With these expansionary and contractionary measures, the government of Nigeria through its central bank, should continuously supply that elusive optimal quantity of money that will support non- inflationary and deflationary economic growth and promote macro- economic policy (i.e. price stability, increased balance of payment (BOP), favourable terms of trade (TOT), high level of employment labour force, output growth etc. As excessive money supply leads to inflation whereas excessive reduction in credit supply leads to deflation. So to avoid both inflationary and deflationary negative effects, it is advisable to maintain money supply at an optimal and moderate rate.

2.2.6 FACTOR THAT HAVE MILITATED AGAINST THE EFFECTIVENESS OF MONETARY POLICY IN NIGERIA

Several research work and efforts have revealed that monetary policy trusts are constrained by various internal and external factors. And these factors inhibit the effectiveness of monetary policy in Nigeria. The factors include:-

- **Political Instability**

The results in instability in the macro-economy increased risks in holding domestic financial assets, high level of capital flight and mostly policy somersaults. Frequent coups, violent change in government, dictatorship and the low level of participatory democracy sustain the ineffective environment for the financial system especially with regard to its ability to perform its intentional roles.

- **Under-Developed Financial Infrastructure**

In most of the rural areas, there are absence of financial institutions which should mobilize financial resources for the success of the financial market. There exists a large sector of economy whose activities are not influenced by the monetary policy.

- **High Marginal Propensity to Import**

Monetary expansion results in increase import and favourable balance of payment, loss international reserves, pressure on the exchange rate etc. The marginal propensity to import is high while production is concentrated in few exports products.

- **Fiscal Deficit**

The financing of large fiscal deficit of the government by the banking system over the years also constraints monetary policy and implementation, It is noteworthy that between 1990 and 1993, the level of federal deficit increases tremendously and resulted in a high level of growth in monetary aggregates. This put excessive pressure on money supply. The monetary authorities thus; were constrained in controlling general level of prices through the use of monetary policy instruments.

- **Inadequate bank data**

Due to various institution malfunctioning and inefficiencies, bank data on these aggregate are inadequate and most times outdated. This policy formulation and implementations are very difficult to be realized.

2.2.7 DEFINITION OF ECONOMIC GROWTH

Economic growth is the increase in the market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real Gross Domestic Product, (GDP). Of more importance it is the growth of the ratio of GDP to population, which is also called per capita income. Growth is usually calculated in real terms i.e., inflation-adjusted terms – to eliminate the distorting effect of inflation on the price of goods

produced. In economics, "economic growth" or "economic growth theory" typically refers to growth of potential output, i.e., production at "full employment".

Economic growth can also be an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. Economic growth can be measured in nominal terms, which include inflation, or in real terms, which are adjusted for inflation. It is also defined as an increase in the production and consumption of goods and services, its occurs when there is an increase in the multiplied product of population and per capita consumption, it is often indicated by an increasing real Gross Domestic Product (GDP) or real Gross National Product (GNP). Economic growth is an increase in real GDP. It means an increase in the value of goods and services produced in an economy. The rate of economic growth measures the annual percentage increase in real GDP.

According to Herrick and Kindleberger (1983) economic growth involves the provisions of inputs that lead to greater outputs and improvements in the quality of life of a people. Jhingan (1985) refers to it as a quantitative and sustained increase in a country's per capita output or income accompanied by expansion in its labour force, consumption, capital and volume of trade and welfare. According to Todaro (1977) and the World Bank (1997) to determine the growth of any country's economy certain indicators are usually taken into consideration.

These indicators include: (i) the nation's Gross Domestic Product (GDP); (ii) the nation's per capita income (iii) the welfare of the citizens; and (iv) the availability of social services and accessibility of the people to these services. Gross Domestic Product refers to the total output of final goods and services produced in a country during any given period of time by residence of a country irrespective of their nationality.

According to Calamitsis (1999), Hernandez-Cata (1999) Ouattara (1999) and Dollar and Kraay (2001) the progress in the above indicators are better determined by the following factors; good rule of law, a well-defined property rights for landholders and informal entrepreneurs, openness to international trade, developed financial markets that strengthens savings mobilization and inter-mediation and promote sound banking systems, macroeconomic stability, moderate size of government, political stability and security of life, a capable and efficient civil service, a transparent and predictable and impartial regulatory and legal system, and good governance with emphasis in tackling corruption and inefficiency and in enhancing accountability.

2.2.8 ADVANTAGES OF ECONOMIC GROWTH

- **Higher living standards:** this implies an increase in real income per head of population.
- **Employment effects:** growth stimulates more jobs to help new people as they enter the labour market.

2.2.9 DISADVANTAGES OF ECONOMIC GROWTH

There are economic and social costs of a fast-expanding economy.

- **Inflation risk:** If demand races ahead of aggregate supply the scene is set for rising prices. Many fast growing developing countries have seen high rates of inflation in recent years, a good example is India.
- **Working hours:** sometimes there are fears that a fast-growing economy places increasing demands on the hours that people work and can upset work-life balance.
- **Structural change:** although a growing economy will be creating more jobs, it also leads to structural changes in the pattern of jobs. Some industries will be in decline whilst others will be expanding. Structural unemployment can rise even though it appears that a country is growing – the labour force needs to be occupationally mobile.

2.2.10 LIMITATION TO THE RATE OF ECONOMIC GROWTH

- **Infrastructure**

Infrastructure includes capital such as ports, transport networks, energy, power and water supplies and telecommunications networks. Poor infrastructure hampers growth because it causes higher costs and delays for businesses, reduces the mobility of labour and hits the ability of export businesses to get their products to international markets. A good example is India whose future growth is often said to be threatened by structural weaknesses in her infrastructure. Many countries will need to increase their spending on infrastructure in the years ahead to adapt to and deal with the consequences of climate change.

- **Corruption and poor governance**

This is a crucial factor for many developing countries. High levels of deeply embedded corruption and bureaucratic delays can harm growth in many ways for example inhibiting inward investment and also making it more likely that domestic businesses will invest overseas rather than at home. Governments need a stable and effective legal framework to collect taxes to pay for public services.

- **Declining and/or ageing population**

In some countries the actual size of the population is declining partly as a result of net outward migration. If a nation lost many younger workers this can have a damaging effect on growth. The changing age-structure of a population also matters.

- **Excessive borrowing**

This feature is common in fat-growth phases for richer developed countries. In particular we have seen in recent years a huge rise in personal sector borrowing and debt, much of it linked to easy credit availability and rising property prices. When a housing bubble bursts and house prices fall, many thousands find themselves in deep trouble.

2.2.11 SOME FACTORS THAT LEADS TO AN INCREASE IN ECONOMIC GROWTH

- Increased investment in physical capital such as factories, machinery and roads will lower the cost of economic activity.
- An increase in the labour force this means larger population and manpower, however, this could lead to high unemployment.
- An increase in investment in human capital can improve the quality of the labour force. A skilled labour force has a significant effect on growth.
- Improvement of technology. This could increase productivity with the same levels of labour, thus accelerating growth and development.

2.3 THEORETICAL FRAMEWORK

2.3.1 THEORIES OF MONEY SUPPLY

2.3.2 THE MONETARIST VIEW OF QUANTITY THEORY OF MONEY

The monetarists used the quantity theory of money as the framework for explaining the relationship between money supply and the price level. According to Jhingan (2006), the Monetarists emphasize the role of money as the principal cause of demand-pull inflation. They contend that inflation is always a monetary phenomenon. Price tends to rise when the rate of increase in the money supply is greater than the rate of increase in real output of goods and services (Johnson, 1973).

Ayodele and Emmanuel (2005), assumes that the price level will change proportionately with changes in the quantity of money. This belief is often summed up in the phase, "money is in the long run-neutral". The rate of money creation is reflected in the rate of inflation in the long run. It further posits the existence of the classical dichotomy between relative and absolute price determination. The crude quantity theory, focusing on long-run relationship, posit that the theory of value explains the relative prices (because they are determined in the real sector) while monetary theory explains absolute prices. A change in the quantity of money will only change the general level of absolute prices; it will not affect output or relative prices (Lucket, 1980).

According to Glahe (1977), it must be noted that the monetary conclusion is based on the joint validity of a particular assumption about the demand for and supply of money. They are both assumed to be perfectly interest elastic. This is what is referred to as the exogeneity of money.

The Monetarist's contention hence goes thus: given the level of real money supply and the level of demand for money at certain income levels, money do not change alone with changes in the level of interest rate. For the derivation of the general equilibrium, the equilibrium in the real (goods) market is needed which together with the money market equilibrium, yield the general equilibrium level which is referred to as the aggregate demand in the economy, while the full employment level yields what is referred to as aggregate supply level. Therefore, national income and price are determined by the equilibrium of aggregate demand and supply (Omofa, 2000).

An increase in the equilibrium in the goods market will only lead to an increase in the rate of interest with little or no impact on the income and price level. It can thus be said that the impact of fiscal policy is not necessary since it may not yield the desired result. If on the other hand, nominal money supply is increased through Central Bank, it will result in an increase in the money market equilibrium. This now meets the original equilibrium in the goods market at full employment which results in a higher aggregate demand than when fiscal policy was embarked

upon. As a result of this decision, aggregate demand meets aggregate supply at a higher level of national income and price level (Omofa, 2000).

The quantity theorists established a direct relationship between money supply and price level. Thus, the monetarists employ the familiar identity of Fisher's equation of exchange:

MV=PQ

Where;

M = Money supply

V = Velocity of money in circulation

P = Aggregate price level

Q = Level of real output/aggregate output.

Assuming V and Q as constant, the price level (P) varies proportionately with the supply of money (M). With flexible wages, the economy was believed to operate at full employment levels. The labour force, the capital stock, and technology also change only slowly over time.

Consequently, the amount of money spent did not affect the level of real output so that a doubling of the quantity of money will result simply in doubling the price level. Until price has risen by this proportion, individuals and firms would have excess cash which they would spend, leading to rise in prices. So inflation proceeds at the same rate at which the money supply expands (Jhingan, 2006).

2.3.3 THE MONETARIST HYPOTHESES (MH)

While reflecting on the quantitative theory of money, it is argued in this hypothesis that the pattern of real economic activity requires a certain desired level of real money balances, and the price level is controlled by the nominal money supply. The logic behind this position is that given

the nominal money supply exogenously determined by the monetary authority, price level is determined at the unique level of prices that will make the purchasing power of the money supply equal to the desired level of real balances.

In practical terms, it means the central bank seeks to ensure the quantity of money agents want for their transactions. If the nominal money supply differs from the desired real balances at a given price level, it will translate into changes in that price level. Hence, the price level has to be fully flexible and determined exclusively by the exogenous nominal money supply. In relation to fiscal policy, the nominal money supply could change due to the use of seigniorage as a main source of financing for public expenditure, or as the result of an open market operation in which the central bank purchases interest-bearing government debt. Since these two money expansion mechanisms may have different repercussions for taxes and the stock of government debt, they may lead to different effects on prices or interest rates.

The budget deficit and its subsequent financing through money creation (seigniorage) are regarded as exogenous to the monetary authority. Hence, money growth would be dominated by the government's financing requirements, and the price level increases as result of that monetary expansion. From an empirical point of view, in terms of tile deficit-money growth-inflation system, it means the first two variables in the system have to satisfy the weak exogeneity property, while the later has to be determined endogenously. Consequently, with a monetarist approach, there is expected to be a positive correlation between monetary growth and inflation.

2.3.4 THE KEYNESIAN VIEW

The Keynesian school of thought is usually referred to as demand side economist. Keynes economic theory proposes that changes in money supply will not directly affect price and that visible inflation is the result of pressure in the economic expressing itself in price. Keynes emphasizes that increases in aggregate demand are the source of demand-pull inflation. There

may be more than one source of demand. Consumers want more goods and services for consumption purposes. Businessmen want more inputs for investment. Government demands more goods and services to meet civil and military requirements of the country. Thus, the aggregate demand comprises consumption, investment and government expenditure. Thus, Keynesian model is given as;

Y=C+I+G (for a close economy)

Where;

Y = Aggregate Demand

C = Private Domestic Consumption

I = Investment

G = Government Expenditure

Inflation according to the Keynesian school of thought arises from excessive aggregate demand over aggregate supply, particularly when the economy operates at the level of full employment resources. Keynes rejected the quantity theory of money, which revolves around the Fisher's equation of exchange which is as stated earlier. He argued that an increase in the money supply would not inevitably lead to an increase in the price level. Increasing M(money supply) may instead lead to a decrease in V(velocity of money in circulation), in order words, the average speed of circulation of money could fall because there was more of it in the system.

Alternatively the increase in M may lead to an increase in T (number of transactions) because as we have seen Keynes disputes the assumption that the economy will find its own equilibrium. It may be in the position where there is insufficient demand for full-employment equilibrium and in that case increasing the money supply will fund extra demand and move the economy closer to

full employment. Keynes tends to argue that inflation is more likely to be cost-push or from an excess level of demand, which is termed demand-pull inflation (Robert 1988).

Some Keynesian economists also disagree with the notion that the central bank fully controls the money supply, arguing that central banks have little control, since the money supply adapts to demand for bank credit issued by commercial banks. This is known as the theory of "endogenous money" and has been advocated strongly by post-Keynesians as far back as the 1960s. It has today become a central focus of "Taylor rule" advocates. This position is not universally accepted-banks create money by making loans but the aggregates volume of these loans diminishes as real interest rate increase. Thus, central bank can influence money supply by making money cheaper or more expensive, thus increasing or decreasing its production (Robert 1988).

The money supply is also thought to play a major role in determining levels of more moderate levels of inflation, although there are differences of opinion on how important this role is for example, the monetarists believe that the link is very strong. But Keynesian economists emphasize the role of aggregate demand in the economy rather than the money supply in determining inflation, that is, for Keynes the money supply is only one determinant of inflation. The fundamental concept in inflation analysis is the relationship between inflation and unemployment. This relationship is sometimes expressed in terms of the "Philips curve". The models suggest that there is a trade off between price stability and employment. Therefore some level of inflation could be considered desirable in order to minimize unemployment. The Philips curve model described the US experience well in the 1960s but failed to describe the combination of rising inflation and economic stagnation (sometime refer to as stagflation) experience in the 1970s (Chatham, 2008). Thus, (Blanchard 2000) describes inflation analysis using a Philips curve that shifts (so that the trade-off between inflation and unemployment changes) because of such matters as supply shock and inflation becoming built into the normal workings of the economy.

The former refers to such events as the oil shocks of the 1970s while the latter refers to the price/wage spiral and inflationary expectations implying that the economy "normally" suffers from inflation. Thought in the case of the monetarist, Keynes did not believe in a single cause of inflation. His analysis allows other factors besides change in money supply to affect the aggregate demand and supply curve such as fiscal policy and supply shocks.

2.4 EMPIRICAL LITERATURE

Money supply plays an important role in boosting the economic growth of any country provided money is exogenously determined in the economy. Its impact on the economy has been widely examined in the developed and developing countries in the context of monetarists and Keynesians controversies, Abbas and Husian (2006). The supply of money at any period of time has the tendency to influence prices and income level in an economy and it is an important macroeconomic variable that policy makers must keep a check on.

The Monetarists claim that money plays an active role and leads to changes in income and prices. In other words, money plays an active role in determining prices and income, i.e changes in income and prices in an economy are mainly caused by the changes in the stock of money supply. This implies that money supply is unidirectional to income and price.

The Keynesians, on the other hand, argue that money does not play an active role in changing income and prices. That is,money supply do not play a leading role in determining income and price. The Keynesians believed that income plays a leading role to changes in money supply,i.e.there exists a unidirectional relationship between income and money. Similarly, changes in prices are mainly caused by structural factors.

The causal relationship between money and income and between money and prices has been an important area of investigation in economics particularly after the provocation paper of Sims (1972). Based on Grager causality, he developed a test of causality to examine the causal

relationship between money and income. He found the evidence of uni-directional causality from money to income as claimed by the monetarists that is any changes in money supply will automatically change income and this is contrary to the ideas of the Keynesians.

Barth and Bannett (1974) replicating Sim's test in the Canadian economy showed a bi-directional causality between income and money. The bi-directional causality stated by Barth and Bannett(1974) went in line with the view of the Keynesians stating that income plays an active role in determining money supply.

Williams's et al (1976) applying Sim's procedure in the United Kingdom found the evidence of uni-directional causality from income to money, and also pinpointed that there exist a uni-directional causality between money and price. Williams's ea al observed that money supply causes a significant change in income and price for instance, expansion of the stock of money supply fuels income and price.

Brillembourg and Khan (1979) using a longer data set supported Sim's findings and established a uni-directional causality from money to income and prices. Their findings were in line with the Monetarists.

However Dyreyes et al (1980), examining the pattern of causality between money and income for six industrialized countries and indicated a bi-directional causality,that is money supply do not play a significant role in determining income and prices, contrary to sim's (1972) and Brillembourg and Khan (1979). Similarly, they pinpointed a uni-directional causality from money to income in Canada contrary to Barth and Bannett (1974). However their findings of uni-directional casualty from income to money in the United Kingdom were in line with Williams et al (1976).

Aziakpono (2003) presents and tests a model to determine either or both anticipated and unanticipated money effects real output and growth in Nigeria. The evidence reveals that while anticipated money supply affects real output and growth in Nigeria, the unanticipated money do not. Aziakpono (2003),stated that money looked forward to or in expectation affect output and growth because the money will act positively in advance and benefit output and the growth rate in an economy.

Das (2003) examined the long run relationship between money and output in Indian and provided the evidence that money unidirectional affects output which affects growth as well. Das (2003),is concluding that money supply significantly affect output that affect growth rate as well.

Ashra et el (2004) examines the relationship between money supply and economic growth in Indian and indicates that there exists a bi-directional causality between money and price level.

Nwankwoeze (2011), examined the impact of money supply on economic growth in Nigeria, using the ordinary least square (OLS) techniques with the aid of Stata 10 software package, and indicates that real interest rate and real exchange rate in Nigeria within the period (1981-2010) failed to influence real Gross Domestic Product while broad money supply being the only significant regressor influenced real Gross Domestic Product (real GDP) within the period under study.

According to Fisher (1932), as money supply changes, the price level and output changes likewise the value of money(purchasing power),for instance, if there is a decrease in money supply, prices and output may likely decrease and this will lead to deflation that is a decrease in purchasing power and vice versa.

Asogun (1998) examined the influence of money supply and government expenditure on gross domestic product. He adopted the Saint Louis model on annual and quarterly time series

data from 1960-1995. He finds money supply and export as being significant on the determinant of economic growth in the Nigerian economy,that is money supply plays an active role in determining the rate of growth. The result indicated that unanticipated growth in money supply would have positive effect on output,that is unexpected or unlooked-for money supply will affect output positively.

Steve (1997) and Domingo (2001), explains that there may not be possibility of economic growth without an appropriate level of money supply credit and appropriate financial conditions in general. Reducing money stock through increased interest rates would lower Gross National Product (GNP). Based on their findings, economic growth can not be fully attained without appropriate stock of money supply and financial condition and that a decrease in money supply lowers the Gross National Product.

Montiel (1995), Emernuga (1996) and Osikoya (1992) all submitted that possible effects of financial debt (money in circulation) on economic growth can manifest in three channels: Improved efficiency of financial inter mediation,Improved efficiency of capital stock and Increases national savings rate.

Masha Iya bode (1999) opined that, in the latter 1980's as a result of Structural Adjustment Program, the effects of wage increases created a cost-push effect on inflation which in the long run, was a structural feature of the economy coupled with the growth in money supply. Masha Iya bode (1999), indicated that increase in wages allows for an increase in Aggregate Supply faster than that of the Aggregate Demand because there exists a rising production cost and higher cost of raw materials and this pushes up prices in order for the firms to maintain their profit margin.

A similar study of Kuwait, where a money supply model was tested, indicated that the

factors that determine the stock of money in Kuwait are not government infections into the economy and capital outflows. The central banks actions in an attempt to control the money supply in Kuwait seem ineffective since the monetary authorities have no control over government expenditures and exports in Kuwait. Here, government infections into the economy and capital outflows do not determine the stock of money supply because of the ineffectiveness of the monetary authorities over government spending and export.

Ogunmuyiwa and Ekone (2010) investigated the relationship between money supply and economic growth in Nigeria by using the data for the period 1980-2006. The study employed OLS and error correction mechanism in order to check the relationship while Granger causality test for checking the causality. The study found that economic growth is influenced by the level of money supply in the economy,that is, the stock of money supply determines the extent of economic growth in Nigeria within the stated period.

In general, to assess the use of monetary policy, through empirical research, in controlling money supply in Nigeria, considering the monetary policy formation as the most important active policy of central bank because of its impact on economic development. It is concluded that the greatest problem of attaining the policy objectives in Nigeria is the governments over increasing expenditure year to year, which is contradictory to the objective of dampening inflationary pressure in the economy. Hence, it is a priority expected that money supply in the Nigerian economy would be positively correlated with GDP and the general price level.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 SOURCES AND METHOD OF DATA COLLECTION

This chapter aims at choosing the methods that will be used to 38determine the efficacy of money supply on the economic growth. Secondary data will used to get expected and reliable information and sources will be from the CBN statistical bulletin. Thus multiple regressions will be used.

3.2 MODEL SPECIFICATION

The specification of econometric model is based on econometric theory and on any valuable information relating to the phenomenon being stated. It is observed that there exist a relationship between economic growth, exchange rate, money supply and inflation rate and government expenditure.

In showing this relationship, the below model will be specified:

GDP = F (XCHR, M2, INF,GEXPD).....3.0

Equation 3.0 reads that Real Gross Domestic Product (Real Per Capita Growth) is a function of real exchange rate (XCHR), broad money supply (M2), and inflation rate (INF), and government expenditure (GEXPD).

However to be able to estimate the equation we transformed it into the following,

$GDP = \alpha_0 + \alpha_1 RER + \alpha_2 M2 + \alpha_3 INF + \alpha_4 GEXPD + \mu_1$

Where,

GDP is Gross Domestic Product,

XCHR is the Real exchange rate,

M_2 is the Broad money supply,

INF is the inflation rate,

GEXPD is the government expenditure,

α_0 is the Parameter Constant,

$\alpha_1, \alpha_2, \alpha_3$ are the Parameter Estimate,

μ_1 is the Error Term.

As state in the above equation, the GDP(Real Gross Domestic Product) is the dependent variable(also known as the regress) while the XCHR(Real Exchange Rate), M_2(Broad Money Supply), INF(Inflation Rate) and GEXPD(government expenditure) are the independent variables(also called the regressors).

3.3 ESTIMATION PROCEDURES

The method to be used for this research is the ordinary least square (OLS) method because it has the Best, Linear, and Unbiased Estimator (BLUE). Another reason being that its computational procedure is fairly simple compared to other econometric techniques.
Then the computer software used to obtain the result will be Eview7.2.

3.4 METHOD OF EVALUATION

The evaluation of the result will be based on the following;

- **Sign and magnitude of parameter**

These are the suggestions about the signs of the parameters and to check whether they are in line with economic theory. As regards to the magnitude of parameters, the B's represents marginal magnitudes of economic theory.

- **Co-efficient of multiple determinations (R2)**

Here, the adjusted (R2) will be used to test for the goodness of fit. The value of R2 lies between 0 and 1. The closer the R2 is to 1, the better the goodness of fit while the closer of the R2 is to 0, the worse the goodness of fit.

- **t-test**

This is used to find out or test for the statistical significance of the individual regression co-efficient. When this is done, the computed or calculated ratio (t_{cal}) will be compared with the theoretical, tabulated or critical value (t_{tab}) with the n-k degree of freedom.

- **F-test**

A test of the overall significance of the entire variables used in the regression model, it is used to denote whether the joint impact of the explanatory (exogenous/ independent variables) actually have a significant influence on the dependent variable.

- **Durbin – Watson test**

This helps to test the validity of the assumption of non-auto correlated disturbances.

3.5 DATA REQUIRED AND SOURCES

In order to ensure an adequate and comprehensive research, secondary data of real exchange rates, broad money supply and real interest rates were collected from 1980-2014.

The relevant statistics were sourced or compiled from the CBN statistical Bulletins for the various years.

CHAPTER FOUR

DATA PRESENTATION AND DATA ANALYSIS

4.1 DATA PRESENTATION AND DATA ANALYSIS

This chapter examines the results of the estimation carried out to analyse the impact of money supply on economic growth in Nigeria and also to examine the impact of money supply on economic growth. It also discuses the analysed result and their interpretation.

4.1.1 Unit roots test

A unit root test tests whether a time series variable is non-stationary using an autoregressive model. A well-known test that is valid in large samples is the augmented Dickey–Fuller test. The optimal finite sample tests for a unit root in auto regressive models were developed by Denis Sargan and Alok Bhargava. Another test is the Phillips–Perron test. These tests use the existence of a unit root as the null hypothesis.

Table 1: Phillip Perron unit root test

Variables	T-statistics	Probability*	Level of integration	Level of significance
Ln RGDP	-3.2937	0.0866	I(1)	10%
M2	-5.7597	0.0002	I(1)	1%
INFL RATE	-10.5433	0.0000	I(1)	1%
EXCH RATE	-4.7827	0.0028	I(1)	1%
GOVT EXPD	-6.7024	0.0000	I(1)	1%

Source: Author's computation with Eview 7.2

Table 1 above exhibits the results of the stationarity test using Phillip-Perron. The LNRGDP is stationary at order one and is significant at 10%. All the other variables such as money supply, inflation rate, exchange rate and government expenditure are integrated at order one but are significant at 1%. Their probability values are less than 1%, 5%, 10% level of significance.

4.1.2 Regression results

A regression analysis is **regression analysis** is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or 'predictors'). More specifically, regression analysis helps one understand how the typical value of the dependent variable (or 'criterion variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables

Table 2: Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2	0.026154	0.002208	11.84776	0.0000
INFL_RATE	491.3636	351.6332	1.397375	0.1741
G_EXPND	-2419.822	1841.470	-1.314071	0.2003
EXCH_RATE	1658.855	177.2014	9.361411	0.0000
C	237744.3	25095.68	9.473516	0.0000

R-squared	0.977315	Mean dependent var	394354.8
Adjusted R-squared	0.973825	S.D. dependent var	205593.0
S.E. of regression	33262.30	Akaike info criterion	23.80893
Sum squared resid	2.88E+10	Schwarz criterion	24.04021

Log likelihood	-364.0384	Hannan-Quinn criter.	23.88432
F-statistic	280.0323	Durbin-Watson stat	1.846774
Prob(F-statistic)	0.000000		

From table 2, the short-run impact of money supply on economic growth is determined. Here, the least-square method was used to ascertain this objective. It was discovered that a Naira increase in money supply will further increase growth by 0.026% holding other variables constant. This findings supports a priori expectations, existing theories and the works of Nwankwoeze (2011), who examined the impact of money supply on economic growth in Nigeria for the period(1981-2010), using the ordinary least square (OLS) techniques with the aid of Stata 10 software package,he indicated that only the broad money supply influences the Real Gross Domestic Product. In the short run, also, exchange rate has a positive impact on economic growth in the short run. If exchange rate increases by 1% in the short run, economic growth will increase by 1.6% holding other variables constant. The above regression results are significant at 1%.

The R-square adjusted is 0.97 showing that it is only 0.03 of the variation in the dependent variables that is explained by the error term(stochastic variables), that is all the dependent variables have effect on economic growth. The value of the probability(F-statistic) is 0.0000, this shows that the model is of good-fit. The above are the first order econometrics properties. The second order econometric property such as the Durbin-Watson(DW) 1.85 shows absence of serial-correlation.

4.1.3 The Pairwise Granger Causality Test

The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another, first proposed in 1969. Ordinarily, regressions reflect "mere" correlations, but Clive Granger argued that causality in economics could be tested for by

measuring the ability to predict the future values of a time series using prior values of another time series

Table 3: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
M2 does not Granger Cause LNRGDP	30	0.99321	0.3845
LNRGDP does not Granger Cause M2		2.66357	0.0894

The Granger Causality Test shows that money supply does not Granger cause economic growth; only economic growth can Granger cause money supply. This findings can be justified with economic theories. Most macro-economist and monetarists believes that increase in money supply could only result to inflationary tendencies but not increase in real values. But if an economy is growing, it will require a robust money supply system to sustain her economic activities.

4.1.4 The Johanoen Co integration Test Result

Johansen Co integration Test is used to test for long run relationship between the variables in the model.

Table 4: Johanoen Co integration test

Trend assumption: Linear deterministic trend

Series: DLNRGDP DM2 DINFR DGXPD DXCHR

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Probability**

None *	0.663114	78.98823	69.81889	0.0077
At most 1 *	0.560741	48.52393	47.85613	0.0432
At most 2	0.439574	25.48930	29.79707	0.1447
At most 3	0.246320	9.275649	15.49471	0.3405
At most 4	0.047330	1.357620	3.841466	0.2439

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

** denotes rejection of the hypothesis at the 0.05 level*

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.663114	30.46429	33.87687	0.1211
At most 1	0.560741	23.03463	27.58434	0.1720
At most 2	0.439574	16.21365	21.13162	0.2126
At most 3	0.246320	7.918029	14.26460	0.3871
At most 4	0.047330	1.357620	3.841466	0.2439

Max-eigenvalue test indicates no cointegration at the 0.05 level

** denotes rejection of the hypothesis at the 0.05 level*

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

The Johanoen co integration Test shows the relationship between change in M2 and the change in LNRGDP. The trace test shows that at least two(2) variables are co integrated at 0.05 levels of significance. These means that having proved that the existence of short-run disequilibrium, at least two variables co-move in the long- run. It is interesting to note that in the long- run, M2 and LNRGDP have a negative relationship. That is,an increase in M2 by 1 naira reduces LNRGDP by 0.023% and an increase in LNRGDP by 1% reduces money supply by (1.51×10^{-6}) in naira. This

findings support the fact that in today's advanced economy M2 is very low because of the cashless economic.

4.1.5 Error Correction Model(ECM)

An Error Correction Model is a dynamical system with the characteristics that the deviation of the current state from its long-run relationship will be fed into its short-run dynamics.

An error correction model is not a model that corrects the error in another model. Error Correction Models (ECMs) are a category of multiple time series models that directly estimate the speed at which a dependent variable— Y —returns to equilibrium after a change in an independent variable—X.

Table 5: Error Correction Model(ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.459008	0.514109	-2.837936	0.0096
LNRGDP(-1)	0.119833	0.039965	2.998435	0.0066
GXPD(-1)	0.001272	0.002500	0.508662	0.6161
INFR(-1)	-0.000452	0.000493	-0.915579	0.3698
M2(-1)	-9.79E-09	4.50E-09	-2.175477	0.0406
D(INFR(-1))	0.000478	0.000546	0.875318	0.3909
D(XCHR)	0.000301	0.000579	0.519143	0.6088
ECT(-1)	-9.62E-07	2.95E-07	-3.256521	0.0036

R-squared	0.504346	Mean dependent var	0.047656
Adjusted R-squared	0.346638	S.D. dependent var	0.049343

S.E. of regression	0.039884	Akaike info criterion	-3.382496
Sum squared resid	0.034996	Schwarz criterion	-3.008843
Log likelihood	58.73743	Hannan-Quinn criter.	-3.262961
F-statistic	3.197976	Durbin-Watson stat	1.632089
Prob(F-statistic)	0.017139		

The table 4.5 shows the long- run impact of M2 on economic growth. The regression result shows that one year lag of LNRGDP has a positive impact on LNRGDP. This is because if an economy grows last year, its means it has the potentials to also grow this year. The result above shows that if LNRGDP(-1) increases by 1%, LNRGDP will increase by 0.12%. This is in line with the overlapping Generation Model. But our variable of interest is M2. The M2 in the long run has a negative effect on LNRGDP, since a naira increase in M2 triggers of $0.98\times10^{-10}\%$ fall in LNRGDP. The above results are significant at 5%.

Note that,the Auto regressive Distributed Lagged (ARDL (1,1)) Model was adopted for the regression.

Also, Notice that the first order econometrics and second order econometrics properties are satisfied. Since the variables co-move in the long run, and it has been established that they have a relationship; it is paramount that the speed of adjustment is ascertained using the Error Correction Mechanism (ECM). The table 4.5shows the Parsimonious Model. The Error Correction Term (ECT) must be negative ans significant. The result of the Parsimonious ECT shows that it will take approximately 9 years for the disequilibrium to be cleared.

4.2 DISCUSSION OF FINDINGS

- The short-run impact of money supply on economics growth in Nigeria is positive. This is because increase in money supply reduces and so triggers off investment and economics growth.

- It is only economic growth that can cause money supply; since macro economist and monetarists believe that an increase in money supply triggers off inflationary tendencies in the long-run. Though a growing economy require a robust money supply system to function optimally.

- The Johansen co integration test shows that M2 and LNRGDP co-move in the long-run; though they have a negative relationship.

- The long-run impact of M2 on LNRGDP using the Parsimonious ECT is negative. This is why advance economy have a narrow money supply base via the recent cashless banking policy being adopted across the globe.

- The speed of adjustment is 0.09. Meaning it will take 9 years for the level of disequilibrium in the model to be cleared.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

The relationship between money supply and economic growth has been receiving increasing attention than any subject matter in the field of monetary economics in recent years. .

Money supply can have both positive and negative effect on economic growth. Economic growth is a long term expansion of a country's productive potential. Nigeria has been controlling her economy through variation in her stock of money. Consequent upon the effect of the collapse of oil price in 1981 and the balance of payment (BOP) deficit experienced during this period, various methods of stabilization ranging from fiscal to monetary policy were used. Ikhide and Alwoda (1993) concluded that reducing money stock of money through increased interest rates would lower gross national product (GNP). Thus the notion that stock of money varies with economic activities applies to the Nigerian economy.

This study is necessitated by the existence of some major problems which include price instability, persistent inflationary rate and unemployment in the economy in spite of the adopted monetary policies used to combat the problems. With the primary aim of examining the effectiveness and efficiency of money supply on economic growth the following specific objectives were examined: to examine the impact of money supply on economic growth in Nigeria; to examine the relationship between money supply and economic growth; to show the causality effect between money supply and economic growth; to use the Error Correction Model to determine the rate or speed of adjustment.

The Monetarists used the quantity theory of money as the framework for explaining the relationship between money supply and the price level. According to Jhingan (2006), the

Monetarists emphasize the role of money as the principal cause of demand-pull inflation. They contend that inflation is always a monetary phenomenon. Price tends to rise when the rate of increase in the money supply is greater than the rate of increase in real output of goods and services (Johnson, 1973). While the Keynesian believed that Inflation according to the Keynesian school of thought arises from excessive aggregate demand over aggregate supply, particularly when the economy operates at the level of full employment resources. Keynes rejected the quantity theory of money, which revolves around the Fisher's equation of exchange which is as stated earlier. He argued that an increase in the money supply would not inevitably lead to an increase in the price level.

Ogunmuyiwa and Ekone (2010) investigated the relationship between money supply and economic growth in Nigeria (1980-2006), and the study found that economic growth is influenced by the level of money supply in the economy, and this was in line with the Granger causality test conducted in this research work. While this research work contradicted the work of Nwankwoeze (2011), that examined the impact of money supply on economic growth in Nigeria (1981-2010), that states that exchange rate does not affect Real Gross Domestic Product (RGDP) only money supply does, whereas, this research states that both exchange rate and money supply have a positive impact on economic growth.

5.2 CONCLUSIONS

The research work accesses the efficacy of money supply of money supply on economic growth in Nigeria(1980-2014) and the general conclusion from this study is that in the short run money supply has a positive relationship on economics growth, that is an increase in money supply will definitely increase economic growth and this conform with the work of Nwankwoeze (2011), who examined the impact of money supply on economic growth in Nigeria for the period(1981-2010), using the ordinary least square (OLS) techniques with the aid of Stata 10 software package,he

indicated that only the broad money supply influences the Real Gross Domestic Product. It was also observed in the short run that exchange rate also positively affect economic growth.

The Granger causality test shows that money supply does not Granger cause economic growth but the reverse that is economic growth Granger cause money supply. It was also noted using the Johansen co integration test that in the long run money supply has a negative relationship with the economy.

5.3 RECOMMENDATIONS

From the analysis realised and the listed problems in this research work the following policy recommendations can be made;

- The government should supply money into the economy, that is to increase money in circulation(money supply) which in turn will increase economic growth with a reduced interest rate so that potential businessmen and women home and abroad will embark on investment to improve the state of the economy.

- As said earlier that in the long run increase in money supply will cause an inflationary situation in the economy so to attain a growing and robust economy the government should increase the tax levied on personal income and corporate firms profit to stabilise the economy and to reduce inflation.

- Government should improve on its provision of infrastructural facilities in order to reduce cost of production and increase exportation, this will add to the country's national income and in general promotes the real GDP.

- Government should increase its effort in pursuing the policies that are anti-inflationary in nature such that its monetary policy objective will not be derailed.

- Government should adopt monetary policies to combat curb inflation, unemployment and price instability which are the main problems in an economy, the government can do this by implementing the right policies and putting in power transparent and accountable policy makers to achieve the objective of attaining an efficient and effective money supply on economic growth in Nigeria.

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APPENDIX

Years	Real GDP	Exchange Rate	Money Supply	Inflation Rate	Government Expenditure
1980	205222.06	0.5445	15100	10	
1981	199685.25	0.6369	16161.7	20.8	14.7
1982	185598.14	0.6702	18093.6	7.7	15.7
1983	183562.95	0.7486	20879.1	23.2	15.3
1984	201036.27	0.8083	23370	17.8	13.2
1985	205971.44	0.9996	27389.8	7.4	12.7
1986	204806.54	3.3166	33667.4	5.7	12.6
1987	219875.63	4.1916	45446.9	11.3	7.2
1988	236729.58	5.353	47055	54.5	7.6
1989	267549.99	7.65	68662.5	50.5	5.4
1990	265379.14	9.0001	87499.8	7.4	5
1991	271365.52	9.7545	129085.5	13	4.8
1992	274833.29	9.7545	198479.2	44.6	6
1993	275450.56	22.6309	266944.9	57.2	6.5
1994	281407.4	21.8861	318763.5	57	17.9

1995	293745.38	21.8861	370333.5	72.8	12.1
1996	302022.48	21.8861	429731.3	29.3	10
1997	310890.05	21.8861	525637.8	8.5	13
1998	312183.48	21.886	699733.7	10	14
1999	329178.74	92.5284	103607.5	6.6	7
2000	356994.26	109.55	1315869.1	6.9	8.3
2001	433203.51	112.4864	1599494.6	18.9	8.2
2002	477532.98	126.4	1985191.8	12.9	6.7
2003	527576.04	135.4067	2263587.9	14	5.2
2004	561931.39	132.67	2814846.1	15	6.7
2005	595821.61	130.4	4027901.7	17.9	6.8
2006	634251.14	128.27	5832488.5	8.2	6.9
2007	672202.55	117.968	9166835.3	5.4	10.2
2008	718977.33	130.75	10780627.1	11.6	11.6
2009	776332.21	147.6	11525530.3	11.5	13
2010	814741.2	148.67	13303494.5	13.7	8.7
2011	834161.83	156.2	15643209.7	10.8	8.5
2012		157.5	16.8	12.2	8.2

2013		157.31	13.2	8.5	8.1
2014		158.5526417		8.1	

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

DLNRGDP	DM2	DINFR	DGXPD	DXCHR
-23.66950	5.63E-07	-0.004487	-0.378139	0.052432
6.011238	-1.04E-07	-0.087106	0.172136	-0.007761
-6.013367	-2.84E-07	0.001709	0.456943	0.074529
-22.03134	3.87E-07	0.016482	0.005505	-0.046843
4.207293	-1.51E-06	-0.009399	0.050192	-0.023981

Unrestricted Adjustment Coefficients (alpha):

D(DLNRGDP)	0.025170	-0.005614	0.014390	0.008125	
D(DM2)	51777.29	-22940.16	22551.86	-142321.0	
D(DINFR)	8.000975	12.87851	-1.445468	-1.013951	
D(DGXPD)	1.606899	-0.773692	-1.921186	-0.640133	
D(DXCHR)	-5.513521	2.622898	-2.475076	6.741904	

1 Cointegrating Equation(s):		Log likelihood	-658.1670	
Normalized cointegrating coefficients (standard error in parentheses)				
DLNRGDP	DM2	DINFR	DGXPD	DXCHR
1.000000	-2.38E-08	0.000190	0.015976	-0.002215
	(9.8E-09)	(0.00056)	(0.00381)	(0.00068)

Adjustment coefficients (standard error in parentheses)				
D(DLNRGDP)	-0.595764			
	(0.17306)			
D(DM2)	-1225542.			
	(3075247)			
D(DINFR)	-189.3790			
	(94.8515)			
D(DGXPD)	-38.03449			
	(18.4113)			
D(DXCHR)	130.5023			
	(77.7422)			

2 Cointegrating Equation(s):		Log likelihood	-646.6497		
Normalized cointegrating coefficients (standard error in parentheses)					
DLNRGDP	DM2	DINFR	DGXPD	DXCHR	
1.000000	0.000000	-0.053698	0.062448	0.001177	
		(0.01022)	(0.06598)	(0.01224)	
0.000000	1.000000	-2266314.	1954455.	142670.6	
		(433821.)	(2801530)	(519606.)	
Adjustment coefficients (standard error in parentheses)					
D(DLNRGDP)	-0.629511	1.47E-08			

	(0.17603)	(4.1E-09)			
D(DM2)	-1363441.	0.031526			
	(3170516)	(0.07430)			
D(DINFR)	-111.9632	3.16E-06			
	(69.7634)	(1.6E-06)			
D(DGXPD)	-42.68534	9.85E-07			
	(18.5429)	(4.3E-07)			
D(DXCHR)	146.2691	-3.38E-06			
	(78.9829)	(1.9E-06)			

3 Cointegrating Equation(s):		Log likelihood	-638.5429	
Normalized cointegrating coefficients (standard error in parentheses)				
DLNRGDP	DM2	DINFR	DGXPD	DXCHR
1.000000	0.000000	0.000000	-0.014785	-0.005621
			(0.00788)	(0.00147)
0.000000	1.000000	0.000000	-1305140.	-144238.5
			(320999.)	(60010.2)
0.000000	0.000000	1.000000	-1.438281	-0.126597

			(1.23091)	(0.23012)
djustment coefficients (standard error in parentheses)				
D(DLNRGDP)	-0.716043	1.07E-08	0.000401	
	(0.16318)	(4.1E-09)	(0.00057)	
D(DM2)	-1499054.	0.025124	1804.417	
	(3262874)	(0.08288)	(11317.8)	
D(DINFR)	-103.2711	3.57E-06	-1.160162	
	(71.4080)	(1.8E-06)	(0.24769)	
D(DGXPD)	-31.13254	1.53E-06	0.056899	
	(15.9221)	(4.0E-07)	(0.05523)	
D(DXCHR)	161.1527	-2.67E-06	-0.207958	
	(80.1999)	(2.0E-06)	(0.27819)	

Cointegrating Equation(s):		Log likelihood	-634.5839	
Normalized cointegrating coefficients (standard error in parentheses)				

DLNRGDP	DM2	DINFR	DGXPD	DXCHR
1.000000	0.000000	0.000000	0.000000	-0.013624
				(0.00349)
0.000000	1.000000	0.000000	0.000000	-850718.9
				(264336.)
0.000000	0.000000	1.000000	0.000000	-0.905147
				(0.34797)
0.000000	0.000000	0.000000	1.000000	-0.541306
				(0.19216)
Adjustment coefficients (standard error in parentheses)				
D(DLNRGDP)	-0.895050	1.38E-08	0.000535	-0.003864
	(0.20868)	(4.7E-09)	(0.00055)	(0.00385)
D(DM2)	1636469.	-0.029932	-541.3344	-14006.36
	(4211597)	(0.09408)	(11183.1)	(77796.2)
D(DINFR)	-80.93240	3.18E-06	-1.176874	-1.474697
	(94.6423)	(2.1E-06)	(0.25130)	(1.74822)
D(DGXPD)	-17.02955	1.28E-06	0.046349	-1.622207
	(20.6454)	(4.6E-07)	(0.05482)	(0.38136)
D(DXCHR)	12.61950	-6.51E-08	-0.096837	1.442517
	(94.5936)	(2.1E-06)	(0.25118)	(1.74732)

Null Hypothesis: D(XCHR) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-4.782748	0.0028
Test critical values:	1% level		-4.262735	
	5% level		-3.552973	
	10% level		-3.209642	
*MacKinnon (1996) one-sided p-values				
Residual variance (no correction)				165.9540
HAC corrected variance (Bartlett kernel)				165.9540

Phillips-Perron Test Equation

Dependent Variable: D(XCHR,2)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(XCHR(-1))	-0.868026	0.181491	-4.782748	0.0000

C	2.286574	5.038870	0.453787	0.6532
@TREND(1980)	0.103990	0.248970	0.417680	0.6792
R-squared	0.432980	Mean dependent var		0.034856
Adjusted R-squared	0.395179	S.D. dependent var		17.37308
S.E. of regression	13.51108	Akaike info criterion		8.131406
Sum squared resid	5476.482	Schwarz criterion		8.267452
Log likelihood	-131.1682	Hannan-Quinn criter.		8.177181
F-statistic	11.45410	Durbin-Watson stat		1.971810
Prob(F-statistic)	0.000201			

Null Hypothesis: D(M2) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-5.759706	0.0002
Test critical values:	1% level		-4.273277	
	5% level		-3.557759	
	10% level		-3.212361	
MacKinnon (1996) one-sided				

p-values.				
Residual variance (no correction)				8.47E+12
HAC corrected variance (Bartlett kernel)				8.47E+12

Phillips-Perron Test Equation

Dependent Variable: D(M2,2)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	-1.067141	0.185277	-5.759706	0.0000
C	570561.9	1162432.	0.490835	0.6272
@TREND(1980)	-32634.18	58809.05	-0.554918	0.5832
R-squared	0.533569	Mean dependent var		-33.29063
Adjusted R-squared	0.501401	S.D. dependent var		4329763.
S.E. of regression	3057313.	Akaike info criterion		32.79303
Sum squared resid	2.71E+14	Schwarz criterion		32.93044
Log likelihood	-521.6885	Hannan-Quinn criter.		32.83858
F-statistic	16.58711	Durbin-Watson stat		2.003436
Prob(F-statistic)	0.000016			

Null Hypothesis: D(LNRGDP) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-3.293741	0.0866
Test critical values:	1% level		-4.296729	
	5% level		-3.568379	
	10% level		-3.218382	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				0.001764
HAC corrected variance (Bartlett kernel)				0.001366

Phillips-Perron Test Equation

Dependent Variable: D(LNRGDP,2)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1))	-0.639186	0.183301	-3.487085	0.0017

C	0.012607	0.017402	0.724499	0.4750
@TREND(1980)	0.001119	0.001063	1.052958	0.3017
R-squared	0.318944	Mean dependent var		0.001697
Adjusted R-squared	0.268495	S.D. dependent var		0.051768
S.E. of regression	0.044276	Akaike info criterion		-3.302108
Sum squared resid	0.052930	Schwarz criterion		-3.161988
Log likelihood	52.53162	Hannan-Quinn criter.		-3.257283
F-statistic	6.322157	Durbin-Watson stat		1.905183
Prob(F-statistic)	0.005597			

Null Hypothesis: D(INFR) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 32 (Newey-West automatic) using Bartlett kernel

			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-10.54328	0.0000
Test critical values:	1% level		-4.262735	
	5% level		-3.552973	
	10% level		-3.209642	
*MacKinnon (1996) one-sided p-values				

Residual variance (no correction)				255.6305
HAC corrected variance (Bartlett kernel)				16.37879

Phillips-Perron Test Equation

Dependent Variable: D(INFR,2)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFR(-1))	-0.969801	0.181547	-5.341883	0.0000
C	0.690254	6.255107	0.110350	0.9129
@TREND(1980)	-0.059652	0.307378	-0.194066	0.8474
R-squared	0.487824	Mean dependent var		-0.339394
Adjusted R-squared	0.453679	S.D. dependent var		22.68710
S.E. of regression	16.76883	Akaike info criterion		8.563428
Sum squared resid	8435.807	Schwarz criterion		8.699475
Log likelihood	-138.2966	Hannan-Quinn criter.		8.609204
F-statistic	14.28683	Durbin-Watson stat		1.918028
Prob(F-statistic)	0.000044			

Null Hypothesis: D(GXPD) has a unit root

Exogenous: Constant, Linear Trend

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-6.702438	0.0000
Test critical values:	1% level		-4.284580	
	5% level		-3.562882	
	10% level		-3.215267	
*MacKinnon (1996) one-sided p-values				
Residual variance (no correction)				9.361820
HAC corrected variance (Bartlett kernel)				8.880596

Phillips-Perron Test Equation

Dependent Variable: D(GXPD,2)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GXPD(-1))	-1.222730	0.183406	-6.666781	0.0000
C	-0.947475	1.304397	-0.726370	0.4736
@TREND(1980)	0.036423	0.064784	0.562221	0.5784

R-squared	0.613597	Mean dependent var	-0.035484
Adjusted R-squared	0.585996	S.D. dependent var	5.003569
S.E. of regression	3.219452	Akaike info criterion	5.268065
Sum squared resid	290.2164	Schwarz criterion	5.406838
Log likelihood	-78.65501	Hannan-Quinn criter.	5.313302
F-statistic	22.23156	Durbin-Watson stat	2.100689
Prob(F-statistic)	0.000002		

d(lnrgdp) c lnrgdp(-1) gxpd(-1) infr(-1) m2(-1) xchr(-1) d(gxpd(-1)) d(infr(-1)) d(m2(-1)) d(xchr(-1))

Dependent Variable: D(LNRGDP)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.405666	1.007240	1.395562	0.1789
LNRGDP(-1)	-0.111612	0.080918	-1.379327	0.1838
GXPD(-1)	0.000518	0.002683	0.193147	0.8489
INFR(-1)	-0.000106	0.000507	-0.209250	0.8365
M2(-1)	-4.66E-09	5.25E-09	-0.887069	0.3861
XCHR(-1)	0.001068	0.000485	2.202779	0.0402
D(GXPD(-1))	0.000900	0.002672	0.336719	0.7400
D(INFR(-1))	0.000776	0.000494	1.573006	0.1322
D(M2(-1))	2.83E-08	1.63E-08	1.734922	0.0989

D(XCHR(-1))	0.000568	0.000656	0.866166	0.3972
R-squared	0.565760	Mean dependent var		0.051822
Adjusted R-squared	0.360067	S.D. dependent var		0.044524
S.E. of regression	0.035617	Akaike info criterion		-3.565164
Sum squared resid	0.024103	Schwarz criterion		-3.093683
Log likelihood	61.69488	Hannan-Quinn criter.		-3.417502
F-statistic	2.750509	Durbin-Watson stat		1.929971
Prob(F-statistic)	0.030321			