

**THE EFFECTS OF MONEY SUPPLY
ON INTEREST RATE IN NIGERIA
(1988 – 2010)**

BY

YUNANA, TITUS WUYAH

**A THESIS SUBMITTED TO THE POST-GRADUATE
SCHOOL, AHMADU BELLO UNIVERSITY, ZARIA IN
PARTIAL FULFILMENT OF THE REQUIREMENT FOR
THE AWARD OF DEGREE OF MASTERS OF SCIENCE
(ECONOMICS)**

JULY, 2011

DECLARATION

I hereby declare that this thesis is a product of my own research. It has not been accepted anywhere for the purpose of awarding a higher degree. All references have been acknowledged by a way of bibliography at the end of the thesis.

YUNANA, TITUS WUYAH

CERTIFICATION

This thesis, entitled “The effects of Money Supply on Interest Rate; 1988 – 2010” by **Yunana, Titus wuyah**, meets the regulations governing the award of the degree of Masters of Science of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

Prof. A.G. Garba
Chairman, Supervisory Committee

DATE

Dr. Njiforti Peter
Member, Supervisory Committee

DATE

Dr. Ishaya Audu
Head of Department

DATE

DEDICATION

This thesis is dedicated to all the members of Mr. and Mrs. Yunana N. Hassan family and to my Wife, Mrs. Tamar T. Yunana.

ACKNOWLEDGEMENT

I have incurred many intellectual debts while writing this thesis and received considerable financial assistance from various individuals to make the whole gamut of this research feasible. No acknowledgement can adequately express my gratitude for the help I have received in the process of this research work.

My profound gratitude and appreciation go to my supervisors Prof. A.G Garba and Dr. Njiforti Peter, who stood by me all through the course of writing this thesis and whose solid and constructive criticisms have greatly improve the quality of this thesis.

Also, appreciated are the efforts of Prof. S.A. Tella, Prof. (Mrs). P.S Aku and Dr. Sanusi Rafindadi for their contributions toward the success of this programme.

I owe a lot to my parents, Mr. Yunana N. Hassan and Mrs. Lami Into Yunana, my brothers and sisters, Mr. Samuel Yunana, Mr. Aku Yunana, Mr. Anche Yunana, Mrs. Lois I. Anthomba, Mrs. Elizabeth A. Nangwan, and my uncle, Mr. U.G. Wuyahku who helped to meet the financial requirements of the research work.

My appreciation equally go to Mrs. Ruth Chenbap, Mr. Ubangida Shua'bu, Mallam Sanusi Adamu, Mr. Akeem oyetunji, Miss Maureen Eneh, Mr. Abdul Ahmed and Mrs. Rhoda Habu for their support. May god bless you all. Equally to be remembered is the supports of my wife- Mrs. Tamar T. Yunana.

Above all, I am most grateful to the Almighty GOD, for without Him, I would have not been able to complete my programme.

Finally, I want to say in as much as I owe a debt of gratitude to many fellows, I nevertheless, accept full responsibility for any error contained herein.

Yunana, Titus Wuyah

ABSTRACT

This thesis work examines the effects of money supply on interest rates in Nigeria from 1988 – 2010, by applying the vector Auto-regression approach. The choice of this period is to enable us focus strictly on the era of market-based monetary regime in Nigeria. The results confirm a negative effect of money supply on interest rates. This result relies on the liquidity frame theory. While, fiscal deficits indicated a positive relation with interest rate. The granger causality indicated a bilateral relation between money supply and interest rate. It is recommended that for government to stimulate investment for economic growth, they should reduce interest rate by expanding money supply. The government should also discouraged unnecessary spending to bring down interest rate. Moreover, where deficit financing is inevitable, it should be put into productive activities in order to create more employment opportunities, raise national output, and increase the living standard of the people.

LIST OF FIGURES

FIGURES	PAGE
2.1 Interest Rate Response to increase in Money Supply -----	20
2.2 Inflation in Nigeria 1988 – 2010 -----	25
2.3 Trends of Broad Money Supply (M2) and Prime Lending Rates (PLR) -----	28
3.1 Response of Interest Rate to Money Supply, Inflation and Fiscal Deficits -----	49

TABLE OF CONTENTS

	PAGE
Declaration -----	ii
Certification -----	iii
Dedication -----	iv
Acknowledgement -----	v
Abstract -----	vii
List of figures -----	viii
List of tables -----	ix
List of Appendices -----	x
Table of contents -----	xi
 CHAPTER ONE	
1.1 Introduction -----	1
1.2 Statement of the Problem -----	2
1.3 Research Questions -----	3
1.4 Objectives of the Study -----	3
1.5 Hypothesis Testing -----	3
1.6 Justification for the Study -----	3
1.7 Scope and Limitation of the Study -----	5
1.8 Organisation of the Study -----	5
 CHAPTER TWO	
2.0 Literature Review -----	6
2.1 Concept Definition -----	6
2.2 Theoretical Frameworks -----	6

2.2.1 The Quantity Theory of Money -----	7
2.2.2 Theories of Interest Rate -----	9
2.2.3 Liquidity Trap -----	10
2.2.4 Money Supply -----	11
2.2.5 The Determinants of the Level of Interest Rates -----	13
2.2.6 How the Central Bank of Nigeria influences Interest Rate -----	15
2.2.7 Money Supply and Inflation -----	19
2.2.8 Money Supply and Interest Rate -----	19
2.2.9 The Liquidity Preference Framework-----	22
2.3 Monetary Policy in Nigeria -----	23
2.3.1 Trends of Money Supply and Interest Rate in Nigeria -----	27
2.4 Empirical Literatures -----	31

CHAPTER THREE

3.0 Research Methodology -----	37
3.1 Introduction -----	37
3.2 Empirical Framework of the Model -----	37
3.3 Impulse Response Function -----	39
3.4 Variance Decomposition -----	40
3.5 Estimation Techniques -----	40
3.6 Unit Root Test -----	40
3.7 The Cointegration Test -----	41
3.8 Granger Causality Test -----	42

CHAPTER FOUR

4.0 Presentation, Analysis and Interpretation of Results -----	44
--	----

4.1 Unit Root Test Result-----	44
4.2 Cointegration Test Result-----	46
4.3 Vector Auto-Regression Estimation -----	47
4.4 Estimated Effects of Money Supply on Interest Rate -----	48
4.5 Variance Decomposition Results -----	50
4.6 VAR Granger Causality Test -----	51
CHAPTER FIVE	
5.0 Summary, Conclusion and Recommendation -----	52
References -----	55
Appendices -----	60

LIST OF TABLES

TABLE	PAGE
2.1 Average Deposit and Lending Rate -----	17
2.2 Money Supply in Nigeria (1988 – 2010) -----	26
2.3 Monetary indications in Nigeria. -----	30
4.1a Unit Root Test for Stationary Result at Levels (ADF) -----	44
4.1b Unit Root Test for Stationary Result at Levels (PP) -----	44
4.2a Unit Root Test for Stationary Result at First Difference (ADF) -----	45
4.2b Unit Root Test for Stationary Result at First Difference (PP) -----	45
4.3a Cointegrations Trace Statistics -----	46
4.3b Cointegrations Max-eigen Statistics -----	46
4.4 Vector Auto-Regression Estimation -----	47
4.5 Pairwise Granger Causality Test at Lag 4 (1988 – 2010) -----	51

LIST OF APPENDICES

APPENDIX	PAGE
A. Money Supply in Nigeria (1988 – 2010) -----	60
B. Variables Considered for VAR Analysis -----	61
C. Granger Causality Result -----	61
D. Results of Vector Auto-Regression -----	62

CHAPTER ONE

1.1 INTRODUCTION

The ultimate effect of money on the real economy has always been of great concern to economists and monetary policymakers. The Classical and New Classical Economics, namely the traditional approach proposes that money supply has no significant effect on interest rates. This approach completely relies on The Quantity Theory of Money and assumes a dichotomy between monetary and real sectors, known as classical dichotomy. Its main hypothesis is that the real money demand of people is fixed, so that there is a direct relation between money supply (Ms) and price level (P). (Mishkin-1989). A change in money supply induces price level to change through the same direction and by the same proportion. The traditional approach hypothesizes that the interest rate is determined in the real sector by investment demands and loanable funds. The causality is from quantity of investment demands and loanable funds to interest rates. Thus, this framework excludes interest rates from monetary analysis. But the Liquidity Preference framework refuses the classical dichotomy and implicates an inverse relation between money supply and interest rates. The Keynesian economics implicates an indirect relation between money supply and price level. This indirect relation is determined by interest rates and unemployment. However, Monetarists argue that the liquidity effect is not the ‘whole story’ (Mishkin-1989/129): Money supply will have other effects on the economy that may make interest rates rise, such as income effect, price level effect and expected inflation effect. Whether monetary authorities could or not affect interest rates by determining money supply variables depends on these factors.

The transmission mechanism, or channels through which changes in monetary aggregates affect real economic variables, has received significant attention. Channels of monetary transmission determine strength, duration, and direction of the impact on the real economy by policy actions. As was observed by Mishkin (1995) in his introduction to the symposium on monetary transmission mechanism “Monetary policy is a powerful tool, but one that sometimes has unexpected or unwanted consequences.” Thus, the ability of central bank authorities to conduct monetary policy successfully depends substantially on

the depth of their awareness of channels through which monetary shocks are transmitted into economy. Mishkin (1995)

The interest rate is a key tool of monetary policy. In October 2001, the European Central Bank stated that it had not changed interest rates because it considered current rates “consistent with the maintenance of price stability over the medium term” (ECB 2001, p. 5). In May 2001, Brazil’s central bank “increased interest rates” because it was “worried about mounting inflationary pressure,” New York Times (Rich2001). And in the first half of 2000, the U.S. Federal Open Market Committee increased the federal funds rate target three times in order to head off “inflationary imbalances” (FR Board 2000). The central bank of Nigeria recently increases the MPR by 25 basis points from 6.0 to 6.25 per cent; in other to cub inflation in the country. (CBN Monetary Policy committee, December, 2010).

Despite this common practice, central banks do not control interest rates directly. They can target interest rates, but they can only attempt to hit those targets by adjusting other instruments they do control, such as the supply of bank reserves. Changes in these instruments directly affect a country’s stock of money, and financial market reactions to money supply changes are what actually change the level of interest rates. Clearly, in order to hit interest rate targets, central banks must have a credible view of the relationship between money supply changes and interest rate changes. (CBN Report, 1992).

1.2 STATEMENT OF THE RESEARCH PROBLEM

According to the Keynesian theory, (liquidity effect of money supply on interest rate) the rate of interest is determined by the intersection of the supply schedule for money and the demand schedule of money. The Keynesians pointed out that, money supply and interest rate are inversely related. An increase in the money supply, given the money demand, causes a decrease in the interest rates which lowers the cost of borrowing and stimulates investment. This will raise the rate of growth of the economy (Dwivedi, 2007). But in the case if Nigeria, the relationship between money supply and interest rates is positively related. Money supply has been increasing over the years with an increase in the interest rate (lending rate) which is contrary with the Keynesian theory of money and interest and

to what is also obtainable in the developed economy. This induces stagnation and slows the growth and development of the country.

Early studies by Cagan and Gandolfi (1969) and Gibson (1970a) found that interest rates fall as the growth rate of the money supply increases. This same methodology was employed in later studies such as Melvin (1983) and Reichenstein (1987). However, in a recent study using a similar approach, Tarhan (1995) found that money supply and interest rates are inversely related. Several studies have presented consistent evidence for the liquidity effect using Vector Auto-Regression (VAR) (see, for example, Christiano and Eichenbaum, 1992a; Gali, 1992; Gordon and Leeper, 1994; Lastrapes and Selgin 1995; and Strongin, 1995). However, most of these recent studies on the liquidity effect have concentrated on the U.S. and very little work has been undertaken using data of other countries.

1.3 RESEARCH QUESTIONS

The questions this research intends to answer are as follows:

1. What is the effect of money supply on interest rates in 1988 - 2010?
2. What is the relationship between money supply and interest rates in Nigeria?

1.4 OBJECTIVES OF THE STUDY

The broad objective of this study is to investigate the effects of money supply on interest rates in Nigeria.

The specific objectives of this research work are:

- i. To estimate the effects of money supply on interest rates in Nigeria.
- ii. To analyze the relationship between of money supply and interest rates in Nigeria

1.5 HYPOTHESIS TESTNG

The hypotheses to be tested in the course of this research work are:

H_0 : Money supply has no effects on interest rates in Nigeria

H_1 : Money supply has an effect on interest rates in Nigeria

1.6 JUSTIFICATION FOR THE STUDY

The controversies surrounding the exact relationship between money supply and interest rates in Nigeria motivated this study. These controversies in the relationship between money supply and interest rates in Nigeria particularly the trend of positive relationship between the variables is contrary with the Keynesian theory of money and interest rates (Liquidity theory framework) and to what is also obtainable in the developed economy. These increase the cost of borrowing and lower the rates of investment, induce stagnation and slow the growth and development of the country. Therefore, this study is expected to look at some of the inherent problems associated with interest rates in Nigeria and proffer solutions.

Many economists believe that the liquidity effect does exist in the U.S. data, though they may disagree on its size. However, many of the previous studies have failed to find a statistically significant liquidity effect. This is particularly true for studies that used the data of the 1970s and 80s. Mishkin (1981, 1982), Melvin (1983), Reichenstein (1987), and Leeper and Gordon (1992) have found little or no evidence of a liquidity effect, whereas Cochrane (1989) found evidence of a liquidity effect only during the 1979-82 period when the Fed adopted the policy of monetary aggregate targeting.

Recently, renewed interest has developed regarding the existence of the liquidity effect. As argued by Pagan and Robertson (1995), "...early failure to detect a liquidity effect (largely based on single-equation methods) has been replaced by a conclusion that there generally is a liquidity effect when inferences are based on systems methods." The possibility that money may be endogenous justifies the use of system estimation. Several studies have presented consistent evidence for the liquidity effect using vector autoregression (VAR) (see, for example, Christiano and Eichenbaum, 1992a; Gali, 1992; Gordon and Leeper, 1994; Lastrapes and Selgin 1995; and Strongin, 1995), Mohammad and Ahmad (1995), Gbenedio, Ayadi, Okpala, and Amon (1999). This study is important because, most of these recent studies on the liquidity effect have concentrated on the U.S. and very little work has been undertaken using data of other countries like Nigeria. The vector autoregressive model, granger – causality and other tests will be use to enhance

the robustness of the result. It is also necessary to update the earlier works by extending the scope of the study to 2010. Moreover, inflation rates, and fiscal deficit will be included in the interest rate model as they are expected to have a lasting effects on interest rate.

1.7 SCOPE AND LIMITATION OF THE STUDY

This study will only focus on investigating the effects of the money supply on interest rates in Nigeria and shall be restricted to the period between 1988 and 2010. The choice of this period is to enable us focus strictly on the era of market-based monetary regime in Nigeria. The study would also verify cointegration between money supply and interest rates and investigate the causal relation between money supply and interest rates in Nigeria. The main limitation of the study was the difficulty in obtaining accurate data. The data used for the study are the publications of the central bank of Nigeria (CBN) and which in must cases usually run conflict with data obtained from other sources. Some questions that remained unanswered also constituted a limitation on the study.

1.8 ORGANIZATION OF THE STUDY

This study is organized in five chapters. Chapter one consists of the general introduction of the study. Chapter two contains related theories and literatures. Chapter three covers the research methodology which contains the model specifications. The focus of chapter four is presentation and analysis of the findings based on the econometric techniques that were adopted in the study. The last chapter contains the summary, conclusion and recommendation base on the findings.

CHAPTER TWO

LITERATURE REVIEW

This chapter is divided into three parts. The first part deals with conceptualization, the second aspect reviews related theories and the third section tackled the empirical framework of the study

2.1 CONCEPT DEFINITION

2.1.1 Money

In general usage the term ‘money’ means currency notes and coins held as cash in hand or chequeable deposit with banks. In economics, however, the term money is used in a much wider sense. Conceptually, money can be defined as any commodity that is generally accepted as a medium of exchange and a measure of value. (Walters, 1973).

2.1.2 Interest Rates

Interest rates are prices for loanable funds – prices of funds invested, lent out or borrowed for various periods of time. The supplier or lender of funds normally wants to earn an income and the user or borrower will generally be prepared to pay for the right to use the accumulated funds.

2.2 THEORITICAL FRAMEWORK

The traditional definition of the liquidity effect is based on the partial equilibrium Keynesian model of money market with a downward sloping demand curve and vertical supply curve (Mishkin 2001). In this simple framework an increase in money supply (*everything else remaining equal*) leads to a decline in interest rate. This immediate (short run) interest rate response to the monetary expansion was called the *liquidity effect*. However, over time the effect of monetary expansion extends on other economic factors, which in turn influence interest rate. These “non-liquidity” factors can be classified as following:

1. ***Income Effect***. Expansionary monetary policy leads to increase in national income and wealth, which affect the demand for money. As a result, the demand curve shifts to the right and interest rate increases

2. **Price-level Effect.** Increase in money supply may lead to overall increase in prices. Since according to the Keynesian framework people care about cash they hold only in real terms, when prices increase, more money is needed to leave the purchasing power at the sufficient level. As with income effect, demand curve shifts to the right and drives interest rate up.
3. **Expected-inflation Effect (or Fisher effect).** Increase in money supply may affect people's expectations about future level of inflation, which in turn leads to increase in interest rate. The Expected-inflation effect works through financial assets, such as government bonds or bank deposits. When expected inflation increases the return on real assets also goes up, making bank deposits less desirable relative to real assets. The decreased demand for bank deposits drives the interest rate on them up. Two important points should be mentioned here:
 - (i) expected-inflation effect persists as long as the price level continues to rise;
 - (ii) expected-inflation effect may operate rapidly, even at the same time when the liquidity effect comes into force.

Strength and persistence of monetary expansion effects are determined by current situation in the economy. Thus, the ultimate result of increase in money supply is ambiguous. Three typical scenarios of interest rate movements are possible

1. Liquidity effect dominates all other effects;
2. Liquidity effect is weak, expected-inflation effect comes into force later;
3. Liquidity effect is weak; expected-inflation effect comes into force immediately.

2.2.1 The Quantity Theory of Money

The basic premise or idea that forms the basis for this reasonable line of argument is to seek to answer the question 'what determines the demand for money?' as a result; there are different theories of demand for money by different schools of thought.

(a) The Fisher's version of the quantity theory of money is formally expressed as:

$$MV = \sum PQ \dots\dots\dots (1)$$

Fisher's simplified the version of the equation as:

$$MV = PT \dots\dots\dots (2)$$

Each variable denotes the following:

M → represents the quantity of money in circulation

V → is the transaction velocity of money

P → is weighted average of all individual prices and $P = MV/T$

T → is the sum of all the transactions of goods and services per unit of time.

The Fishers theory assumes that; V (velocity of money) and T (volume of transactions are constant in the short term) that the quantity of money, which is determined by outside forces, is the main influence of economic activities in a society. The theory also assumes that the economy is in equilibrium and at full employment. Essentially, the theory's assumptions imply that the value of money is determined by the amount of money available in an economy.

From equation... (2), when V and T are constant, changes in M will lead to proportionate change in P.

(b) The classical modification of the model called income version of quantity theory of money was expressed as:

$$MV = PY \dots\dots\dots (3)$$

Where Y is the physical output which include all exchanges which is the same as real income in social accounting sense.

The assumption of this theory is that, Y is constant. Therefore, equation... (3) Implies that a rise in money (Y remaining constant) results in a proportional rise in price. When money supply increases, it increase the cash balance at the disposal of the people. People do not prefer to hold idle cash balance. They spend it on goods and services. An increase in money expenditure, while Y is held constant, means aggregate demand increases while aggregate supply is fixed. The ultimate result is rise in price. Price rise because production cannot be increased in the shot run.

(c) Cambridge reformation of the model came under the leadership of Marshal and Pigou. They expressed their equation as:

$$M^d = KPQ \dots\dots\dots(4)$$

Where M^d is demand for money, P is the price, Q is the real income and K is the proportion of money held as currency and bank deposits. Equation ... (4) means that the

demand for money (M^d) equal K proportion of the total money income. They claimed that, K is fairly stable and that, at equilibrium level, stock of money (M) equals demand for money (M^d) that is

$$M = M^d = KPQ \dots\dots\dots(5)$$

At equilibrium,

$$M = KPQ \dots\dots\dots(6)$$

or

$$M (1/k) = PQ \dots\dots\dots(7)$$

According to this version, price level is affected only by that part of money which people hold in the form of cash for transaction purpose, not by the total MV as suggested by the classical theory.

2.2.2 Theories of Interest Rates

Anyanwu (1990) reviewed different types of theories of interest rate theories which include the classical theory, the loanable funds theory, the Keynesian theory and the modern theory of interest or the Hicks-Hanson ISLM Model. The classical theory of interest otherwise called the supply and demand theory of saving maintained that the rate of interest is determined by the supply and demand for capital by businessmen and house hold respectively. The supply of capital is governed by the time preference and the demand for capital by the expected productivity of capital. The classical theory fails to proffer solution hence indeterminate. Anyanwu (1990)

The loanable funds theory is a flow theory that determines the interest rate by the interaction of demand for and supply of loanable funds or credit. It involves the linking of the interest rate with dissaving, investment and hoarding of funds sourced from government, businessmen and consumers, on the demand side with saving, dishoardings and bank money on the supply side from private individuals and corporate bodies. Hansen asserted that the loanable funds theory like the classical and the Keynesian theories of interest indeterminate unless the income level is already known. Anyanwu (1990)

Keynesian liquidity preference theory is a stock theory. The theory determines the interest rate by the demand for and supply of money. It emphasizes that the rate of

interest is a purely monetary phenomenon as distinct from the real theory of the classics. It is a stock analysis because it takes the supply of money as given during the short run and determines the interest rate by liquidity preference or demand for money. Anyanwu (1990)

Roy Harrod (1937), James Meade (1937) and Oskar Lange (1938) had attempted to express the main relationships of Keynes's theory as equations in order to elucidate the interrelationships between the theory of effective demand and the theory of liquidity preference. In a similar effort, John Hicks, in his famous 1937 Econometric article, "Mr. Keynes and the Classics: A suggested interpretation", drew two curves, "SI-LL" to illustrate these relationships. These curves have since become famously known as the IS-LM model and were popularized by a now-converted Alvin Hansen (1949, 1953).

The crucial feature of the Keynesian system Hicks and Hansen concentrated on when formulating the simple IS-LM is the interaction between the real and monetary markets. From the real market, one extracts the level of income (Y) and from the money market; one obtains the interest rate (r). These variables, in turn, affect elements in the other market - in the simplest version, income affects money demand and interest affects investment. This interaction clearly violates the "classical dichotomy" and, as we shall see, it also does not support the neutrality of money. Financial-real interaction is the core of the IS-LM version of Keynes's theory - therefore, Hicks (1937) concluded with perfect Walrasian instincts, it is necessary to solve for the money and real markets simultaneously.

2.2.3 Liquidity Trap

A liquidity trap is defined as a situation in which the short-term nominal interest rate is zero. The old Keynesian literature emphasized that increasing money supply has no effect in a liquidity trap so that monetary policy is ineffective. The modern literature, in contrast, emphasizes that, even if increasing the current money supply has no effect, monetary policy is far from ineffective at zero interest rates. What is important, however, is not the current money supply but managing expectations about the future money supply in states of the world in which interest rates are positive. The liquidity trap is originally a Keynesian idea and was contrasted with the quantity theory of money, which

maintains that prices and output are, roughly speaking, and proportional to the money supply. Anyanwu (1990)

According to the Keynesian theory, money supply has its effects on prices and output through the nominal interest rate. Increasing money supply reduces the interest rate through a money demand equation. Lower interest rates stimulate output and spending. The short-term nominal interest rate, however, cannot be less than zero, based on a basic arbitrage argument: no one will lend 50 Naira unless she gets at least 50 Naira back. This is often referred to as the ‘zero bound’ on the short-term nominal interest rate. Hence, the Keynesian argument goes, once the money supply has been increased to a level where the short-term interest rate is zero, there will be no further effect on either output or prices, no matter by how much money supply is increased. Anyanwu (1990)

2.2.4 Money Supply

The central banks of all countries are empowered to issue the currency. The currency issued by the central bank is called ‘high power money’ because it is generally backed by supporting reserves and its value is guaranteed by the government and it is the source of all other forms of money. The currency issued by the central bank is, in fact, a liability of the central bank and the government. (Dwivedi, 2007). High-powered money is a macroeconomic term referring to the monetary base and includes currency and vault cash.

The monetary base is called high-powered because the magnitude of changes in monetary base can be greatly magnified by the money multiplier. That is, a small change in the monetary base can result in a large change in the overall money supply. (Friedman and Schwartz, 1960).

The central bank is the main source of money supply in the country. The supplied by the central bank is known as “high power money”. However, the central bank is not only the source of supply of money use as a medium of exchange (Dwayne, 1971). The second major source of money supply is the banking system of the country. Banks create money supply in the process of borrowing and lending money to the public. Money created by the commercial banks is called “credit money”. The high power money and the credit money constitute the most common measure of money supply or the total money of a

country (Gupta, 1998). The non-banking financial intermediaries also contribute to money supply (Gurley and Shaw, 1960).

The Central Bank of Nigeria (CBN) takes a number of monetary policy decisions, which include a change in the level of money supply (M2), the Minimum Rediscount Rate (MRR) now monetary policy rate (MPR), or a change in the exchange rate. The central bank defines money supply in two ways: narrow and broad money. Narrow money (M1) is defined to include currency in circulation plus current account deposits with commercial banks. Broad money measures the total volume of money supply in the economy and is defined as narrow money plus savings and time deposits with banks including foreign denominated deposits. There is excess money supply when the amount of money in circulation is higher than the level of total output of the economy. When money supply exceeds the level the economy can efficiently absorb, it dislodges the stability of the price system, leading to inflation or higher prices of goods. In this brief, we shall examine how a change in money supply by the CBN affects people and the economy. In subsequent series, we shall look at the effects of an increase/decrease in interest rate and the effects of depreciating/appreciating the exchange rate on the people and the economy.

When the CBN changes the level of money supply, it does so through the control of the Base money. Base money is made up of currency and coins outside the banking system plus the deposits of banks with the central bank. If the central bank perceives that there is too much money in circulation and prices are rising (or there is potential pressure for prices to rise), it may reduce money supply by reducing the base money.

To reduce the base money, the central bank sells financial securities to banks and the Non-bank public so as to reduce the ability of deposit money banks to create new money. The central bank can reduce the money supply by also raising the cash reserve deposits that banks are required to hold with the central bank. The larger the deposit balances on bank balance sheets, the higher their ability to create more money. Central bank monetary policy, therefore, targets the growth in those deposit balances so as to control the expansion in money supply which could precipitate price distortions.

A reduction in money supply affects the ability of banks to create new money through giving loans to their customers. In this way, the central bank could be said to be pursuing a contractionary monetary policy. When investors cannot get new loans to expand their investments, it reduces the level of total output in the economy. A reduction in output affects the level of employment and prices as less money is available for purchasing goods. In this way, prices remain stable or fall. The central bank can also pursue an expansionary monetary policy when it reduces the cash reserve ratio and buy securities from the open market. In this case, the reverse of our analysis above, holds.

2.2.5 The Determinant of Level of Interest Rates

The nominal or market interest rate is determined by the supply of and the demand for funds. The supply of funds depends on the preference of society for current versus future consumption. Societies that are prepared to postpone consumption to a later date and that prefer to accumulate wealth now will set aside a higher portion of their current income for wealth accumulation than societies that have a stronger preference to spend now. The lower the preference for current consumption, the stronger the incentive will be to accumulate funds.

The demand for funds depends on the opportunities available for using borrowed funds efficiently and profitably. The more profitable the usage of funds, the greater the demand for funds. Similar to the determination of the prices of goods and services, the prices of funds, i.e. the general level of interest rates, are determined by the demand for and the supply of funds. If the demand for funds increases and/or the supply declines, the price of funds will rise, i.e. interest rates will move higher. If the demand for funds declines and/or the supply increases, interest rates will move lower. At the same time, the interest rate level and expected changes in that level will also affect the supply of and demand for funds.

The period to which the interest rate relates is in the future, because funds are provided to borrowers for future repayment. The future can be foreseen only imperfectly by both lenders and borrowers of funds. Uncertainty about the future will consequently play a

prominent part in the process of interest rate determination. Among the more prominent types of uncertainty likely to have an impact on the level of interest rates are the following:

The term of the period over which funds are made available. The longer the term of the loan, the greater the uncertainty that circumstances may change and therefore the higher the compensation demanded by the lenders of funds. Thus, the longer the term of a loan, the higher the interest rate charged. Other factors may at times, however, lead to higher short-term than long-term interest rates.

The lender of funds will also be concerned about the ability of the borrower of funds to repay the loan. The higher the risk of default by the user or the lower his/her credit rating, the higher the interest rate asked by the supplier of funds.

If inflation is expected to be high, the buying power of borrowed funds declines rapidly. The supplier or lender of funds will seek protection against the erosive power of inflation by demanding a higher interest rate. Therefore, higher expected inflation will bring about higher interest rates.

If expected inflation is not properly accounted for in interest rates, lenders of funds will reduce the portion of their income that they are prepared to lend out. By contrast, the demand for borrowed funds will be strong under such circumstances, as potential buyers will borrow more money in order to buy ahead of the expected price increases.

The interest rate is the price which equates the supply of funds with the demand for funds. If there is an imbalance in the market for funds, as is likely to occur when expected inflation is not fully reflected in the level of interest rates, market interest rates will have to adjust in such a way that the total demand for and supply of funds will be equal over time.

If the supply of funds is inadequate relative to demand, the interest rate has to rise to encourage a larger supply of funds to match the demand for funds. The central Bank of Nigeria (the Bank) plays an important role in determining the level of short-term interest

rates as these rates are closely related to the rates at which the Bank lends money to private-sector banks.

2.2.6 How the Central Bank of Nigeria Influence Interest Rates

The repurchase or repo rate is the interest rate at which the central bank of Nigeria lends money to commercial banks. The central Bank acts as banker for commercial banks. Commercial Banks experience a cash shortfall or a need for liquidity on a daily basis and their lender of last resort is the central Bank. A formal system is in place to guide the process through which commercial banks borrow from the central Bank and it is called the repurchase transactions system (repo system). The repo system of borrowing and lending involves the temporary sale of a financial asset by the borrower (commercial banks) in exchange for the needed cash from the lender (the central Bank). In such a transaction, there is an explicit agreement that the borrower must repurchase the financial assets at an agreed future date – for example, after one week. The repo rate (monetary policy rate) is determined by the central Bank at each meeting of its Monetary Policy committee (MPC). It is expressed as a rate per annum.

The repo rate or monetary policy rate (MPR) serves as a benchmark for the level of short-term interest rates. For example, if the monetary policy rate (MPR) increases, commercial banks have to pay more for repo funds. To maintain their existing profit margins, commercial banks raise the interest rates at which they take deposits from and lend money to their customers. This causes a general rise in interest rates or the cost of holding money, and this eventually helps to control inflation by reducing the demand for credit to be spent on the purchase of goods and services. The actions of the Bank described here are also known as the formulation and implementation of monetary policy. On the 15th of April, 2010, the central bank monetary policy committee retained the MPR at 6 per cent and existing asymmetric corridor around the MPR at +2.0 per cent and -5.0 per cent. May 10-11, 2010, monetary policy committee leave the MPR unchanged at 6.0 percent and retained the asymmetric corridor of interest rates at 200 basis points above the MPR and 500 basis points below the MPR for the standing lending facility and standing deposit facility, respectively. In July 5, 2010, the committee decided that; no changes are made to the current policy stance: the MPR should remain unchanged at 6.0

per cent; and the asymmetric corridor of 200 basis points above and 500 basis points below the MPR, respectively, are to be retained. An increase in MPR by 25 basis points from 6.0 to 6.25 per cent; and Adjustment of asymmetric corridor to 200 basis points above and 300 basis points below the MPR for the Standing Lending Facility and Standing Deposit, respectively. This effectively increases interest payable on standing deposits with the CBN by 225 basis points forthwith. (Central Bank of Nigeria Communiqué No. 72 of the Monetary Policy Committee Meeting, September 21, 2010) the Monetary Policy Committee retained MPR at 6.25 per cent throughout the 2010. To control the raising rate of inflation in the country as a result of the 2011 election, the Monetary Policy Committee increased the MPR to 6.5 per cent in January, 2011. All other interest rates and monetary policy instruments respond to a change in monetary policy rate (MPR). The Interest rates banks charge the public on loans and advances which reflect the cost of borrowings and also include all charges and commissions levied by banks depend on monetary policy rate (MPR).

Below are the Average Deposit and lending rates commercial banks in Nigeria charge the public in response to the new monetary policy rate of 6.5%.

Table: 2.1 (a) Average Deposit and Lending Rates

S/N	Name of Bank	Deposit			Lending rate									
		Demand Deposit	Savings Deposit	Time Deposit	Agriculture		Mining & Quarrying		Oil & Gas		Manufacturing		Real Estate & Const	
		Ave. Int rate	Ave. Int rate	Ave. Int rate	Prime	Max.	Prime	Max.	Prime	Max.	Prime	Max.	Prime	Max.
1	Access bank	-	1.00	1.50-6.25	12.00	18.00	12.50	18.50	12.00	18.00	12.00	18.00	12.00	18.00
2	Afribank Nig	0.01	1.50	7.00	18.00	22.00	18.00	22.00	18.00	22.00	18.00	22.00	18.00	22.00
3	Diamond bank	0.75	2.55	5.20	14.00	19.00	17.00	23.00	17.00	23.00	17.00	23.00	17.00	23.00
4	Ecobank Nig	0.01	2.00	3.50	n/a	n/a	17.00	20.00	15.00	20.00	12.00	20.00	17.00	20.00
5	Equitorial Trust bank	0.05	2.00	6.00	10.00	20.00	10.00	20.00	10.00	20.00	10.00	20.00	10.00	20.00
6	Fidelity bank	1.00	2.00	5.50	6.00	23.00	19.00	23.00	19.00	23.00	19.00	23.00	19.00	23.00
7	First bank of Nig	0.00	1.00	0.3-2.00	9.00	16.50	18.00	24.00	18.00	24.00	18.00	24.00	14.00	16.00
8	FCMB	0.38	1.17	5.50	17.00	22.00	17.00	22.50	17.00	22.00	17.00	23.00	17.00	23.00
9	Finbank	0.25	2.00	5.72	14.00	20.00	18.00	20.00	20.00	22.00	18.00	20.00	20.00	22.00
10	Guaranty Trust Bank	N/A	1.25	1.50-4.00	7.00	21.00	13.00	17.00	14.00	21.00	7.00	18.00	12.00	17.00
11	Stanbic IBTC Bank	0.40	2.09	4.54	16.00	20.00	14.00	20.00	14.00	20.00	14.00	20.00	14.00	20.00
12	Intercontinental bank	1.00	0.50	5.50-8.50	17.00	21.00	18.00	23.00	18.00	23.00	17.00	21.00	19.00	24.00
13	Citi bank Nig	0.25	1.50	1.75	13.00	21.00	13.00	21.00	13.00	21.00	13.00	21.00	13.00	21.00
14	Oceanic bankl	-	1.00	0.50-8.00	16.00	23.00	16.00	23.00	16.00	23.00	16.00	23.00	16.00	23.00
15	Bank PHB	0.60	1.50	10.20	4.00	24.00	12.00	24.00	17.00	24.00	17.00	24.00	17.00	24.00
16	Skye Bank	1.00	1.50	3.45	14.00	14.00	17.00	22.00	17.00	22.00	17.00	22.00	17.00	22.00
17	Spring bank	0.25	2.00	4.40	19.00	22.00	19.00	22.00	19.00	22.00	19.00	22.00	19.00	22.00
18	Standard Chartered Bank	0.50	1.25	3.00	13.00	16.00	13.00	16.00	13.00	17.00	13.00	16.00	13.00	16.00
19	Sterling bank	0.50	2.50	3.0-6.0	14.00	18.00	16.00	20.00	16.00	20.00	16.00	19.00	16.00	20.00
20	Union bank	0.50	2.00	2.50-7.25	8.00	18.00	16.00	20.00	14.00	20.00	16.00	18.00	15.00	20.00
21	United bank for Africa	-	-	3.92	6.00	24.00	20.00	24.00	14.00	24.00	10.00	24.00	14.50	24.00
22	Unity bank	0.00-0.50	3.00	1.00-6.00	18.00	22.00	18.00	26.00	18.00	26.00	18.00	26.00	18.00	26.00
23	Wema bank	1.00	2.30	2.66	16.00	20.00	16.00	20.00	16.00	20.00	16.00	19.00	16.00	21.00
24	Zenith bank	1.25	1.25	2.00-4.00	11.00	16.00	11.00	19.00	11.00	19.00	11.00	19.00	13.00	19.00

Source: Central Bank of Nigeria. 04/02/2011

Table: 2.1 (b) Average Deposit and Lending Rates

S/N	Name of Bank	Deposit			Lending Rate									
		Demand Deposit	Savings Deposit	Time Deposit	Gen. al Comm.		Mortgage		Transp. & Comm.		Fin. & Ins.		Govt.	
		Ave. Int rate	Ave. Int rate	Ave. Int rate	Prime	Max.	Prime	Max.	Prime	Max.	Prime	Max.	Prime	Max.
1	Access bank	-	1.00	1.50-6.25	12.00	18.00	12.00	18.00	12.00	18.00	12.00	18.00	12.00	18.00
2	Afribank Nig	0.01	1.50	7.00	18.00	22.00	18.00	22.00	18.00	22.00	18.00	22.00	18.00	22.00
3	Diamond bank	0.75	2.55	5.20	17.00	23.00	17.00	22.00	17.00	23.00	17.00	23.00	17.00	23.00
4	Ecobank Nig	0.01	2.00	3.50	10.50	22.00	11.00	18.00	17.00	20.00	15.00	20.00	14.00	20.00
5	Equatorial Trust bank	0.05	2.00	6.00	10.00	20.00	10.00	20.00	10.00	20.00	10.00	20.00	10.00	20.00
6	Fidelity bank	1.00	2.00	5.50	19.00	23.00	19.00	23.00	19.00	23.00	19.00	23.00	19.00	23.00
7	First bank of Nig	0.00	1.00	0.3-2.00	18.00	24.50	18.00	24.00	18.00	24.00	18.00	24.00	14.00	23.00
8	FCMB	0.38	1.17	5.50	17.00	24.00	17.00	22.50	17.00	21.00	17.00	23.00	17.00	20.00
9	Finbank	0.25	2.00	5.72	18.00	22.00	18.00	22.00	20.00	22.00	15.00	20.00	16.00	22.00
10	Guaranty Trust Bank	N/A	1.25	1.50-4.00	10.00	21.00	12.00	17.00	15.00	21.00	12.00	21.00	15.00	21.00
11	Stanbic IBTC Bank	0.40	2.09	4.54	14.00	20.00	16.00	22.00	14.00	20.00	14.00	20.00	14.00	20.00
12	Intercontinental bank	1.00	0.50	5.50-8.50	19.00	25.00	9.50	9.50	18.00	23.00	18.00	21.00	18.00	22.00
13	Citi bank Nig	0.25	1.50	1.75	13.00	21.00	-	-	13.00	21.00	13.00	21.00	-	-
14	Oceanic bankl	-	1.00	0.50-8.00	16.00	23.00	16.00	23.00	16.00	23.00	16.00	23.00	16.00	23.00
15	Bank PHB	0.60	1.50	10.20	17.00	24.00	17.00	24.00	17.00	24.00	17.00	24.00	17.00	24.00
16	Skye Bank	1.00	1.50	3.45	17.00	22.00	17.00	22.00	17.00	22.00	17.00	22.00	17.00	22.00
17	Spring bank	0.25	2.00	4.40	19.00	22.00	19.00	22.00	19.00	22.00	19.00	22.00	19.00	22.00
18	Standard Chartered bank	0.50	1.25	3.00	13.00	16.00	12.00	14.00	13.00	16.00	13.00	15.00	-	-
19	Sterling bank	0.50	2.50	3.0-6.0	16.00	21.00	16.00	21.00	16.00	20.00	16.00	20.00	16.00	18.00
20	Union bank	0.50	2.00	2.50-7.25	18.00	21.00	16.00	20.00	16.00	20.00	15.00	20.00	18.00	20.00
21	United bank for Africa	-	-	3.92	15.00	24.00	10.00	24.00	12.00	24.00	11.00	24.00	13.00	24.00
22	Unity bank	0.00-0.50	3.00	1.00-6.00	18.00	26.00	18.00	26.00	18.00	26.00	18.00	26.00	18.00	26.00
23	Wema bank	1.00	2.30	2.66	16.00	21.00	16.00	21.00	16.00	21.00	16.00	20.00	16.00	21.00
24	Zenith bank	1.25	1.25	2.00-4.00	12.00	22.00	12.00	19.00	11.00	19.00	12.00	21.00	12.00	19.00

Source: Central Bank of Nigeria. 04/02/2011

2.2.7 Money Supply and Inflation

The idea that persistent changes in the price level are associated with changes in the supply of money is one of the oldest and most established propositions in economics. From the above discussion on quantity theory of money, it is obvious that either within the analytical framework of fisherine equation of exchange or the Cambridge demand for money, increase in money supply is seen as the causal factor in inflationary pressure. Inflation occurs when the rate of growth of the money supply is higher than the growth rate of the economy. This brings to mind the quantity equation. The quantity equation is

$$M \times V = P \times Y \dots\dots\dots(8)$$

Where M is the money supply, V is the velocity of money (roughly, how many times each Naira in the money supply is spent each year). P is the price level, and Y is real output. Written in terms of growth rates, the quantity equation becomes

$$M + v = p + y \dots\dots\dots(9)$$

Where the lowercase letters in (9) refer to the growth rates of the variables represented by the uppercase letters in (8). The growth rate version of the quantity equation implies that there should be a linear relationship between money growth and inflation with a slope coefficient of unity when v and y are treated like constants. However, a central bank can be confident that over the long-run a higher growth rate of money supply will result in a proportionally higher inflation rate.

The mechanism through which an increase in money supply leads to an increase in price is that, an increase in money supply changes asset holdings which produces portfolio adjustment in terms of expenditure. With the assumption of full employment, price level is thereby increased.

2.2.8 Money Supply and Interest Rate

We now turn to analyze the changes in money supply and its effects on the interest rate. It may be noted at the outset that the money supply and interest rate are inversely related. An increase in the supply of money, given the money demand curve, causes a decrease in the interest rate and vice versa. This relationship between the money supply and the interest rate is depicted in *fig.2.1*

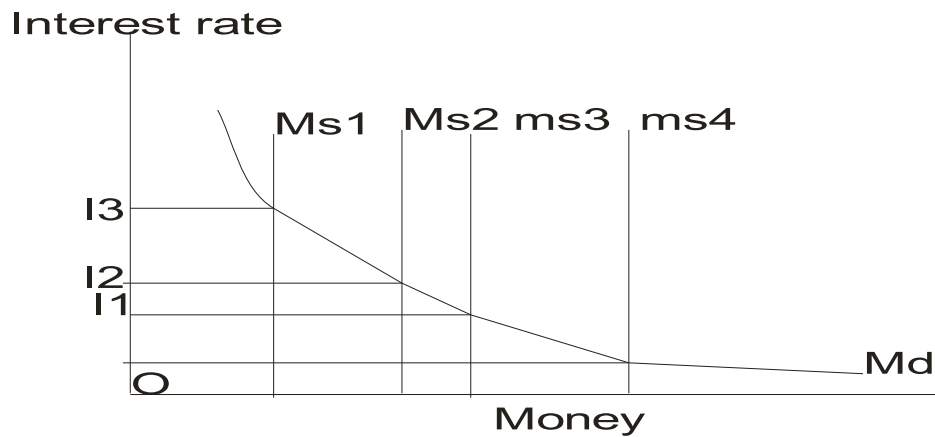


Fig 2.1. *Interest rate response to increase in money supply*

The money demand curve is given by M^d and money supply is given at Ms_1 . Given the money demand curve and money supply, the equilibrium rate of interest is determined at i_3 . If the central bank increases money supply to Ms_2 , the rate of interest falls to i_2 .

This theory is in line with the findings of Guvel (1995). According to his results, there is no any long run relation between M2 and pre-tax nominal interest rates of time deposits. The evidences of short term analyzes support liquidity theory framework. When money supply increases, interest rates decline in the first step. The lagged value of M2 is more significant than the current value.

Money supply in the economy can be regulated with Interest rates. Interest Rates are of two types: Lending Rates and Deposit Rates. Lending rates are always higher than deposit rates. The differential is the banks profits. When lending rates are cheap (low), more people with take loans. There will be greater money supply in the economy. We assume that if you hold your wealth as money, you earn no interest, while you do earn interest if you hold your wealth as bonds. How does your demand for money change when the interest rate rises? The opportunity cost of each Naira held as money is the foregone interest that could have been earned had you held that Naira in bonds as the interest rate rises, so too does the opportunity cost of money. The quantity of money demanded is *inversely* related to the interest rate on bonds. In Keynes original analysis, two things would cause the demand for money to change: An Increase in Income/Wealth, with more income, people would like to consume more. To increase consumption, you need more money. Money demand shifts right, causing interest rates to rise. An Increase

in Prices With higher prices, the same quantity of money held buys *fewer* goods and services. To maintain consumption, people need to hold *more* money.

The current monetary system in just about every country has a single central bank responsible for issuing currency. In the U.S., the only entity that can issue dollars is the Federal Reserve while central bank is the only entity to do that in Nigeria. In other words, private banks cannot issue their own currency because the supply of money is controlled by the central bank and no one else; we assume that the money supply is *invariant* to the interest rate. In other words, the supply of money will stay the same regardless of whether the interest rate is 1%, 5% or even 1000%. This is operationalized by drawing the money supply curve as a vertical line at the current money supply.

Since the central bank is the sole issuer of money, any changes in the money supply must come directly from central bank policy (monetary policy). At its most basic level, an increase in the money supply is just the central bank printing up more money. Operationally, the central bank changes the money supply through three channels (much more on this later)

1. Buying and selling bonds from the public in exchange for money
2. Changing banks reserve requirement
3. Changing the discount rate at which banks borrow from the central bank at.

Using these tools, the central bank can lower interest rates by raising the money supply and increase rates by cutting the money supply. Note that this analysis only considers the short run and not the long term consequences of changes to the money supply.

2.2.9 THE LIQUIDITY PREFERENCE FRAMEWORK

There are essentially two things you can do with your wealth: Spend it using money and Save it by purchasing bonds. Breaking down wealth into these two broad asset categories yields the following identity:

$$B^S + M^S = B^D + M^D \dots \dots \dots (10)$$

Equilibrium in the bond market will be achieved when $B^S = B^D$. The interest rate will adjust until the quantity of bonds supplied is equal to the quantity of bonds demanded.

At the equilibrium interest rate, $B^S = B^D$. Rearranging the identity above:

$$B^S - B^D = M^D - M^S \dots \dots \dots (11)$$

At equilibrium, $B^S - B^D = 0$, so... $M^S = M^D$ When the bond market is in equilibrium, the supply of money is equal to the demand for money. We can find the equilibrium interest rate by looking only at the money market!

One of the most useful features of the liquidity preference framework is that it allows us to see how changes in the demand and supply of money affect interest rates.

Equilibrium interest rates will *increase* if there is an increase in money demand (+), Decrease in money supply (+) .Equilibrium interest rates will *decrease* if there is a decrease in money demand (-), Increase in money supply (-)

Milton Friedman argued that while Keynes' analysis was technically correct, he failed to consider the longer term effects of monetary policy. Friedman argued that increasing the money supply may actually cause interest rates to go *up*! An increase in the money supply will cause income to rise, spurring an increase in money demand and interest rates. An increase in the money supply will stimulate spending, which will then cause prices to rise. Higher prices will increase money demand and raise interest rates. If the increase in money supply is continuous, then people will expect higher inflation. This causes the nominal interest rate to rise

Fisher effect: $i = r + \pi^e$

2.3 Monetary Policy in Nigeria

According to Ojo (2000), monetary and financial policies played a dual role during the sap period for stabilization purposes, monetary policy was tight to complement fiscal policy in order to contain domestic demand and prevent inflationary pressures. The financial sector policies had a structural component, involving the movement towards a

more market-oriented financial system designed to strengthen monetary management, facilitate the mobilization of financial savings and encourage a more efficient allocation of resources.

In an attempt to keep control over the liquidity in the system, a number of measures were introduced during the review period. These included the reduction in bank credit growth, special deposit requirements against outstanding external payments arrears, abolition of foreign guarantees/currency deposits as collateral for naira loans and the withdrawal of public sector deposits from the banks and their subsequent transfer to the CBN. Cash and liquidity ratios of the banks were increased in order to check excessive growth in bank reserves. Other measures included the issue of stabilization securities to banks in 1990 which was aimed at complementing earlier actions of the CBN to reduce excess liquidity in the system. In line with the objectives of building a market-oriented financial system and the expected improvement in credit allocation by banks, the sectoral credit guidelines were revised which provided banks greater flexibility in their credit operations. Prior to the introduction of the programme, there were controls on allocation of credit among 18 sectors but with the relaxation of credit control by CBN, the sector-specific credit distribution targets were limited to four sectors in 1986 and to only two as from 1987. Similarly, in August 1987, interest rates were deregulated which resulted in and gave room for the removal of all forms of control on market interest rates. In an attempt to ensure that yields on treasury securities became more attractive and paved way for the adoption of indirect monetary control, the CBN introduced an auction system for the sale of Treasury bill and certificates in 1989. Interest rate policy was further amended in 1991 when maximum lending rates were pegged at 21 percent while a minimum of 13.5 percent was fixed for savings deposit rates. These controls were later removed in 1992 but brought back in 1994.

Monetary growth exploded in 1988 following the reflationary budget of that year. Thereafter, money stock growth got moderated in 1989, but escalated again in 1990 owing to significant external inflow following increased prices of petroleum products. Monetary expansion became more rapid between 1991 and 1994 because of the

corresponding increase in the monetary base. Narrow money (M1) declined by 4.5% in 1986 as against the 9.1% increase in 1985. Contraction in narrow money was attributable largely to the transfer of N4.2 billion to CBN from banks being naira lodgments for foreign payments arrears which the CBN could not affect due to foreign exchange scarcity. Monetary restraint weakened somewhat in 1987 following an increase in the fiscal deficit, which was partly sourced from the banking system.

Over the years, inflationary trend was largely influenced by monetary and fiscal policies. In the period under review, though inflation rate moderated at an average of 11.7 per cent from the over 20.0 per cent level of the 1980-1990 era, (12-month moving average) for the eleven- year period, it was still high compared with global price trends. The annual inflation rate ranged from a low level of 5.4 per cent in 2007 to a peak of 18.9 per cent in 2001 and averaged 11.9 and 11.6 per cent for 1999-2003 and 2004-2009, respectively. Although the domestic price level was in the low double-digit rate, the single-digit target inflation rate was met only in four years 1999, 2000, 2006 and 2007 at 6.6, 6.9, 8.2 and 5.4 per cent respectively. The composite consumer price index showed that household goods witnessed significant price increases in 2001, 2005 and 2008 with 18.9, 17.9 and 15.4 per cent per annum, respectively (see Table 2.2). The observed inflationary trend had both cost-push and demand-pull elements. These included increased liquidity as the broad measure of money supply (M2) surpassed target for most of the period and depreciation of the exchange rate of the naira from N92.00/US\$1.00 in 1999 to N145/US\$1.00 in 2009. Other factors included surging commodity prices; global food crisis; energy and infrastructural constraints; as well as the global financial and economic crises.

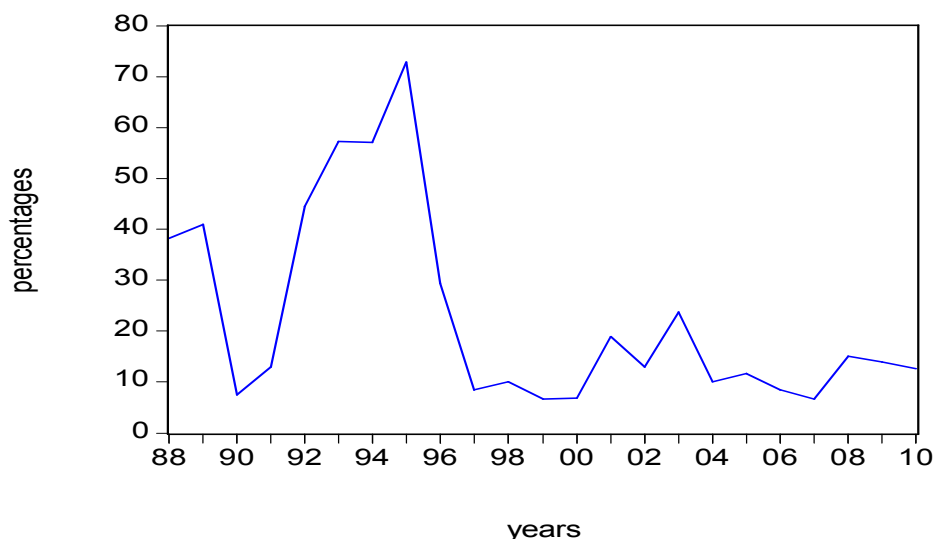


Fig. 2.2 Inflation in Nigeria 1988-2010

In Nigeria, government fiscal deficits increased continuously in the past two decades. For instance, deficits increased from ₦3, 902.10 million in 1981 to ₦8, 254.30 million in 1986 and further to ₦15, 134.70 million in 1989. The rising trend of deficits continued except in the year 1995 when it was registered a surplus (that is ₦1, 000 million). By the year 1998, overall deficits had jumped to ₦133, 389.30 million and further to ₦301, 401.60 million in 2002. Beginning from 2003, government fiscal deficits declined moderately from ₦202, 724.70 million to ₦172, 601.30 million, ₦161,406.30 million, and ₦101,397.50 million in 2004, 2005 and 2006; respectively (see appendix 1). Similarly, fiscal deficits as a percentage of GDP (at 1990 factor cost), deteriorated from -3.8 percent in 1981 to -5.7 percent in 1986 and further to -9.5 percent in 1993. However, the value of deficits as a percentage of GDP declined to -0.1 percent in 1997 only to rise to -5.9 percent in 1999. The share of deficits in total GDP has been declining, from -2.0 percent in 2003 to -1.1 percent and -0.6 percent in 2005 and 2006, respectively

Table 2.2: Money Supply in Nigeria (1988 - 2010)

YEARS	M1	M2	C.OUTSIDE BANK	D.DEPOSIT
1988	22232.1	45446.9	5463.6	12818.5
1989	26268.8	47055	9760.6	16508.2
1990	39156.2	68682.5	149511	24295.1
1991	50071.7	87487.6	23120.6	26951.1

1992	75970.3	129085.4	36755.5	39214.7
1993	118753.4	198519.1	57845.1	60908.3
1994	169391.5	266944.9	906010	78790.5
1995	201414.5	318763.5	106843.4	94571
1996	227464.4	370333.5	116121	111343.4
1997	268622.9	429731.4	130668	137954.9
1998	318576	525637.6	156716.1	161859.9
1999	393078.8	699733.7	186456	206622.8
2000	637731.1	1036079.5	274010.6	363720.6
2001	816707.6	1315869.1	338671.2	478036.5
2002	946253.4	1490457.6	386942.3	559311.1
2003	1225559.3	1862604.6	412155.2	813404.1
2004	1330657.8	2097049.6	458586.5	872071.3
2005	1725395.8	2814846.1	563232	973772.8
2006	2280618.9	2814846.1	690841.5	1244163.5
2007	3116272.2	56726224	737867.2	2378404.9
2008	3857541.5	89602877	8929078	3964636.7
2009	5422502.30	10767377.80	4076630.10	5763511.20
2010	5724242.10	11142651.40	892330.10	4381912.00

Source: computed from CBN statistical bulletin of various years

by 17.3%, exceeding the 11.8% target for the year. In an attempt to moderate an apparent excess in money growth, the CBN increased the liquidity ratio from 25.0 to 30.0%, deregulated interest rates and increased its minimum re-discount rate from 13.0 to 15.0% so as to make funds more expensive and thereby discourage marginal borrowers. However, in response to the reflationary budget of 1988, the monetary authorities lowered the liquidity ratio, reduced the minimum rediscount rate to 12.75% from 15.0% and increased the credit growth target to the domestic economy from 4.4% in 1987 to 8.1% in 1988. Money supply (M1), consequently, rose by as high as 42.3%, reflecting largely the inflationary financing of the federal deficit which amounted to 7.1% of GDP.

He added that as a result of the policy slippage of 1988, and the subsequent increase in budget deficit and the monetary aggregates, the monetary authorities tightened up monetary policy in 1989. It therefore, increased the rediscount rate from 12.75 to 18.5%, increased the cash ratio, raised the liquidity ratio for banks to 30.0%, adjusted the capital adequacy ratio from 1.12 to 1.10 and ordered the transfer of public sector deposits in banks to CBN when this was discovered to be the source of liquidity pressure. These contractionary measures impacted on the money supply as the expansion of M1 moderated from 42.3% in 1988 to 21.2% in 1989. In 1990, M1 raised again by 44.7%, largely due to the significant foreign exchange inflow from the increase in petroleum

prices. Between 1991 and 1994, M1 grew more rapidly, recording record level of 66.4% in 1992. The pattern of growth of broad money supply (M2) was similar to that of M1 during the entire period. The annual increase in M2 recorded a peak of 49.8% in 1993. However, the growth rates of both M1 and M2 decelerated in 1995, with M2 increasing by 10.1% while M1 recorded an increase of 5.6%. the renewed liquidity pressures in the system led to the introduction of stabilization securities to mop up excess liquidity in the banking sector.

He noted that, in spite of the intense pressures in the financial sector, the CBN introduced the use of open market operations (OMO) as a tool of monetary control in June 1993, while it gradually dismantled the direct credit controls. The use of the instrument was a huge success in 1993 mainly because of the prevailing high levels of interest rates which made investments in treasury securities very attractive. In 1993, treasury bills worth N4495 billion were offered for sale in the market while bills worth N49.27 billion were sold. The average yield of the bills ranged between 23.8and 27.8%. in 1994, the volume of OMO expanded significantly although its upward direction was threatened by the sudden policy changes announced n the 1994 budget. An example of such changes was the capping of interest rates which brought down the yield of treasury bills for OMO to 12.4%. Even with a slightly higher average yield in 1995, the volume of OMO transactions was significantly down compared to 1994 on the whole; the OMO instrument was quite useful in checking the growth of bank reserves during the period.

2.3.1 The Trends of Money Supply and Interest Rates in Nigeria

As evidenced in table 1.0, the growth rate of money supply between 1983 and 1985 increased but at a decreasing rate. The government has to take about N5.2 billion for deficit financing as credit from the banking system. Thus, the sharp fall of N3.3 billion in oil revenue from N8.6 billion in 1982 to N5.3 billion in 1983 resulted in budget deficit of about N4.9 billion, while that of 1982 was N3.7 billion. The mean annual percentage change in money supply was 9.7% for the period 1983 to 1985. The only factors that accounted for the increase are expansion in the bank credit to the government, increase in the net foreign assets, and other assets (net) of the banking system.

Following the moderate expansion of money supply since 1981, it was further dipped in 1986 as money supply in that year fell by about 1.2%. The Fall can be attributable to the fall of N6.6 billion in the other assets) of the Banking system and the N936.9 million accretion to quasi-money. The fall in the other assets could be accounted for by the rapid build up of the other liabilities of the CBN following the call on authorized dealers in foreign exchange in August and October, 1986 to transfer to the CBN naira lodgments in respect of foreign payments arrears which could not be affected because of the foreign exchange shortage. With draws from banks on this account amounted to N4.2 billion by the end of the year. In addition, the fall in the naira exchange rate lead to the revelation of the CBN's medium and long-term liabilities, which bankers deposit in their SFEM accounts with the CBN rose. The contractionary impact of these factors was, however, partly offset by the expansionary effect of the N4509 million increases in bank credit to the economy.

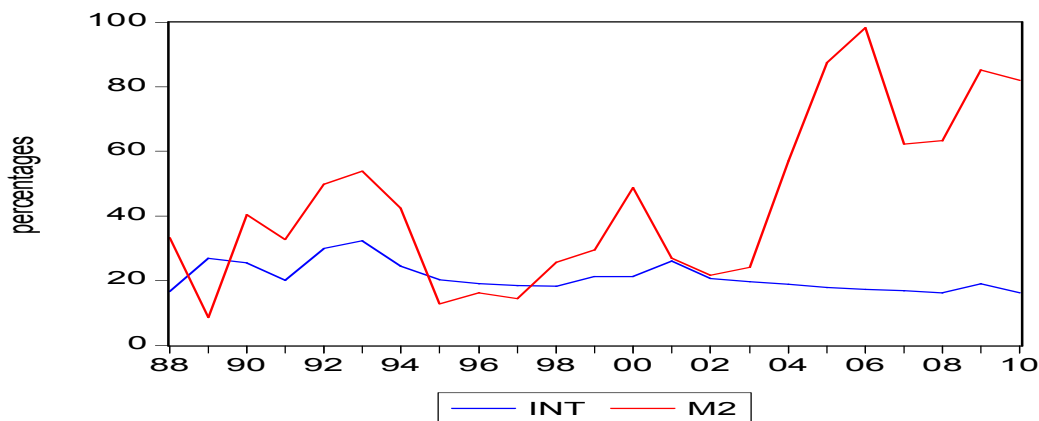


Fig. 2.3: Trends of Broad Money Supply (M2) and Prime Lending Rates (PLR)

This moderate trend recorded in the past few years was interrupted in 1987 when the percentage increased to 13.7%; 41.9% in 1988 and 21.5% in 1989 respectively. These three years recorded a mean annual percentage increase of 25.8%.

Between 1991 and 1993, the annual growth rate of money supply continued to be on the increase. The annual average percentage for the three years was 46.7%. The factors that were expansionary include, the increase in the bank credit to the economy and the net accretion to foreign assets of the banking system.

The interest rate (lending rate) also showed a rising trend during the period under review. For example, interest rate increased from 7.75 percent in 1981 to 10.50 percent in 1986 percent and to a record high of 26.80 percent in 1989. In 1995, interest rate dropped to 20.18 percent only to rise again to 21.32 percent in 1999 and 24.40 percent in 2002. The value of interest rate has been falling, moving from 20.48 percent in 2003 to 19.15 percent, 17.85 percent and 17.30 percent, in 2004, 2005 and 2006; respectively

Provisional data showed that relative to end-December 2009, broad money (M2) grew by 7.0 per cent in August 2010, which, when annualized represented a growth of 10.50 per cent. Reserve money (RM), which stood at N1, 653.86 billion at end-December 2009, fluctuated downward and by September 13, 2010, stood at N1, 407.51 billion.

Available data showed that in August 2010, aggregate domestic credit (net) grew by 18.0 per cent over the December 2009 level, and by 27.0 per cent when annualized. Credit to government (net), which grew substantially by 65.81 per cent over end-December 2009 (or 98.72 per cent on annualized basis), was the major contributor. Credit to the private sector, on the other hand, declined by 0.91 per cent (or 1.37 per cent on an annualized basis). The Committee believes that in order to provide the private sector with the necessary credit to grow the economy, further efforts were needed to restore confidence to the credit market and to unlock the flow of credit to the real economy. In general monetary aggregates are growing but remain below indicative benchmarks for the year.

The rates at the interbank segment of the money market remained stable and low, owing to the prevailing banking system liquidity and the de-risking of the market through the CBN guarantee of the interbank transactions. Consequently, in August 2010, the average inter-bank call and open-buy-back (OBB) rates fell significantly to 1.26 and 1.25 per cent, respectively, representing decreases of 233 and 195 basis points from the 3.59 and 3.20 per cent recorded in the preceding month. In line with the decrease in rates at the inter-bank call and OBB segments, the 7- and 30- day NIBOR rates decreased by 62 and 196 basis points to 3.85 and 4.55 per cent, respectively, from 4.47 and 6.51 per cent in July. As at September, 17, 2010, inter-bank call and OBB rates increased averaging 3.56

and 2.91 per cent, respectively. (Central Bank of Nigeria Communiqué No. 72 of the Monetary Policy Committee Meeting, September 21, 2010)

TABLE 2.3: Monetary Indications in Nigeria

Year	Narrow Money Supply (M1)	Broad Money Supply (M2)	Prime Lending Rates (PLR)	Inflation Rates	Deposit Rates of Interest (DRI)
1988	43.61	33.30	16.5	38.3	14.30
1989	21.51	8.5	26.8	40.9	21.20
1990	44.89	40.41	25.5	7.5	23.00
1991	32.58	32.74	20.0	13.0	20.10
1992	53.90	49.83	29.8	44.5	20.50
1993	56.32	53.76	32.2	57.2	28.02
1994	55.93	42.45	24.5	57.0	15.00
1995	8.77	12.75	20.2	72.8	14.27
1996	12.93	16.18	19.1	29.3	13.55
1997	18.09	16.40	18.4	8.5	7.43
1998	24.03	25.72	18.26	10.0	10.09
1999	17.98	29.52	21.3	6.6	14.30
2000	62.24	48.70	21.25	6.9	10.44
2001	28.06	26.8	26.0	18.9	10.09
2002	15.86	21.58	20.6	12.9	15.89
2003	29.52	24.11	19.6	23.8	11.45
2004	43.54	56.97	18.9	10.0	11.71
2005	63.56	87.45	17.8	11.6	8.18
2006	86.45	98.2	17.3	8.5	8.20
2007	62.09	62.33	16.9	6.6	8.90
2008	64.15	63.38	17.8	15.1	10.01
2009	97.08	85.14	19.0	13.9	12.72
2010	81.21	82.00	16.11	12.6	12.08

Source: computed from CBN statistical bulletin of various years

2.4 EMPIRICAL LITERATURES

Although the claim that macroeconomic variables (such as money supply and interest rates) drive the movement of stock prices has been a widely accepted theory for long time, serious attempts for empirical verification of the theory started only in the 1980s. This coincided with the development of investigative procedures such as cointegration and causality techniques with the associated computer programs deemed appropriate for carrying out such empirical research. Moreover, the time series data necessary for applying these techniques has been made available for a wide spectrum of countries only recently.

Guvel (1995) in his study, analyze money supply-interest rates relation by using Turkish quarterly data, 1987.1-1994.4. According to his results there is no any long run relation between M2 and pre-tax nominal interest rates of time deposits. The evidences of short term analyzes support liquidity theory framework. When money supply increases, interest rates decline in the first step. The lagged value of M2 is more significant than the current value. This evidence implicates that the income, price and price expectations effects are not robust in the short term. The liquidity effect continues for a while. Also, according to results the current money supply shocks have no any significant effect on interest rates. Money supply shocks effect interest rates with a lag and negatively. However current money supply affects interest rates more significant than lagged policy variables. The policy implication of these results is that the monetary authorities can control interest rates by manipulating money supply in the short run, but this is not possible in the long run due to income, price and price expectations effects. The VAR model with the equation below was used by the researcher:

$$INT = \alpha_1 + \alpha_2 M2 + \alpha_3 u_{t-1} + u_t \dots \dots \dots \dots \dots \dots \dots \dots (12)$$

Where INT is the interest rate, and M2, broad money supply. The problem with his equation is that, prime lending rate to the public would have been better used to estimate this relationship then the pre-tax nominal interest rates of time deposits.

One method of estimating the responsiveness of interest rates to changes in the money stock, used by Cagan and Gandolfi (1969) and in the early 80's by Melvin (1983) and brown and Santoni (1983), is to regress the change in the nominal interest rate (Δi_t) on a distributed lag of unanticipated changes in the nominal money stock, ΔM^u , that is the equation is estimated

$$\Delta i_t = a_0 + \sum b_1 \Delta M^u_{t-1} + \epsilon_t \dots \dots \dots \dots \dots \dots \dots \dots (13)$$

The random error, ϵ_t is assumed to be identically and independently distributed with a mean of zero and a constant variance, δ^2 , that is, ϵ_t is iid(0, δ^2). This equation is estimated with ordinary least squared (OLS).

Another approach used by Peek (1982), Wilcox (1983), Mehra (1985), Hoffman and Schlagenhanf(1985) and peek and Wilcox (1985) employs an IS-LM, aggregate demand/ aggregate supply model. In this model, commodity demand is a function of real interest

Pairwise Granger Causality test that supports Friedman's hypothesis that money growth variability impacts the term structure of interest rates. These results have implications for developing economies, especially those that share characteristics similar to Nigeria's.

Lynch and Ewing (1995) acknowledge that the relationship between money growth variability and the term structure of interest rates has received little or no attention in many countries outside the industrial world. The contention is that countries with higher inflation rates are subject to decreasing long-term real growth rates. In addition, they experience more variability in money growth which subsequently creates economic uncertainty. According to Lynch and Ewing, monetary uncertainty is positively related to the spread between short and long-term interest rates.

Marcus Hagedorn (2009) studies the joint business cycle dynamics of inflation, money growth, nominal and real interest rates and real money demand. He extends and estimates a standard cash and credit monetary model by adding two features: idiosyncratic preference shocks to cash consumption, and a banking sector. The estimated model accounts very well for the business cycle data, a result that standard monetary models have not been able to generate. He finds that the quantitative performance of the model is explained through substantial liquidity effects.

Monnet and Weber (2001) examine annual average interest rates and money growth rates over the period 1961 to 1998 for a sample of 31 countries. They find a correlation of 0.87 between money growth and long-term interest rates. For the developed countries, the correlation is somewhat smaller (0.70); for the developing countries, it is 0.84, although this falls to 0.66 when Venezuela is excluded. This evidence is consistent with the Fisher equation.

Mishkin (1992) examines the interest rates – Inflation correlation directly by testing for the presence of a long-run relationship between the two. Using U.S. data, Mishkin finds the evidence to be consistent with the Fisher relationship.

Monetary-policy shocks have been modeled as money-supply shocks, interest-rate shocks and combinations of the two (for example, Cochrane 1994). Sims (1986) argues that, since movements in M1 are the combination of private and central banking behaviour, an M1 shock may not be an appropriate monetary-policy shock. Instead, Sims argues that a

Treasury-bill-rate shock is a more reasonable measure of a monetary-policy shock. Similar to Sims (1986), Christiano and Eichenbaum (1992) use contemporaneous restrictions to identify monetary-policy shocks. Using monetary base and M1 as the measures of the money supply for quarterly and monthly U.S. data, they argue that money supply shocks lead to implausible interest rate and output movements. However, the orthogonalized innovation in non-borrowed reserves, the central bank's instrument of monetary policy, could be interpreted as a monetary-policy shock.

Though the relationship between money and the interest rate is straightforward in theory, empirical evidence of the liquidity effect has been puzzling since the earliest empirical research, and it is today. Historically, the theoretical explanation of the liquidity effect was treated as a plausible concept. In the earliest empirical studies the existence of a negative short-run relation between money and interest rate was taken for granted. As a general rule, researchers focused on the strength and persistence of interest rate decline in response to the money stock growth.

Cagan and Gandolfi (1969) investigate the time pattern of the monetary effect on interest rates for monthly data spanning the period 1910-65. The equation presented in first differences relates the change in commercial paper rate during period t to M2 growth rates in period t and previous periods back to $t-n$. They find that, as theory predicts, the interest rate declines immediately after the increase in M2 growth rate and begins to rise later. To be precise, a 1% increase in M2 growth rate leads to a maximum 2.6% decline in commercial paper rate.

Absolutely different results are obtained by Melvin (1983). He provides similar analysis for data drawn from the 1970s and finds that liquidity effect disappears during a month after the increase in money growth rate. The liquidity effect is immediately offset by other economic factors that drive interest rate up. Melvin himself infers that it is an anticipated inflation effect that dominates the liquidity effect in 1970s. Melvin's "vanishing liquidity effect" contributes to the development of monetary business cycle models that imply that persistent exogenous increase in money growth leads to a rise in the nominal interest rate. However, Cochrane (1989), using a spectral band pass filter technique, finds that the liquidity effect reemerges in 1979-82.

Gordon and Leeper (1992) estimate a four-variable vector autoregression (VAR) model that includes money growth rates, interest rates, CPI and industrial production. They assume that the endogenous component of the monetary base is small; with this assumption they use monetary base to model the exogenous innovations in monetary policy. They find that relation between monetary base and federal funds rate is never negative; that is, there is again no liquidity effect.

Fung and Gupta (1994) use structural VAR to investigate the response of output, interest rate, and exchange rate to shocks in monetary policy for Canadian economy. They find that positive monetary shocks measured by increases in excess cash reserves lead to declines in the interest rate, increases in output, and depreciation of the Canadian dollar. Hayashi (2000) builds an elaborated econometric model of market for reserves to verify the existence of the liquidity effect in the Japanese interbank market for overnight loans.

Charles and Fuerst (1995) in their studies consider the welfare consequences of two particularly simple rules for monetary policy: an interest rate peg and a money growth peg. The model economy consists of a real side that is the standard real business cycle model, and a monetary side that amounts to imposing cash-in-advance constraints on certain market transactions. The paper also considers the effect of assuming rigidity in the typical household's cash savings choice. The competitive equilibrium of the economy is not Pareto efficient, partly because of two intertemporal distortions: a distortion on the capital accumulation decision, and a distortion on portfolio choice that arises from the assumed rigidity. The principal result of the paper is that the interest rate rule (but not the money growth rule) entirely eliminates these two intertemporal distortions and is thus the benevolent central banker's policy choice.

O'mte Diahavbe, M. Rabiun and F. Oshilim (1989) conducted a study on the output and price effect of money supply in Nigeria, pure monetarist approach was adopted in their model specification:

$$\text{Log } P_t = \alpha + B_1 \text{ log } H_t + B_2 \text{ log } RD_t + B_3 \text{ log } CD + C_t \text{ ----- (19)}$$

$$\text{Log } Q_t = \alpha + B_1 \text{ log } H_t + B_2 \text{ log } RD_t + B_3 \text{ log } LD_t + e_t \text{ ----- (20)}$$

Where P_t = consumer price index

Q_t = GDP, H_t = high power money, RD_t = reserve deposit ratio, CD_t = currency deposit ratio, E = stochastic term and t = time.

While government budget deficit and rate of interest was outlined as part of the causes of inflationary process in Nigeria, yet the model did not capture these variables.

$$M2_t = f(M2_{t-1}, INT_{t-1}, FD_{t-1}, INF_{t-1}, U_{t2}) \dots \dots \dots (3.6)$$

$$FD_t = f(FD_{t-1}, INT_{t-1}, M2_{t-1}, INF_{t-1}, U_{t3}) \dots \dots \dots (3.7)$$

$$INF_t = f(INF_{t-1}, INT_{t-1}, M2_{t-1}, FD_{t-1}, U_{t4}) \dots \dots \dots (3.8)$$

Where

INT_{t-1} = interest rates at time $t-1$ refers to interest rates, and it is proxied by the prime lending rate. The data is obtained from the Central Bank of Nigeria bulletin of various years..

$M2_{t-1}$ = broad money supply at time $t-1$ refers to the total currency incirculation in the economy The data is obtained from the Central Bank of Nigeria bulletin of various years.

FD_{t-1} = overall fiscal deficits-GDP ratio at time $t-1$ is the ratio of overall fiscal deficits to GDP. The data is obtained from the Central Bank of Nigeria bulletin of various years

INF_{t-1} = inflation rate at time $t-1$ refers to inflation rate. The data is obtained from the Central Bank of Nigeria bulletin of various years.

U_t = is the error term

The structural form is:

$$INT_t = \alpha_0 + \alpha_1 INT_{t-1} + \alpha_2 M2_{t-1} + \alpha_3 FD_{t-1} + \alpha_4 INF_{t-1} + U_{t1} \dots \dots \dots (3.9)$$

$$M2_t = \beta_0 + \beta_1 M2_{t-1} + \beta_2 INT_{t-1} + \beta_3 FD_{t-1} + \beta_4 INF_{t-1} + U_{t2} \dots \dots \dots (3.10)$$

$$FD_t = \gamma_0 + \gamma_1 FD_{t-1} + \gamma_2 INT_{t-1} + \gamma_3 M2_{t-1} + \gamma_4 INF_{t-1} + U_{t3} \dots \dots \dots (3.11)$$

$$INF_t = \delta_0 + \delta_1 INF_{t-1} + \delta_2 INT_{t-1} + \delta_3 M2_{t-1} + \delta_4 FD_{t-1} + U_{t4} \dots \dots \dots (3.12)$$

3.3 IMPULSE RESPONSE FUNCTION

An *impulse response function* traces out the response of a variable of interest to an exogenous shock. Often the response is portrayed graphically, with horizon on the horizontal axis and response on the vertical axis. In the vast majority of applications, the exogenous shock is unobservable because it is a linear combination of unobservable regression disturbances. In other words, the impulse response functions can be used to produce the time path of the dependent variables in the VAR, to shocks from all the explanatory variables. If the system of equations is stable any shock should decline to zero, an unstable system would produce an explosive time path.

3.4 VARIANCE DECOMPOSITION

This is an alternative method to the impulse response functions for examining the effects of shocks to the dependent variables. This technique determines how much of the forecast error variance for any variable in a system, is explained by innovations to each explanatory variable, over a series of time horizons. Usually own series shocks explain most of the error variance, although the shock will also affect other variables in the system. It is also important to consider the ordering of the variables when conducting these tests, as in practise the error terms of the equations in the VAR will be correlated, so the result will be dependent on the order in which the equations are estimated in the model.

3.5 ESTIMATION TECHNIQUES

The empirical analysis is presented in three stages; Unit root, Co-integration and Granger causality test. Central to this framework of analysis is the examination of the variable in the econometric model for stationarity. Basically, the idea is to ascertain the order of integrations of the variables and the number of time the variables have to be differenced to arrive at stationarity. This enables us to avoid the problems of spurious or inconsistent regression that are associated with non-stationary time series models.

3.6 UNIT ROOT TEST

This involves testing the order of integration of the individual series under consideration. Several procedures for the test of order of integration have been developed. The most popular ones are Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip-Perron (PP) due to Phillips (1987) and Phillips and Perron (1988). Augmented Dickey-Fuller test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationarity. The tests are conducted with and without a deterministic trend (t) for each of the series. The general form of ADF test is estimated by the following regression:

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum \alpha_i \Delta y_i + e_t \dots\dots\dots(3.13)$$

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum \alpha_i \Delta y_i + \delta + e_t \dots\dots\dots(3.14)$$

Where

Y is a time series, t is a linear time trend, Δ is the first difference operator, α_0 is a constant, n is the optimum number of lags in the dependent variable and e is the random error term; and the Phillip- Perron (PP) is equation is thus:

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + e_t \dots\dots\dots(3.15)$$

3.7 THE COINTEGRATION TEST

This involves testing of the presence or otherwise of cointegration between the series of the same order of integration through forming a cointegration equation. The basic idea behind cointegration is that if, in the long-run, two or more series move closely together, even though the series themselves are trended, the difference between them is constant. It is possible to regard these series as defining a longrun equilibrium relationship, as the difference between them is stationary (Hall and Henry, 1989). A lack of cointegration suggests that such variables have no long-run relationship: in principal they can wander arbitrarily far away from each other (Dickey et. al., 1991). We employ the maximum likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991). Specifically, if Y_t is a vector of n stochastic variables, then there exists a p-lag vector auto regression with Gaussian errors of the following form:

Johansen’s methodology takes its starting point in the vector auto regression (VAR) of order P given by

$$y_t = \mu + \Delta y_{t-1} + \dots + \Delta^p y_{t-p} + e_t \dots\dots\dots(3.16)$$

Where

Y_t is an nx1 vector of variables that are integrated of order commonly denoted (1) and ϵ_t is an nx1 vector of innovations.

This VAR can be rewritten as

$$\Delta y_t = \mu + \eta_{y_{t-1}} + \sum \tau_i \Delta y_{t-1} + e_t \dots\dots\dots(3.17)$$

$$\Pi = \sum A_{i-1} \text{ and } \lambda_i = - \sum A_j \dots\dots\dots(3.18)$$

Where

$$\Lambda \text{ trace } (\delta) = -^T \sum \ln [1 - \lambda t]$$

To determine the number of co-integration vectors, Johansen (1988, 1989) and Johansen and Juselius (1990) suggested two statistic test, the first one is the trace test (λ trace). It tests the null hypothesis that the number of distinct cointegrating vector is less than or equal to q against a general unrestricted alternatives $q = r$. the test calculated as follows:

$$\Lambda \text{ trace } (r) = -T \sum \ln [1 - \lambda_i] \dots\dots\dots(3.19)$$

Where

T is the number of usable observations, and the λ_i s are the estimated eigenvalue from the matrix.

The Second statistical test is the maximum eigenvalue test ($\lambda \text{ max}$) that is calculated according to the following formula

$$\lambda \text{ max } (r, r + 1) = -T \ln (1 - \lambda_{r+1}) \dots\dots\dots(3.20)$$

The test concerns a test of the null hypothesis that there is r of co-integrating vectors against the alternative that r + 1 co-integrating vector.

3.8 GRANGER CAUSALITY TEST

A common problem in economies is the determining whether changes in one variable are a cause of changes in another. This problem is brought to the fore in our analysis that there is a relationship between money supply and interest rate. But the causal link could run in either direction.

The granger (1969) causality test to be used in this study is specified as follows:

$$INT_t = Ms_{t-1} + INT_{t-j} + u_{1t} \dots\dots\dots(3.22)$$

$$Ms_t = Ms_{t-1} + INT_{t-j} + u_{2t} \dots\dots\dots (3.23)$$

Where

INT_t = interest rates at time t

Ms_t = money supply at time t

And are the parameters to be estimated

Note:

Null hypothesis

Ms_t does not granger cause INT_t

INT_t does not granger cause Ms_t

Thus, the Ganger causality test shall be run for:

$Ms \rightarrow INT$

$INT \rightarrow Ms$

The statistics used to test the hypothesis is the F statistics. If the parameter $\alpha_i \neq 0$ but $\delta_j = 0$, then there is unidirectional causality from Ms to INT. On the other hand, if the parameter $\alpha_I = 0$ but $\delta \neq 0$, then there is unidirectional causality from INT to Ms. A bi-directional causality exist when $\alpha_i \neq 0$ and $\delta_j \neq 0$. If the computed F ratio is greater than the critical value, we reject null and if the value of F calculated are less than the critical value we accept null.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULT

This chapter deals with the presentation, analysis and interpretation of results and findings of the effects of money supply on interest rates in Nigeria. We shall present and analysis findings of unit root test, cointegration test, Vector Auto-Regressive test and granger causality test.

4.1 UNIT ROOT TEST

Before the regression analysis, we perform a stationarity test on the variables: interest rate, broad money supply, inflation rate and fiscal deficit. Economic theory requires that variables be stationary before application of standard econometric techniques. This is to avoid misleading results. In performing the stationarity test we used a maximum lag of 4, and excluded both intercept and trend. We use both the augmented Dickey Fuller (ADF) and Phillip-Perron (PP) test to find the existence of unit root in each of the time series. The results for both the ADF and PP test are reported in the table 3 (A) and (B) below:

Table 4.1a: Unit Root Test for Stationary Result at Levels (Augmented Dickey Fuller)

Variables	ADF Statistics Value	1%	5%	10%
INT	-0.919702	-2.6819	-1.9583	-1.6242
M2	-0.039208	-2.6819	-1.9583	-1.6242
INF	-1.676270	-2.6819	-1.9583	-1.6242
FD	-1.103646	-2.6819	-1.9583	-1.6242

*MacKinnon critical values for rejection of hypothesis of a unit root.

Table 4.1b: Unit Root Test for Stationary Result at Levels (Phillip Peron)

Variables	PP Statistics Value	1%	5%	10%
INT	-0.373967	-2.6756	-1.9574	-1.6238
M2	-0.184935	-2.6756	-1.9574	-1.6238
INF	-1.579675	-2.6756	-1.9574	-1.6238
FD	-1.178016	-2.6756	-1.9574	-1.6238

* MacKinnon critical values for rejection of hypothesis of unit root.

The result in the table shows that all the variables were not stationary in levels. This can be seen by comparing the observed values (in absolute terms) of both ADF and PP test statistics with the critical values (also in absolute terms) of the test statistic at 1%, 5% and 10% level of significance. Result from the table provides strong evidence of non-stationary. This is because; both the ADF and PP test statistics are less than the McKinnon critical values at 1%, 5% and 10% level of significance. Therefore, the null hypothesis is accepted and it sufficient to conclude that there is a presence of unit root in the variables at levels, following from the above result, all the variables were differenced once and both the ADF and PP test were conducted on then, the result is shown in the table 4 (A) and (B) below:

Table 4.2a: Unit Root Test for Stationary Result at First Difference (Augmented Dickey Fuller)

Variables	ADF Statistics Value	1%	5%	10%
INT	-5.189093	-2.6889	-1.9592	-1.6246
M2	-3.539183	-2.6889	-1.9592	-1.6246
INF	-5.18909	-2.6889	-1.9592	-1.6246
FD	-4.472539	-2.6889	-1.9592	-1.6246

*MacKinnon critical values for rejection of hypothesis of a unit root.

Table 4.2b: Unit Root Test for Stationary Result at First Difference (Phillip Peron)

Variables	PP Statistics Value	1%	5%	10%
INT	-6.157746	-2.6819	-1.9583	-1.6242
M2	-4.768734	-2.6819	-1.9583	-1.6242
INF	-4.349956	-2.6819	-1.9583	-1.6242
FD	-5.220148	-2.6819	-1.9583	-1.6242

* MacKinnon critical values for rejection of hypothesis of a unit root.

The table reveals that all the variables were stationary at first difference, on the basis of this, this is because; both the ADF and PP test statistics are greater than the McKinnon critical values at 1%, 5% and 10% level of significance. On the basis of this, the null hypothesis of non stationary is rejected and it is safe to conclude that the variables are stationary. This implies that the variables are integrated at order one i.e I (1).

4.2 COINTEGRATION TEST

To have confirmed the stationary of the variables at I(1), we proceed to examine the presence or non-presence of cointegration among the variables. When a cointegration relationship is present, it means that interest rates, broad money supply, inflation rate and fiscal deficit share a common trend and long-run equilibrium as suggested theoretically. We started the cointegration analysis by employing the Johansen cointegration test. The results in table 5 reported for the trace and maximum eigenvalue statistics show that the null-hypothesis of no-cointegrating is accepted at both 1% and 5% levels of significance. The trace test statistics reveal that there is no cointegrating relationship. The maximal eigenvalue statistics suggests at most one cointegrating relationships among variables. Since the trace statistics takes into account all of the smallest eigenvalues, it possesses more power than the maximal eigenvalue statistic (see Serletis and King, 1997; and Kasa, 1992). Furthermore, Johansen and Juselius (1990) recommend the use of the trace statistics when there is a conflict between the two statistics. The conclusion drawn from this result is that there exists no long-run relationship between interest rate, broad money supply, inflation rate and fiscal deficit.

Table 4.3a: Cointegrations Trace Statistics

Hypothesize No. of CE (s)	Eigenvalue	Trace Statistic	1 % Critical Value	5% Critical Value
None	0.737655	35.63945	45.58	39.89
At most 1	0.167946	7.539469	29.75	24.31
At most 2	0.142952	3.678443	16.31	12.53
At most 3	0.020685	0.438949	6.51	3.84

*(**) denotes rejection of the hypothesis at the 5% level

Trace test indicates no cointegration at both 1% and 5% levels

Table 4.3b: Cointegration Max-Eigen Statistics

Hypothesize No. of CE (s)	Eigenvalue	Max-Eigen Statistic	1 % Critical Value	5% Critical Value
None	0.737655	28.09998	28.82	28.23
At most 1	0.167946	3.861026	22.99	17.89
At most 2	0.142952	3.239494	15.69	11.44
At most 3	0.020685	0.438949	6.51	3.84

*(**) denotes rejection of the hypothesis at the 5% level

Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level

Max-eigenvalue test indicates no cointegration at the 1% level

4.3 VECTOR AUTOREGRATION ESTIMATION

We estimate the quantitative effect of broad money supply, inflation rate, and fiscal deficits on interest rate in Nigeria, using the vector auto-regression (VAR) approach. The result of the estimation is presented below:

Table 4.4: Vector Autoregration Estimation

	Coefficient	Std. Error	T-Statistics
C	15.19679	4.75850	-3.19361
(INT(-1))	0.523920	0.20738	2.52633
(INT(-2))	0.178377	0.18624	0.95776
(M2(-1))	-0.022168	0.03810	-0.58177
(M2(-2))	-0.056425	0.04238	-1.33147
(INF(-1))	0.072196	0.05797	1.24537
(INF(-2))	-0.211972	0.05546	-3.82196
(FD(-1))	10.60839	4.21064	2.51943
(FD(-2))	-0.124802	3.89108	-0.03207
R. Squared	0.758073		
Adj. R-Squared	0.596789		
F- statistic	4.700221		

The results of the estimation show that the explanatory variables account for approximately 76 percent variation in interest rate in Nigeria. The estimation also shows that broad money supply (our variable of interest) is statistically insignificant but economically significant for the two lagged periods. For instance, a 1 percentage increases in broad money supply at lag one period decrease interest rate by approximately 0.022 percentages and a 1 percentage increases in broad money supply at lag two period decrease interest rate by approximately 0.056 percentages. The evidences of short term analyzes support liquidity theory framework. When money supply increases, interest rates decline in the first step. This evidence implicates that the income, price and price expectations effects are not robust in the short term. The policy implication of these results is that the monetary authorities can control interest rates by manipulating money

supply in the short run, but this is not possible in the long run due to income, price and price expectations effects.

The estimation result also indicates that inflation at previous one year is statistically significant but it is positively signed. A 1 percentage increase in inflation in the previous one year leads to approximately 0.072 percentages increased in interest rate. While inflation rate in the previous two years is statistically significant but it is negatively signed. A 1 percentage increase in inflation in the previous two years leads to approximately 0.21 percentages decreased in interest rate. This finding is consistent with the work of Obi and Nurudeen (2009).

Furthermore, the estimation revealed that overall fiscal deficit-GDP ratio is statistically significant and positively related. A 1 percentage increase in overall fiscal deficit-GDP ratio in the previous one year causes the interest rate to rise by approximately 10.61 percentages. This result is consistent with the findings of Gale and Orszag (2003), Qiang Dai and Thomas Phillipon (2004). The finding of the overall fiscal deficit-GDP ratio in the previous two years is statistically insignificant and negatively related. A 1 percentage increase in overall fiscal deficit-GDP ratio in the previous two years causes the interest rate to fall by approximately 0.12 percentages. The F-statistic who measures the significant contribute of the whole variables is statistically significant. That is, all the variables are significant in influencing interest rates. Finally, in the Roots of Characteristic Polynomial, no root lies outside the unit circle therefore; our VAR result satisfies the stability condition.

4.4 ESTIMATED EFFECTS OF MONEY SUPPLY ON INTEREST RATE

The impulse response functions were also used to interpret the estimated effects of innovations in monetary policy variables (money supply, inflation and fiscal deficit) on interest rate. The interpretation follows from the path of the impulse response functions generated from the recursively-orthogonalized VAR estimated residuals. The impulse responses show the path of interest rate when there are innovations in the policy variables i.e. money supply, inflation and fiscal deficit.

Response to Cholesky One S.D. Innovations ± 2 S.E.

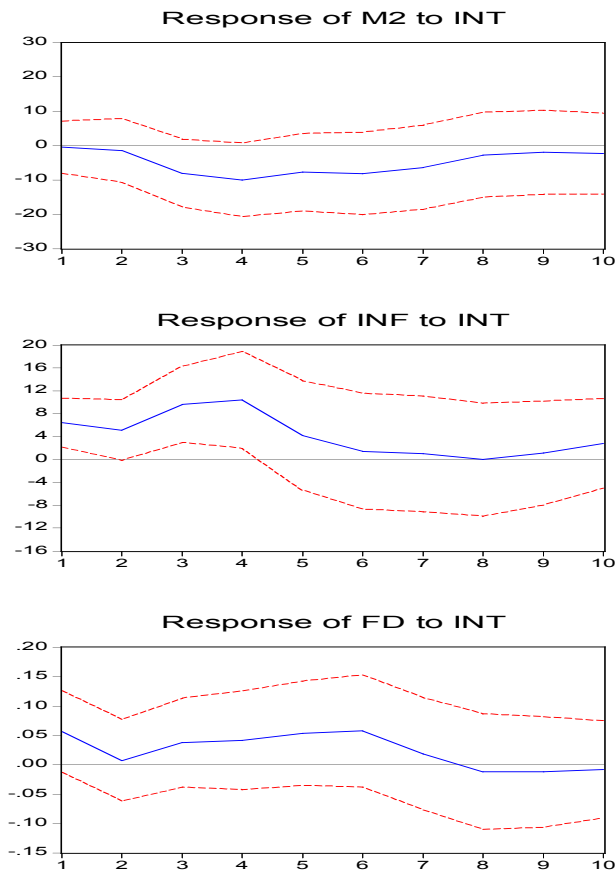


Figure 3.1: Response of Interest Rate to Money Supply, Inflation and Fiscal Deficit

Figure 3.1, shows three panels of impulse response graphs indicating how innovations in respective monetary policy variables i.e. money supply, inflation and fiscal deficit affect interest rate in Nigeria over a period of 21 years. A value of zero means that the monetary shock has no effect on the non-policy variable and the variable continues on the same path it would have followed had there been no monetary shock. A positive or negative value indicates that the shock would cause the variable to be above or below its „natural“ path as the case may be. The solid lines depict the estimated effects, while the dashed lines show the boundaries of a 95% confidence interval. (Chuku, 2009)

The first graph in figure 3.1 shows the response of interest rate to an expansionary shock in the broad money supply. here, interest rate fall slightly as broad money supply expand between the first two quarters and quickly within the 8 quarters, slows down and then stabilizes at the new level. This result is consistent to the liquidity theory framework.

The second graph displays the response of interest rate to a shock in overall fiscal deficit-GDP ratio. We observe that a positive innovation in overall fiscal deficit-GDP ratio has a significant positive choking effect on interest rate in the first six quarters and then slows down in the eighth quarter with overall fiscal deficit falling to zero and returning to its natural path in the ninth quarter. Again, this response is consistent with the findings of Gale and Orszag (2003), Qiang Dai and Thomas Phillipon (2004).

Lastly, a positive shock in the inflation rate increases interest rate with the positive effects to the seventh quarter and petering out in the eighth quarter as shown in the third graph.

4.5 VARIANCE DECOMPOSITION RESULT

Variance decomposition showed that inflation rate is a very important source of fluctuations in interest rate, accounting for 15.17% shocks in interest rate after four quarters, while own shocks accounted for 66.64% and fiscal deficit and broad money supply accounted for 13.35% and 4.84% respectively. For broad money supply own shocks accounted for most of the shocks-72.19% while inflation rate accounted for 3.10%. Fiscal deficit and interest rate accounted for 1.57% and 23.14% respectively. This result suggested that inflation can affect interest rate but has little effect on money supply.

4.6 VAR GRANGER CAUSALITY TEST

Table 4.5: Pairwise Granger Causality Tests at Lag 4 (1988 – 2010)

Null Hypothesis	Obs	F-statistic	Probability Values
M2 does not granger cause INT	19	0.83600	0.53251
INT does not granger cause M2	19	0.62811	0.65341
INF does not granger cause INT	19	2.31599	0.12833
INT does not granger cause INF	19	3.14249	0.06462
FD does not granger cause INT	19	1.12910	0.39646
INT does not granger cause FD	19	0.98563	0.45815

The model was estimated using lag four (4) for the variables (interest rates, broad money supply, inflation rate and overall fiscal deficit – GDP ratio). The null hypothesis for both money supply (M2) and interest rate (INT) i.e M2 does not granger cause INT and INT does not granger cause M2 is rejected, which indicates that there exist a bilateral causality between money supply and interest rate. In other words, interest rate can cause money supply and money supply could cause interest rate. Results from the table suggest that the null hypotheses that interest rate (INT) does not granger cause inflation rate (INF) is rejected, which indicates that causality runs from interest rate (INT) to inflation rates (INF) because of the high F-Statistic and low probability value. The same cannot be said of interest rate and overall fiscal deficit-GDP ratio because of the low F-Statistics and high probability values.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

This study had attempted to find out the effect of money supply on interest rates in Nigeria. Economic theory offers two seemingly contradictory views of this relationship. One view, which follows from the interaction of money demand and supply, is that money and interest rates are negatively related: increasing interest rates, for example, requires a decrease in the stock of money. According to this view, money demand is a decreasing function of the nominal interest rate because the interest rate is the opportunity cost of holding cash (liquidity). So a decrease in the supply of money must cause interest rates to increase in order to keep the money market in equilibrium. We call this the liquidity effect view.

Another view, which follows from the Fisher equation, is that money and interest rates are positively related: increasing interest rates requires an increase in the rate of money growth. The Fisher equation states that the nominal interest rate equals the real interest rate plus the expected rate of inflation (Fisher 1896). If monetary policy does not affect the real interest rate (and errors in inflation expectations are ignored), then the Fisher equation implies that higher nominal interest rates are associated with higher rates of inflation. Since in the long run, high inflation rates are associated with high money growth rates; the Fisher equation suggests that an increase in interest rates requires an increase in the money growth rate. We call this the Fisher equation view.

The vector autoregression model was adopted for this research work. This is because; economic theory is often not rich enough to provide a tight specification of the dynamic relationship among variables. Furthermore, estimation and inference are complicated by the fact that endogenous variables may appear on both the left and right sides of the equations. (VAR) is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables.

To avoid spurious result, we First test if the relevant variables i.e prime lending rates, broad money supply, inflation rate and overall fiscal deficit are stationary and to determine their order of integration; we use both the augmented Dickey Fuller (ADF) and Phillip-Perron (PP) test to find the existence of unit root in each of the time series. The

results indicated that, both Augment Dickey Fuller and Phillip-Perron test in levels are not stationary for all the variables in questioned but are stationary at first difference. To have confirmed the stationary of the variables at I(1),we proceed to examine the presence or non-presence of cointegration among the variables. When a cointegration relationship is present, it means that interest rates, broad money supply, inflation rate and overall fiscal deficit share a common trend and long-run equilibrium as suggested theoretically. We started the cointegration analysis by employing the Johansen cointegration test. The result suggested that there is no cointegrating (long-run) relation among the variables. Then nonexistence of the co-integrating relationship implies that the variables does share mutual stochastic trend and are not linked in a common long-run equilibrium.

The findings from the vector autoregressive estimation show that the explanatory variables account for approximately 76 percent variation in interest rate in Nigeria during the period under review. The broad money supply (our variable of interest) is statistically insignificant but economically significant for the two lagged periods. This evidence of short term analyzes support liquidity theory framework. When money supply increases, interest rates decline in the first step. This evidence implicates that the income, price and price expectations effects are not robust in the short term. The policy implication of these results is that the monetary authorities can control interest rates by manipulating money supply in the short run, but this is not possible in the long run due to income, price and price expectations effects.

Furthermore, the estimation revealed that overall fiscal deficit-GDP ratio is statistically significant and positively related. The policy implication of these results is that Deficits financing leads to huge debt stock and tends to crowd-out private sector investment, by reducing the access of investors to adequate funds, thereby raising interest (lending) rates. The rise in interest rate reduces investment demand and output of goods and services. These in turn reduce national income as well as employment rate, and the overall welfare of the people would decline. Thus, government should make efforts to reduce unnecessary spending, because experience has shown that a large proportion of government expenditures have been channeled to unproductive ventures. Obo and Nurudeen (2009).

To analyze the relationship between money supply and interest rate in Nigeria under the review period, pair wise granger causality tests at lag 4 was used for the variables (interest rates, broad money supply, inflation rate and overall fiscal deficit – GDP ratio). The granger causality results suggested that there exist a bilateral causality between money supply and interest rate. The same cannot be said of inflation rate and overall fiscal deficit-GDP ratio because of the low F-Statistics and high probability values.

REFERENCES

- Alvarez, Fernando; Lucas, Robert E., Jr.; and Weber, Warren E. (2001). Interest rates and inflation. *American Economic*
- Armour and Fung.(1996).“Overnight Rate Innovations as a Measure of Monetary Policy Shocks.” Working Paper No 96-4. Bank of Canada.
- Baillie, R.T. and T. Bollerslev (2000), ‘The forward premium anomaly is not as bad as you think,’ *Journal of International Money and Finance*, vol.19
- Bansal, R. and M. Dahquist (2000), ‘The forward premium puzzle: Different tales from developed and emerging markets,’ *Journal of International Economics*, vol.51
- Barnhart, S.W., R. McNown, M.S. Wallace (1999), ‘Non-informative tests of the unbiased forward exchange rate,’ *Journal of Financial and Quantitative Analysis*, vol.34
- Central Bank of Nigeria Communiqué No. 69 of the Monetary Policy Committee Meeting, April 15, 2010
- Central Bank of Nigeria Communiqué No. 70 of the Monetary Policy Committee Meeting, May 10-11, 2010
- Central Bank of Nigeria Communiqué No. 71 of the Monetary Policy Committee Meeting, July 5, 2010
- Central Bank of Nigeria Communiqué No. 72 of the Monetary Policy Committee Meeting, September 21, 2010
- Charles and Fuerst (1995). ‘Interest rate rules vs. Money growth rules: A welfare Comparison in a cash-in-advance economy
- Christensen, M. (2000), ‘Uncovered interest parity and policy behavior: New evidence,’ *Economics Letters*, vol..69
- Christiano, Eichenbaum, (1992). "Interest Rate Smoothing in an Equilibrium Business Cycle Model," Northwestern University, *Unpublished Manuscript*,
- Chuku (2009)“ Measuring the effects of monetary policy innovations in Nigeria: a structural vector autoregressive (svar) approach” *African Journal of Accounting, Economics, Finance and Banking Research Vol. 5. No. 5. 2009*.
- Cochrane, J. (1994). “Shocks.” *Carnegie-Rochester Conference Series on Public Policy* **41**.
- Cooley, T. and S. Leroy. 1985. “Atheoretical Macroeconometrics: A Critique.” *Journal of Monetary Economics*.
- Cornell, B., (1989), ‘The impact of data errors on measurement of the foreign exchange risk premium,’ *Journal of International Money and Finance*, vol.8

- Engel, C. (1996), 'The forward discount anomaly and the risk premium: A survey of the recent Evidence,' *Journal of Empirical Finance*, vol.3
- Fama, E.F., (1984), 'Forward and spot exchange rates,' *Journal of Monetary Economics*, vol.14
- Filosa, R. 1995. "Money Demand Stability and Currency Substitution in Six European Countries 1980 to 1992)." Working Paper No. 30 Bank for International Settlements.
- Flood, R.P. and A.K. Rose (1996), 'Fixes: Of the forward discount puzzle,' *Review of Economics and Statistics*, vol.78
- Flood, R. P and A K Rose (2002), 'Uncovered Interest Parity in Crisis,' *IMF Staff Papers*, vol. 49
- Frankel, J.A. and K.A. Froot, (1990), 'Exchange rate forecasting techniques, survey data, and Implications for the foreign exchange market.
- Froot, K.A. and J.A. Frankel, (1989), 'Forward discount bias: Is it an exchange risk premium?' *Quarterly Journal of Economics*, vol.104
- Froot, K.A. and R.H. Thaler, (1990), 'Anomalies: Foreign exchange,' *Journal of Economic Perspectives*, vol.4
- Fung and Gupta (1994). "Searching for the Liquidity Effect in Canada." Working Paper No.94-12. Bank of Canada.
- Gale, W. G. and Peter, O. (2003) "Economic Effects of Sustained Budget Deficits", *National Tax Journal* vol. 56 No. 3,
- Gbenedio, Ayadi, Okpala, and Amon (1999) 'Money supply variability and interest rate spread in developing economies: the case of Nigeria': *International Journal of Commerce and Management*
- Granger, C.W.J. (1981). "Some Properties of Time Series Data and their Use in Econometric Model Specification", *Journal of Econometrics*.
- Granger, C.W.J. and Lee, T. (1990), "Multicointegration", in Rhodes, G. F. and Fomby, T. B., *Advances in Econometrics*, Vol.8
- Ho, Y. (1983), "Money Supply and Equity Prices: An Empirical Note on Far Eastern Countries", *Economic Letters*.
- Hogan, W. P., Sharpe, I. G. and Volkar, P. A. (1982), "Capital Market Efficiency and the Relationship between Equity Returns, Interest Rates, and Monetary Aggregates in Australia", *Journal of Economics and Business*.
- Johansen, S. (1988a), "The Mathematical Structure of Error Correction Models", *Contemporary Mathematics*.

- Johansen, S. (1988b), "Statistical Analysis of Cointegration Vector", *Journal of Economic Dynamics and Control*.
- Johansen, S. (1995), "Likelihood-inference in Cointegrated Vector Auto-regressive Models", Oxford: OUP.
- Jones, J.D. and Uri, N. D., (1987) "Money Supply Growth, Stock Returns and the Direction of Causality", *Socio-Econ. Plann. Sci., Volume 21*
- Kaul, G. (1990), "Monetary Regimes and the Relation between Stock Returns and Inflationary Expectations", *The Journal of Financial and Quantitative Analysis, vol. 25*.
- Kraft, J. and Kraft, A. (1977), "Determinants of Common Stock Prices: A Time Series Analysis", *The Journal of Finance, Vol.32*.
- Kwon, C.S and Shin, T. S. (1999), "Cointegration and Causality between Macroeconomic Variables and Stock Market Returns", *Global Finance Journal*.
- Lastrapes, W. and G. Selgin. 1995. "The Liquidity Effect: Identifying Short-Run Interest Rate Dynamics Using Long-Run Restrictions." *Journal of Macroeconomics 17*.
- Lucas, Robert E., Jr. (1980). Two illustrations of the quantity theory of money. *American Economic Review*
- Lucas, Robert E., Jr., and Stokey, Nancy L. (1987). Money and interest rates in a cash-in-Advance Economy. *Econometrical*
- Luvigson, S., Steindel, C. and Lettau, M. (2002), "Monetary Policy Transmission through the Consumption Wealth Channel", *Federal Reserve Bank of New York*.
- Manzur, M, Wong, W.K. and Chau, I.C. (1999), "Measuring international competitiveness: experience from East Asia", *Applied Economics*
- Marcus Hagedorn (2009) 'Money, Interest Rates and Strong Liquidity Effects' *university of Zurich*
- Matsumura, E M, Tsui, K. W. and Wong, W. K. (1990) An Extended Multinomial-Dirichlet Model for Error Bounds for Dollar-Unit Sampling, *Contemporary Accounting Research*.
- Maysami, R. C. and Koh, T. S. (2000), "A Vector Error Correction Model of the Singapore Stock Market", *International Review of Economics and Finance*
- McCandless, George T. Jr., and Weber, Warren E. (1995). Some Monetary Facts. *Federal Reserve Bank of Minneapolis Quarterly Review*
- Mishkin, Frederic S. (1989) *The Economics of Money, Banking and Financial Markets*. Second Edition, Scot, Foresman and Company, Boston.
- Mokerjee, R. and Yu Q. (1997), "Macroeconomic Variables and Stock Prices in a Small Open Economy: The case of Singapore". *Pacific-Basin Finance Journal*

- Mukherjee, T. K. and Naka, A. (1995), "Dynamic relations between macroeconomic variables and the Japanese stock market: an application of a vector error-correction model", *The Journal of Financial Research*.
- Nasseh, A. and Strauss, J. (2000), "Stock Prices and Domestic and International Macroeconomic Activity: a Cointegration Approach", *The Quarterly Review of Economics and Finance*.
- Obi and Nurudeen (2009). "Do fiscal deficits raise interest rates in nigeria? A Vector auto regression approach. *Journal of Applied Quantitative methods*
- Occhino, Filippo. (2000). Heterogeneous investment behavior and the persistence of the Liquidity effect. Ph.D. dissertation. University of Chicago.
- Pender Gbenedio, O. Felix Ayadi, Amon Okpala, (1993) "money supply variability and interest rate spread in developing economies: the case of nigeria", *International Journal of Commerce and Management*
- Poloz, S. 1984. "The Transactions Demand for Money in a Two-Currency Economy." *Journal of Monetary Economics*.
- Poloz, S. 1986. "Currency Substitution and the Precautionary Demand for Money." *Journal of International Money and Finance*.
- Rich, Jennifer L. (2001). Brazil: Rate increase. *World Business Briefing: Americas*. New York Times
- Sack, B. (1998). "Uncertainty, Learning, and Gradual Monetary Policy [Finance and Economic Discussion Series No. 1998-34]". Washington: Board of Governors of the Federal Reserve System.
- Sargent, T. and N. Wallace. 1975. "'Rational' Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule." *Journal of Political Economy*.
- Sims, C. 1980a. "Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered." *American Economic Review*.
- Sims, C. 1980b. "Macroeconomics and Reality." *Econometrica*
- Sims, C. 1986. "Are Forecasting Models Usable for Policy Analysis?" Federal Reserve Bank of Minneapolis *Quarterly Review*.
- Sims, C. 1992. "Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy." *European Economic Review*.
- Stock, J. and M. Watson. 1993. "A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems." *Econometrica* .
- Taylor, John B. (1993). Discretion versus policy rules in practice. *Carnegie-Rochester Conference Series on Public Policy*

APPENDIX A

MONEY SUPPLY IN NIGERIA (1988 - 2010)

YEARS	M1	M2	C.OUTSIDE	
			BANK	D.DEPOSIT
1988	22232.1	45446.9	5463.6	12818.5
1989	26268.8	47055	9760.6	16508.2
1990	39156.2	68682.5	149511	24295.1
1991	50071.7	87487.6	23120.6	26951.1
1992	75970.3	129085.4	36755.5	39214.7
1993	118753.4	198519.1	57845.1	60908.3
1994	169391.5	266944.9	906010	78790.5
1995	201414.5	318763.5	106843.4	94571
1996	227464.4	370333.5	116121	111343.4
1997	268622.9	429731.4	130668	137954.9
1998	318576	525637.6	156716.1	161859.9
1999	393078.8	699733.7	186456	206622.8
2000	637731.1	1036079.5	274010.6	363720.6
2001	816707.6	1315869.1	338671.2	478036.5
2002	946253.4	1490457.6	386942.3	559311.1
2003	1225559.3	1862604.6	412155.2	813404.1
2004	1330657.8	2097049.6	458586.5	872071.3
2005	1725395.8	2814846.1	563232	973772.8
2006	2280618.9	2814846.1	690841.5	1244163.5
2007	3116272.2	56726224	737867.2	2378404.9
2008	3857541.5	89602877	8929078	3964636.7
2009	5422502.30	10767377.80	4076630.10	5763511.20
2010	5724242.10	11142651.40	892330.10	4381912.00

Source: Computed from CBN statistical bulletin of various years

APPENDIX B

Variables Considered for Vector Autoregression Analysis

Years	Prime Lending Rate	Broad Money Supply	Inflation Rate	Overall Fiscal Deficit-GDP Ratio
1988	16.5	33.3	38.3	-0.04416
1989	26.8	8.5	40.9	-0.05129
1990	25.5	40.41	7.5	-0.0673
1991	20.0	32.74	13.0	-0.1088
1992	29.8	49.83	44.5	-0.11721
1993	32.2	53.76	57.2	-0.31452
1994	24.5	42.45	57.0	-0.20355
1995	20.2	12.75	72.8	0.002836
1996	19.1	16.18	29.3	0.087276
1997	18.4	14.4	8.5	-0.01323
1998	18.26	25.72	10.0	-0.34337
1999	21.3	29.52	6.6	-0.72526
2000	21.25	48.7	6.9	-0.25168
2001	26.0	26.8	18.9	-0.51194
2002	20.6	21.58	12.9	-0.66713
2003	19.6	24.11	23.8	-0.40954
2004	18.9	56.97	10.0	-0.32716
2005	17.8	87.45	11.6	-0.28723
2006	17.3	98.2	8.5	-0.17018
2007	16.9	62.33	6.6	-0.19431
2008	16.1	63.38	15.1	-0.27654
2009	19.0	85.14	12.6	-0.26253
2010	16.11	82.0	12.6	-0.26253

Source: Central Bank of Nigeria (Various Issues).

APPENDIX C

GRANGER CAUSALITY RESULT

Pairwise Granger Causality Tests

Date: 02/09/11 **Time:** 22:27

Sample: 1988 2010

Lags: 4

Null Hypothesis:	Obs	F-Statistic	Probability
M2 does not Granger Cause INT	19	0.83600	0.53251
INT does not Granger Cause M2		0.62811	0.65341
INF does not Granger Cause INT	19	2.31599	0.12833
INT does not Granger Cause INF		3.14249	0.06462
FD does not Granger Cause INT	19	1.12910	0.39646
INT does not Granger Cause FD		0.98563	0.45815

APPENDIX D

RESULTS OF VECTOR AUTO-REGRESSION

Vector Autoregression Estimates

Date: 02/05/11 Time: 14:11

Sample(Adjusted): 1990 2010

Included Observations: 21 after adjusting endpoints

Standard Errors in () & t-statistics in []

	INT	M2	INF	FD
INT(-1)	0.523920 (0.20738) [2.52633]	-1.033119 (1.31357) [-0.78650]	0.313872 (0.81038) [0.38731]	-0.004312 (0.01234) [-0.34956]
INT(-2)	0.178377 (0.18624) [0.95776]	-1.788933 (1.17968) [-1.51646]	3.056291 (0.72778) [4.19949]	0.002456 (0.01108) [0.22171]
M2(-1)	-0.022168 (0.03810) [-0.58177]	0.824616 (0.24135) [3.41667]	0.139534 (0.14890) [0.93712]	0.001198 (0.00227) [0.52843]
M2(-2)	-0.056425 (0.04238) [-1.33147]	-0.319011 (0.26842) [-1.18846]	-0.011862 (0.16560) [-0.07163]	0.001429 (0.00252) [0.56671]
INF(-1)	0.072196 (0.05797) [1.24537]	0.407520 (0.36719) [1.10983]	0.568405 (0.22653) [2.50917]	0.001028 (0.00345) [0.29814]
INF(-2)	-0.211972 (0.05546) [-3.82196]	-0.340816 (0.35130) [-0.97017]	-0.481170 (0.21672) [-2.22020]	0.006523 (0.00330) [1.97715]
FD(-1)	10.60839 (4.21064) [2.51943]	-14.20847 (26.6703) [-0.53274]	11.54287 (16.4537) [0.70154]	0.224958 (0.25045) [0.89820]
FD(-2)	-0.124802 (3.89108) [-0.03207]	11.82001 (24.6462) [0.47959]	11.75102 (15.2049) [0.77284]	-0.082049 (0.23145) [-0.35450]
C	15.19679 (4.75850) [3.19361]	82.19901 (30.1405) [2.72719]	-51.67215 (18.5945) [-2.77889]	-0.474371 (0.28304) [-1.67597]
R-squared	0.758073	0.725030	0.816863	0.616948
Adj. R-squared	0.596789	0.541717	0.694771	0.361581
Sum sq. resids	91.69413	3678.766	1400.135	0.324417
S.E. equation	2.764268	17.50897	10.80176	0.164422
F-statistic	4.700221	3.955147	6.690569	2.415922
Log likelihood	-45.27404	-84.03872	-73.89563	13.98991
Akaike AIC	5.168956	8.860830	7.894821	-0.475229
Schwarz SC	5.616608	9.308483	8.342474	-0.027577
Mean dependent	20.89619	46.40095	21.29524	-0.264409