statistic		38.71282		
Prob(F-statistic)		0.000000		
Durbin-Watson stat		1.692875		

Source: Author's computation using E-view 10 (2018)

4.4.2 Short Run Effect of Inflation on Demand for Money

To determine the short-term effect of inflation on real demand for money, the assessment of the short-term equilibrium adjustment mechanism as well as the speed adjustment of the short-run equilibrium relationship dynamics were obtained directly as the estimated coefficients of the first-differentiated variables in the ARDL model (5) and the results are presented in Table 4.4.1. As can be observed from the results presented in table 4.4.1 it is evident that the coefficient of the error correction term for the estimated equation is statistically insignificant with the probability value p=0.2196 and t-statistic t= -1.246210. Essentially, the adjustment speed implied by the CointEq (-1) coefficient suggests that the short-term to long-term deviation is adjusted by 3.38 percent every year. The inflation rate, scale variables, real interest rate, foreign exchange rate and real exchange rate, therefore have a stable long-term relationship.

Table 4.4.1 Estimated Short Run Effect of Inflation on Demand for Money

Regressand: DLNRGDPPC				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.054405	0.043656	-1.246210	0.2196
RY	0.068743	0.121605	0.565296	0.5749
RF	0.312757	0.312541	1.000691	0.3227
LNEXC	0.506632	0.365729	1.385265	0.1733
C	3.387711	3.070502	1.103308	0.2762
Cointeq = LNRDM - (-0.054405*INF + 0.68743*RY + 0.312757*LNRF+0.506632*LNEXC+3.387711))				

Source: Author's computation using E-view 10 (2018)

4.4 Granger Causality Tests based on TYDL Approach

Table 4.4 Granger Causality Tests based on TYDL Approach for Objective Two

Null Hypothesis	Chi-Square (X^2)	P-Value	Conclusion
INF does not granger cause LNRDM	1.417157	0.2339	Accept Ho
LNRDM does not granger cause INF	1.203126	0.2727	Accept Ho
RY does not granger cause LNRDM	0.603170	0.4374	Accept Ho
RF does not granger cause LNRDM	7.185066	0.0074	Reject Ho
LNEXC does not granger cause LNRDM	3.493753	0.0616	Accept Ho
RY does not granger cause INF	0.083491	0.7726	Accept Ho

Source: Author's computation using E-view 10 (2018)

As observed in table 4.4, the results show the evidence of no causal relationship between the inflation rate and the real money demand. Specifically, the null hypothesis of no causal relationship between inflation and real demand for money was accepted. This is because the p-values of the Wald statistic is greater than 0.05, as shown in the p-values of the Wald statistic modified the evidence that there is no unidirectional causality running from inflation rate to real demand for money. Furthermore, the null hypothesis of no causal relationship between the scale variables (proxied by real gross domestic product) and real money demand is accepted. However, the null hypothesis that no causal relationship between foreign interest rate and real money demand is rejected. While, the null hypothesis of no causal relationship between the real exchange rate and real money demand is accepted as so as the null hypothesis of the relationship between the scale variables (proxied by real gross domestic product) and the inflation rate.

4.5 Summary of Discussion of Results

The study of the two specific objectives in this empirical work was discussed in line with the results estimation. These objectives (examining the effect of inflation on real money demand

and the causal relationship between inflation rate and real money demand) were achieved by econometric techniques. The effect of inflation rate on real money demand in Nigeria shows that they have positive and insignificant effect on real money demand in Nigeria. And also, the inflation rate have negative and insignificant effect on real money demand in both long-run and short-run.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

5.1 Summary

In summary, the aim of this study is to examine empirically the effect of inflation on the actual demand for cash in Nigeria. Research from various appropriate literatures suggests that inflation rate fluctuations in Nigeria are primarily determined by structural and infrastructural constraints such as the elimination of fuel subsidies, damaging floods in the economy during the third and fourth quarters of the year, and seasonal impacts. These variables have contributed one way or the other to the country's price increase. Data from the time series for significant factors for the seasons 1970-2018 were gathered annually. The research used the Augmented Dickey Fuller (ADF), Phillips Peron (PP), and the co-integration test from Johansen.

5.2 Conclusion

The results produced empirically for the ADF, however, showed that inflation rates, scale variables (proxied by true gross national product), opportunity costs (proxied by real interest rate) and prices (proxied by consumer price index) are stationary at level, while demand for money, foreign interest rates, actual exchange rates and per capita income were stationary and integrated of order one 1(1). The cointegrated test of Johansen and Julius was used to verify whether there is a long-term balance between the factors, the findings of this test reveals that the variables were not cointegrated, implying that there is no long-run equilibrium between the factors.

5.2 Policy Recommendation

As the research attempts to leverage the long-term economic growth effect of inflation, our results from this research show that inflation has a long run negative and permanent impacts on money demand. Furthermore, the causality test demonstrates that there is no causality from real money demand to inflation rate. While policymakers are watchful of movements at the overall price level, policies that tend to decrease inflation can be expensive for society as they are likely to slow down financial activity and could also lead to other financial disadvantages, such as the short-run unemployment rate created by rising inflationary measures that could have a temporary multiplication.

This assessment, as in the case of Nigeria, discovered that the impacts of inflation gradually transmit as salaries and prices slowly adjust to changing economic environment. Therefore, it should be recommended that the social economic planner should build a dynamic model that can weigh the short-term costs against the long-term benefits of such plans before making any inflation targeting policy. The short-term price of handling inflation at a small level within the economy is the trade-off with unemployment that is expected to decrease in the long run as the economy begins to enhance. In other words, the central agency should take a long-term structural perspective of the industry and the advantages of its policies when formulating inflation targeting strategies. Achieving a minimum short-term price of decreasing the country's inflation would rely on the government's engagement, which determines how the public views and acts towards such policy.

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Appendix

YEAR	RMD	EXC	INF	INCOME	PRICE	RY	RIR	RF
1970	90.57407	0.714286	13.75707992	224.11	0.100081955	25.00724	-29.27	7.9
1971	83.344	0.712855833	15.99911485	160.25	0.116094182	14.23753	5.6	5.7
1972	94.17829	0.657894999	3.457649752	209.24	0.120108312	3.364262	3.99	5.2
1973	111.9485	0.657894999	5.402664454	252.25	0.126597361	5.39276	1.57	8
1974	152.7468	0.630282046	12.67439318	402.87	0.142642808	11.16067	-25.67	10.8
1975	204.8889	0.615501553	33.96418832	438.34	0.19109028	-5.22775	-13.97	7.9
1976	230.668	0.626601004	24.3	556.66	0.237525218	9.042352	-6.9	6.8
1977	266.8412	0.644701062	15.08783406	536.12	0.273362629	6.024118	-4.26	6.8
1978	219.8667	0.635271994	21.70924574	527.15	0.332707594	-5.76416	-6.29	9.1
1979	265.57	0.604007374	11.70973062	661.98	0.371666757	6.759431	-2.99	12.7
1980	356.974	0.546780892	9.97226199	873.96	0.40873034	4.204831	-3.55	15.3
1981	315.6582	0.617708175	20.81282291	809.15	0.493798662	-13.1279	-65.86	18.9
1982	328.3775	0.673461262	7.697747247	663.43	0.531810035	-6.80339	-4.59	14.9
1983	307.4978	0.724409851	23.21233155	446.14	0.655255543	-10.9241	-8.022	10.8
1984	243.9457	0.766527449	17.82053329	349.71	0.772025576	-1.11562	4.34	12
1985	262.776	0.893774083	7.435344828	345.33	0.829428339	5.913027	2.34	9.9
1986	259.8653	1.754523004	5.717151454	241.46	0.876848014	0.060945	4.31	8.3
1987	289.7367	4.016037344	11.29032258	273.47	0.975846983	3.200125	-4.77	8.2
1988	250.8107	4.536966667	54.51122478	257.29	1.507793125	7.334025	-2.96	9.3
1989	172.5523	7.364735	50.46668812	260.99	2.268726379	1.919381	-6.6	10.9
1990	234.1832	8.038285	7.364400306	322.84	2.435804472	11.77689	17.47	10
1991	264.4297	9.909491667	13.0069731	280.3	2.752628904	0.358353	0.991	8.5
1992	269.8276	17.298425	44.58884272	292.36	3.979994277	4.631193	-14.99	6.3
1993	263.9702	22.0654	57.16525283	153.65	6.255168068	-2.03512	-7.05	6
1994	226.0904	34.18778926	57.03170891	171.67	9.822597313	-1.81492	-15.92	7.1
1995	156.226	67.39009287	72.8355023	264.3	16.9769354	-0.07266	-31.45	8.8
1996	140.3789	87.85414581	29.26829268	315.55	21.94579455	4.195924	-5.26	8.3
1997	150.0878	87.28669562	8.529874214	274.99	23.81774322	2.937099	12.13	8.4
1998	166.9115	80.09492626	9.996378124	300.61	26.19865489	2.581254	11.48	8.4
1999	208.4029	92.3381	6.618373395	379.12	27.93257969	0.584127	6.05	5.2
2000	288.5613	101.6973333	6.933292156	351.8	29.86922705	5.015935	-1.14	9.2
2001	308.3105	111.23125	18.87364621	459.46	35.50663929	5.917685	12.14	6.9
2002	326.6274	120.5781583	12.8765792	512.65	40.07867982	15.32916	3.02	4.7
2003	361.3842	129.22235	14.03178361	648.82	45.70243345	7.347195	9.94	4.1
2004	358.157	132.888025	14.99803382	807.89	52.55689987	9.250558	-2.6	4.3
2005	378.0144	131.2743333	17.86349337	1019.74	61.94539819	6.438517	-1.6	6.2
2006	499.7645	128.6516667	8.239526517	1136.83	67.0494057	6.059428	-5.6	8
2007	6373.021	125.8081083	5.382223652	1383.89	70.65815468	6.59113	9.2	8.1
2008	8976.533	118.5460167	11.57798352	1097.66	78.83894418	6.764473	6.7	5.1
2009	8334.92	148.9017417	11.53767275	2327.32	87.93512356	8.036925	18.18	3.3
2010	8481.435	150.298025	13.72020184	2527.94	100	8.005656	1.07	4.2
2011	7907.441	154.7403	10.84002754	755.3	110.8400275	5.307924	5.7	3.75
2012	10255.31	157.4986712	12.21778174	2996.96	124.3822202	4.230061	6.22	3.98
2013	5446.875	157.3116667	8.475827285	3221.68	134.9246423	6.671335	11.2	1.61
2014	345.655	158.5526417	8.062485824	2655.16	145.8029225	6.309719	11.36	1.43
2015	574.878	192.44	9.009387183	2175.67	158.9388723	2.652693	13.6	1.95
2016	1089.75	253.49	15.67534055	2004.77	183.8530818	-1.61687	6.7	2.21
2017	1156.8	305.8	16.52353998	1701.731	214.2321193	0.805887	5.8	2
2018	544.89	365	11.26	1398.692	226.5498616	-3.15741	5.094	2.25

Unit Root Test at Levels

Null Hypothesis: **LNRDM** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.818286	0.3675
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNRDM)
Method: Least Squares
Date: 07/28/19 Time: 05:11
Sample (adjusted): 1971 2018
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRDM(-1)	-0.117904	0.064844	-1.818286	0.0755
C	0.749397	0.400696	1.870237	0.0678

R-squared	0.067054	Mean dependent var	0.037384
Adjusted R-squared	0.046772	S.D. dependent var	0.602913
S.E. of regression	0.588644	Akaike info criterion	1.818785
Sum squared resid	15.93910	Schwarz criterion	1.896752
Log likelihood	-41.65084	Hannan-Quinn criter.	1.848249
F-statistic	3.306166	Durbin-Watson stat	1.620968
Prob(F-statistic)	0.075535		

Null Hypothesis: **INF** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.411377	0.0153
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)

Method: Least Squares
Date: 07/25/19 Time: 16:56
Sample (adjusted): 1971 2018
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.405077	0.118743	-3.411377	0.0014
C	7.460829	2.887626	2.583724	0.0130

R-squared	0.201908	Mean dependent var	-0.052022
Adjusted R-squared	0.184559	S.D. dependent var	14.32949
S.E. of regression	12.93978	Akaike info criterion	7.999264
Sum squared resid	7702.147	Schwarz criterion	8.077230
Log likelihood	-189.9823	Hannan-Quinn criter.	8.028728
F-statistic	11.63749	Durbin-Watson stat	1.670214
Prob(F-statistic)	0.001356		

Null Hypothesis: **RY** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.437359	0.0000
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RY)
Method: Least Squares
Date: 07/25/19 Time: 18:10
Sample (adjusted): 1971 2018
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RY(-1)	-0.660880	0.121544	-5.437359	0.0000
C	2.069387	0.919868	2.249657	0.0293

R-squared	0.391252	Mean dependent var	-0.586764
Adjusted R-squared	0.378018	S.D. dependent var	6.847209
S.E. of regression	5.400109	Akaike info criterion	6.251489
Sum squared resid	1341.414	Schwarz criterion	6.329456
Log likelihood	-148.0357	Hannan-Quinn criter.	6.280953
F-statistic	29.56487	Durbin-Watson stat	2.200499
Prob(F-statistic)	0.000002		

Null Hypothesis: **RF** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.647479	0.4510
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RF)
Method: Least Squares
Date: 07/25/19 Time: 18:03
Sample (adjusted): 1971 2018
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RF(-1)	-0.129415	0.078553	-1.647479	0.1063
C	0.845975	0.650071	1.301357	0.1996

R-squared	0.055717	Mean dependent var	-0.117708
Adjusted R-squared	0.035189	S.D. dependent var	2.000395
S.E. of regression	1.964884	Akaike info criterion	4.229517
Sum squared resid	177.5954	Schwarz criterion	4.307484
Log likelihood	-99.50842	Hannan-Quinn criter.	4.258981
F-statistic	2.714186	Durbin-Watson stat	1.596803
Prob(F-statistic)	0.106275		

Null Hypothesis: **LNEXC** has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.521852	0.8775
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNEXC)
Method: Least Squares
Date: 07/25/19 Time: 16:48
Sample (adjusted): 1972 2018
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXC(-1)	-0.005916	0.011337	-0.521852	0.6044
D(LNEXC(-1))	0.526768	0.127817	4.121258	0.0002
C	0.080578	0.042890	1.878690	0.0669

R-squared	0.279190	Mean dependent var	0.132731
Adjusted R-squared	0.246426	S.D. dependent var	0.212537
S.E. of regression	0.184501	Akaike info criterion	-0.480626
Sum squared resid	1.497782	Schwarz criterion	-0.362531
Log likelihood	14.29471	Hannan-Quinn criter.	-0.436186
F-statistic	8.521222	Durbin-Watson stat	2.093823
Prob(F-statistic)	0.000745		

Null Hypothesis: **RIR** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.443382	0.0000
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RIR)
Method: Least Squares
Date: 07/25/19 Time: 18:06
Sample (adjusted): 1971 2018
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR(-1)	-0.743789	0.136641	-5.443382	0.0000
C	-0.527001	1.966548	-0.267983	0.7899

R-squared	0.391779	Mean dependent var	0.715917
Adjusted R-squared	0.378557	S.D. dependent var	17.16631
S.E. of regression	13.53249	Akaike info criterion	8.088838
Sum squared resid	8423.903	Schwarz criterion	8.166805
Log likelihood	-192.1321	Hannan-Quinn criter.	8.118302
F-statistic	29.63041	Durbin-Watson stat	1.933790
Prob(F-statistic)	0.000002		

Null Hypothesis: **LNPCI** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.497364	0.5264
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNPCI)
Method: Least Squares
Date: 07/26/19 Time: 16:31
Sample (adjusted): 1971 2018
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPCI(-1)	-0.092551	0.061809	-1.497364	0.1411
C	0.622699	0.393800	1.581256	0.1207

R-squared	0.046476	Mean dependent var	0.038149
Adjusted R-squared	0.025747	S.D. dependent var	0.363194
S.E. of regression	0.358488	Akaike info criterion	0.826931
Sum squared resid	5.911632	Schwarz criterion	0.904898
Log likelihood	-17.84635	Hannan-Quinn criter.	0.856395
F-statistic	2.242099	Durbin-Watson stat	2.311607
Prob(F-statistic)	0.141129		

Null Hypothesis: **PRICE** has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		6.504150	1.0000
Test critical values:	1% level	-3.581152	
	5% level	-2.926622	
	10% level	-2.601424	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PRICE)
Method: Least Squares
Date: 07/25/19 Time: 17:20
Sample (adjusted): 1973 2018
Included observations: 46 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRICE(-1)	0.156072	0.023996	6.504150	0.0000

D(PRICE(-1))	0.384998	0.191927	2.005955	0.0513
D(PRICE(-2))	-1.069437	0.238839	-4.477644	0.0001
C	0.968296	0.481684	2.010231	0.0509

R-squared	0.855213	Mean dependent var	4.922386
Adjusted R-squared	0.844871	S.D. dependent var	6.582290
S.E. of regression	2.592531	Akaike info criterion	4.826088
Sum squared resid	282.2912	Schwarz criterion	4.985100
Log likelihood	-107.0000	Hannan-Quinn criter.	4.885655
F-statistic	82.69349	Durbin-Watson stat	1.840642
Prob(F-statistic)	0.000000		

Unit Root Test at AT First Order Difference

Null Hypothesis: **D(LNRDM)** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.722912	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNRDM,2)
Method: Least Squares
Date: 07/28/19 Time: 05:12
Sample (adjusted): 1972 2018
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRDM(-1))	-0.860998	0.150447	-5.722912	0.0000
C	0.032416	0.089370	0.362711	0.7185

R-squared	0.421235	Mean dependent var	-0.014248
Adjusted R-squared	0.408373	S.D. dependent var	0.793239
S.E. of regression	0.610138	Akaike info criterion	1.891358
Sum squared resid	16.75207	Schwarz criterion	1.970087
Log likelihood	-42.44690	Hannan-Quinn criter.	1.920984
F-statistic	32.75172	Durbin-Watson stat	1.901965
Prob(F-statistic)	0.000001		

Null Hypothesis: **D(RF)** has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.991271	0.0002
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RF,2)
Method: Least Squares
Date: 07/25/19 Time: 18:04
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RF(-1))	-1.545598	0.309660	-4.991271	0.0000
D(RF(-1),2)	0.589411	0.248556	2.371347	0.0228
D(RF(-2),2)	0.361672	0.195592	1.849120	0.0720
D(RF(-3),2)	0.241808	0.148198	1.631652	0.1108
C	-0.249592	0.291950	-0.854912	0.3978

R-squared	0.534008	Mean dependent var	-0.057955
Adjusted R-squared	0.486214	S.D. dependent var	2.680217
S.E. of regression	1.921150	Akaike info criterion	4.250370
Sum squared resid	143.9419	Schwarz criterion	4.453118
Log likelihood	-88.50813	Hannan-Quinn criter.	4.325559
F-statistic	11.17310	Durbin-Watson stat	1.841538
Prob(F-statistic)	0.000004		

Null Hypothesis: **D(LNEXC)** has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.777616	0.0058
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNEXC,2)
Method: Least Squares
Date: 07/25/19 Time: 16:49

Sample (adjusted): 1972 2018
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEXC(-1))	-0.477800	0.126482	-3.777616	0.0005
C	0.065408	0.031280	2.091015	0.0422

R-squared	0.240767	Mean dependent var	0.003808
Adjusted R-squared	0.223896	S.D. dependent var	0.207729
S.E. of regression	0.183003	Akaike info criterion	-0.517009
Sum squared resid	1.507052	Schwarz criterion	-0.438279
Log likelihood	14.14971	Hannan-Quinn criter.	-0.487382
F-statistic	14.27038	Durbin-Watson stat	2.082828
Prob(F-statistic)	0.000462		

Null Hypothesis: **D(LNPCI**) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.527619	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.925169	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNPCI,2)
Method: Least Squares
Date: 07/26/19 Time: 16:34
Sample (adjusted): 1972 2018
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNPCI(-1))	-1.228398	0.144049	-8.527619	0.0000
C	0.055949	0.052450	1.066698	0.2918

R-squared	0.617738	Mean dependent var	0.002964
Adjusted R-squared	0.609243	S.D. dependent var	0.571182
S.E. of regression	0.357049	Akaike info criterion	0.819732
Sum squared resid	5.736770	Schwarz criterion	0.898462
Log likelihood	-17.26371	Hannan-Quinn criter.	0.849359
F-statistic	72.72029	Durbin-Watson stat	2.053045
Prob(F-statistic)	0.000000		

VAR Residual Normality Tests

VAR Lag Order Selection Criteria
Endogenous variables: LNRDM INF RY RF LNEXC
Exogenous variables: C
Date: 07/28/19 Time: 05:28
Sample: 1970 2018
Included observations: 45

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-598.7274	NA	309583.0	26.83233	27.03307	26.90716
1	-424.7729	301.5212*	416.0186*	20.21213*	21.41657*	20.66113*
2	-408.2627	24.94869	633.0699	20.58945	22.79760	21.41263
3	-392.9052	19.79411	1086.764	21.01801	24.22985	22.21535
4	-377.8937	16.01233	2130.035	21.46194	25.67749	23.03345

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Lag Order Selection Criteria
Endogenous variables: LNRDM INF RY RF LNEXC LNPCI PRICE RIR
Exogenous variables: C
Date: 07/28/19 Time: 05:30
Sample: 1970 2018
Included observations: 46

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1019.703	NA	3.51e+09	44.68275	45.00077	44.80188
1	-697.0238	519.0929*	47747.80*	33.43582	36.29804*	34.50802*
2	-639.9214	71.99862	82980.93	33.73571	39.14213	35.76099
3	-549.6862	82.38873	56479.97	32.59505*	40.54567	35.57340

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

ARDL Long Run Form and Bounds Test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LNRDM)
Selected Model: ARDL(1, 0, 0, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 07/27/19 Time: 18:21
Sample: 1970 2018
Included observations: 48

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.705594	0.692860	1.018378	0.3143
LNRDM(-1)*	-0.178315	0.087513	-2.037589	0.0479
INF**	-0.008648	0.006015	-1.437768	0.1579
RY**	0.009853	0.017610	0.559517	0.5788
RF**	0.043456	0.035990	1.207448	0.2340
LNEXC**	0.076853	0.054847	1.401235	0.1685

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

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.048501	0.037756	-1.284599	0.2060
RY	0.055258	0.106652	0.518116	0.6071
RF	0.243705	0.255283	0.954646	0.3452
LNEXC	0.430997	0.309298	1.393471	0.1708
C	3.957017	2.576413	1.535863	0.1321

EC = LNRDM - (-0.0485*INF + 0.0553*RY + 0.2437*RF + 0.4310*LNEXC + 3.9570)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	1.452166	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
			Finite Sample:	
Actual Sample Size	48		n=50	
		10%	2.372	3.32
		5%	2.823	3.872
		1%	3.845	5.15
			Finite Sample:	

	n=45	
10%	2.402	3.345
5%	2.85	3.905
1%	3.892	5.173

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LNRDM)
Selected Model: ARDL(1, 0, 1, 0, 0, 2, 2, 2, 0)
Case 2: Restricted Constant and No Trend
Date: 07/27/19 Time: 18:23
Sample: 1970 2018
Included observations: 47

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.391065	1.334485	-1.042398	0.3056
LNRDM(-1)*	-0.943739	0.229557	-4.111139	0.0003
INF**	-0.001016	0.005893	-0.172358	0.8643
RY(-1)	0.054174	0.020573	2.633300	0.0132
RF**	0.026573	0.037490	0.708788	0.4839
LNEXC**	0.147742	0.049082	3.010082	0.0053
LNPCI(-1)	1.020695	0.280163	3.643220	0.0010
PRICE(-1)	-0.014652	0.009951	-1.472414	0.1513
RDM(-1)	0.000216	9.74E-05	2.216876	0.0344
RIR**	-0.004602	0.007463	-0.616708	0.5421
D(RY)	0.029514	0.015727	1.876642	0.0703
D(LNPCI)	-0.206590	0.224908	-0.918554	0.3657
D(LNPCI(-1))	-1.289736	0.251541	-5.127345	0.0000
D(PRICE)	0.074501	0.034149	2.181630	0.0371
D(PRICE(-1))	-0.059461	0.040889	-1.454186	0.1563
D(RDM)	0.000324	8.35E-05	3.881677	0.0005
D(RDM(-1))	8.79E-05	5.37E-05	1.637179	0.1120

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

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.

INF	-0.001076	0.006265	-0.171783	0.8648
RY	0.057403	0.025598	2.242508	0.0325
RF	0.028157	0.040481	0.695565	0.4921
LNEXC	0.156550	0.053155	2.945143	0.0062
LNPCI	1.081544	0.255934	4.225868	0.0002
PRICE	-0.015526	0.008285	-1.873956	0.0707
RDM	0.000229	5.97E-05	3.831149	0.0006
RIR	-0.004877	0.008017	-0.608291	0.5476
C	-1.473993	1.517002	-0.971648	0.3390

EC = LNRDM - (-0.0011*INF + 0.0574*RY + 0.0282*RF + 0.1565*LNEXC +
1.0815*LNPCI -0.0155*PRICE + 0.0002*RDM -0.0049*RIR -1.4740)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.633436	10%	1.85	2.85
k	8	5%	2.11	3.15
		2.5%	2.33	3.42
		1%	2.62	3.77
			Finite Sample: n=50	
Actual Sample Size	47			
		10%	-1	-1
		5%	-1	-1
		1%	-1	-1
			Finite Sample: n=45	
		10%	-1	-1
		5%	-1	-1
		1%	-1	-1