Potency of Monetary Policy Instruments on Economic Growth of Nigeria

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ABSTRACT

The incapability of the monetary policies to efficiently and effectively exploit its policy objective could be a function of pitfall of policy instruments adopted which restricts its contributions to economic progress in Nigeria. It is on this premise we explore the potency of monetary policy instruments on economic growth in Nigeria between year 2000 and 2015 with time series data. The study engages Johansen multivariate cointegration approach and Vector Error Correction Model (VECM) after all the variables were confirmed stationary at first difference and integrated at similar order I(1) using ADF, PP test and confirmatory technique of KPSS test .The Cointegration measure establishes existence of long-term relationship between monetary policy instruments and economic growth. Also reveal was a low monthly speed of adjustment of the variables towards their long-run equilibrium path to the tune of 26% approximately .The major discovery of this work discloses that Consumer Price Index (CPI) , Real Exchange Rate, Money Supply (M2) and Interest Rate are significant monetary policy instruments that propel economic growth in Nigeria in the year under review. Based on the outcomes, we therefore recommend inflation targeting which will not only assist in proper monitoring of money supply but will also boost the overall growth in the economy. Also Domestic production of exports commodities should be promoted via deliberate policy measure by the Nigerian government so as to ensure stability in real exchange rate and positively contribute to the Nigerian economic growth.

Keywords: Monetary policy, Economic Growth, Time Series, Unit Root, VECM.

ÖZ

Para politikasının etkin ve verimli bir şekilde politika amacını yerine getirmedeki imkansızlıklarından dolayı ortaya çıkan durum Nijerya için politika araçlarının ekonomi gelisimini engelleyecek bir tuzak çukuru haline gelmesini saglamıştır. Bu çalışmada 2000 yılından 2015'e Kadar Nijerya örneginde para politikası araçlarının ekonomik büyüme üzerindeki etkileri incelenmektedir. Bu çalışmada I(1) düzeyindeki tüm degişkenler için Johansen çok degişkenli eşbütünleşme yaklaşımı ve vektör hata düzeltme modeli kullanılmıştır. Birim kök testi olarak da ADF, PP ve KPSS tesetlerine yer verilmiştir. Eşbütünleşme testi sonucunda para politikası araçları ile ekonomik büyüme arasındaki uzun dönem ilişkisi dikkati çekmektedir. Aynı zamanda oldukça düşük aylık yakınsama hızı (yüzde 26) olarak karşımıza çıkmaktadır. Bu çalısmanın asıl keşfi ise tuketici fiyat endeksi (TüFE), reel döviz kuru, ikincil para arzı ve faiz oranı degerlerinin Nijerya'nın ekonomik büyümesine olumlu katkı yaptıgını gostermesidir. çalışma bulguları enflasyon belirleme hedefinin sadece para arzını denetlemede degil aynı zamanda ekonomik büyümede katkı saglayacagını ortaya koymaktadır. Aynı zamanda ihraç emtialarının yerel üretimi iyi bir politika ile desteklenmelidir. Böylece döviz kurunda da stabilite yakalanacak Nijerya ekonomisi daha fazla büyüyecektir.

Anahtar Kelimeler: Para politikası, ekonomik büyüme, zaman serisi, birim kök, VEC

DEDICATION

I dedicate this work to Jehovah the all-knowing God.

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LIST OF ABBREVIATIONS

CBN   Central Bank of Nigeria

GDP   Gross Domestic Product

VECM   Vector Error Correction Model

GNP   Gross National Product

SAP   Structural Adjustment Program

LDC   Less Developed Countries

OMO   Open Market Operation

CPI   Consumer Price Index

REV   Oil Revenue

RER   Real Exchange Rate

M2   Money Supply

INT   Interest Rate

ADF   Augment Dickey Fuller

PP   Phillip Perron

KPSS   Kwiatkowski Phillip Schmidt and Schin

JJ   Johansen and Juselius

ECT   Error Correction Term

IFS   International Financial Statistics

EIU   Economists Intelligent Unit

Chapter 1

INTRODUCTION

1.1 Study Background

In 1959, the operation of Central Bank of Nigeria started and since then it has continued to discharge its role as enshrined in the Act that established it. Its major role is to systematically control the stock of money in the circulation to advance development. This function is defined as the use of monetary policy measure towards attaining the stated macroeconomic objective of rapid economic progress, full employment, stability of price and external balance. Passing decades have seen the two later objectives occupied the forefront of monetary policy objective as the primary goals. The assumption that exchange rate policy and inflation targeting are crucial instruments for attaining macroeconomic stability has made the two a major force of monetary policy authorities in the recent past (Ajayi, 1999).

Folawewo and Osinubi (2006) defined monetary policy as a tool designed to control the supply, volume and cost of money in the circulation in line with predicted economic activities. Attainment of sustainable development, full employment, the balance of payment equilibrium and price stability are the primary monetary policy objective in many countries. Since 1980s, evidence abounds in Nigeria that considerable level of relationship exists between the Nigerian stock of money and economic progress. Variation in the stock of money has over the years been the main policy measure employed by the monetary authorities to regulate the Nigerian

economy. Nigerian government made drastic efforts to mitigate the consequence of the fall in the oil price in 1981 and deficit balance of payment (BOP) witnessed during that critical period prompted the employing of stabilization measure alternating from monetary to fiscal policy. Ojo, (1989) discovered that only the huge borrowers who were predominantly farmers benefited from the fixed interest rates during the period. Appraising the impact of the Structural Adjustment Program (SAP), Ikhide and Alawole (2001) established that Gross National Product would diminish if money stock is reduced through the decrease in interest rate. Thus, the Nigerian economy is not excluded from the notion that the economic activities in the circulation is a function of variation in money stock (Laidler, 1985).

In third world nations, tradable economic activities are essential. Countries in this regard are kept poor because the economic activities suffer excessively from the institutional and market failure. To alleviate the economic cost of this distortions, enduring real exchange rate depreciation raises the relative benefit of investing in the act of second best fashion and tradable activities, which is the main reason why higher economic growth is strongly associated with current era of devaluation of currency. There exist a unique affiliation between economic growth and the rate of interest, the rate of interest is a crucial determining factor of economic progress in Nigeria. If those other factors as highlighted by Guseh and Oritsejafor (2007) which negatively affect the rate of investment in Nigeria are not adequately analyzed and attended to, and then the interest rate deregulation in Nigeria may fail to attain its stated goals optimally.

It is on this premise that this study depends to critically appraise the potency of monetary policy instruments on economic growth in Nigeria over the year with monthly data.

1.2 Statement of the Problem

Growth policies in less developed economies are healthier to be conveyed as a full bundle since monetary and fiscal policies are complex, aside in terms of the tools and the implementing authorities. Nevertheless, monetary policy seems to be more active and potent in modifying short-run macroeconomic instability due to the rate at which policy instruments are applied and altered. It is also active with which its process of decisions and sheer nature of the sector that promote its impact on the real economy, that is the financial sector.

Price stability and monetary stability are the major policy objectives of the Nigerian monetary policy. One of the main channels of attaining monetary and price stability is via appropriate interest rate structures which allows savers to avail investors of surplus funds for investment. Also to ensure proper monitoring of banks and related institutions so as to guarantee the financial sector's efficiency by curtailing broad in the naira exchange rate variation. Efficient and practical payment structure must as well be maintained. Policies to raise the coverage of the economic system must be thoughtfully applied so that interior economies that are hugely informal are financially included. The effectiveness and efficiency of monetary policy is a product of a vibrant financial system. Because the larger the financial system, the more sensitive interest rate of production and aggregate demand will be in an economy.

The high inflation rate, low investment, and increasing unemployment rate are the major challenges faced by the Nigerian economy and these factors slow the pace of Nigerian economic progress. The problem highlighted above can better be managed or tackled via contractionary and expansionary measures by the Central Bank of Nigeria (CBN) as the monetary instrument to manipulate the fluctuations experienced so far in the Nigerian economy. On this note, there arise the need to investigate the monetary policy impact on the Nigerian pursuit of economic stability and growth. Since the birth of CBN in 1959, the institution has been saddled with the responsibility of manipulating the monetary policy tools to attaining the policy objective of the government. But unfortunately, over time, this has remained elusive in Nigeria. The impact of monetary policy on growth process in Nigeria has been well researched (Balogun, 2007; Onyeiwu, 2012; Okoro, 2013; Nnanna 2001, Imoughale et al, 2014, and many more) with nearly all of them using annual data that may not adequately capture the high volatility of time series macroeconomic variables being employed. The motivation for this work is to scrutinize the efficacy of monetary policy instruments on the Nigerian economic growth over the years with the aid of monthly data as against the traditional annual data engaged by most researchers. The vacuum this study intend to fill is the use of monthly data. Monthly data is considered more effective and efficient because time series data often exhibit strong seasonality pattern and volatility. Therefore, lower frequency series like monthly data tend to be more accurate and reliable as it captures more effectively the impact of time than the usual annual data.

What this study seek to pursue is the potency of monetary policy instruments on economic growth in Nigeria between the fifth month of the year 2000 and fourth month of 2015 totaling one hundred and eighty (180) observations. This

investigation employs Vector Error Correction model (VECM) and the long-run affiliation between the monetary policy and economic growth will also be put to test with the aid of the famous Johansen Cointegration mechanism.

1.3 Study Objectives

The key resolve for this research work is to assess the potency of monetary policy on economic growth in Nigeria .It is the aim of this work to find appropriate answer to the questions below:

1. What impact does monetary policy command on economic growth in Nigeria?

2. Does long-run relationship between monetary policy and economic growth exist?

The definite aims include:

1. To ascertain the potency of monetary policy instruments on the Nigerian growth process,

2. To determine the long-term affiliation between monetary policy and economic growth.

1.4 Research Methodology

This research work is carried out with the aid of time series analysis to have the potency of monetary policy instruments on the Nigerian economic growth assessed between the year 2000 and 2015. Because most time series data often exhibit seasonality pattern and contain unit root, we, therefore, carry out unit root test using the popular Augmented Dickey-Fuller (ADF) and Phillips –Perron (PP) test and KPSS test as confirmatory measure to ascertain the stationarity of all the variables investigated in this study .Having established the stationarity of the variables in use, we then move ahead with Johansen Cointegration to find out the long term relationship between the parameters. The study also adopt Vector Error Correction

Model (VECM) to establish the adjustment speed from the possible short-run disequilibrium value to long-run equilibrium path.

1.5 Organizational Structure

The body of this study is made up of six chapters. Introduction, the background of the work, problem statement, research objective, methodology and organizational structure are all contained in chapter one. Chapter two has the review of related literature. The third chapter deals with monetary theories and the Nigerian economic progress. Chapter four covers the research methodology, nature of data, the technique of sourcing data and data analysis method. Presentation of data, analysis, and discussion of findings and results interpretations are contained in chapter five. While what chapter six contains is the summary, conclusion and possible policy implications where necessary.

Chapter 2

LITERATURE REVIEW

Monetary policy as a measure of economic management for an enduring economic progress for nations and how economic aggregate is affected by money could be widely traced to the days of Adam Smith and later promoted by monetary economists. Since monetary policy became obvious tool to stimulate macroeconomic objectives like price stability, balance of payment equilibrium, economic growth, etc, monetary authorities have been saddled with the responsibility of manipulating the policy to achieve maximum economic prosperity .In Nigeria for instance, the 1958 CBN act allows the apex bank to execute monetary policy for the attainment of macroeconomic objectives and goals in Nigeria. This role has giving birth to active money market where financial instruments and treasury bills used for open market operation and securing government debt has increased in value and volume and a significant earning assets and balancing of equity for investors in the market .In Nigeria, monetary policy comes in the different regime based on the prevailing economic dictates, it could be contractionary or expansionary policy mostly to stabilize the price level.

2.1 Review of Previous Empirical Findings

Irving Fisher, Diamond (2003, pg. 49) pioneered monetary policy where he established the root of the quantity theory of money via his equation of exchange. To him, the dynamism of money only affected the price level and not economic aggregate. However, it was Keynes (1930, pg.90) that further expanded the role of

money and other Cambridge economists where they affirmed that money and other economic parameters have indirect effect by influencing the rate of interest. This according to them will in turn determines investment and cash holding of the economic managers. Based on Keynes' philosophy, insufficient aggregate demand leads to unemployment which can be augmented by increasing the supply of money leading to more expenditure, raise employment and-and growth in the economy. He, therefore, suggests that both monetary and fiscal policy be blended correctly because monetary policy could at any time fail to attain its stated objectives. Further to this is the work of Friedman (1968, pg. 1-17). He postulated that cost, volume, and direction of money supply in an economy are the major determinant of the supply of money .In his words, inflation is everywhere and always a monetary phenomenon, saying that increase in the short-run, unemployment can dwindle with increase in the supply of money   but can lead to inflation, so therefore caution must be exercised by monetary authorities to tangle with increase in money supply, he submitted.

There exist different dimension by which economic activities can be influenced by monetary policy. These channels have been critically evaluated by both the Keynesians and the monetarist believers. Monetarist's school of thought postulates that changes in the real magnitude of money is a function of the change in money supply. Friedman and Schwartz (1963) Established that expansive open market operation by Central Bank raises the stock of money which in turn increases commercial bank reserves, create credit, and ultimately raises the supply of money via the multiplier effect. To keep the quantity of portfolio money at Bay, CBN sells securities to banks and non –bank financial institutions to advance economic activities in the real sector of the economy. Tobin (1978) who had the same position explored the impact of transmission in the area of asset portfolio choice, affirming

that what triggers asset switching between bonds, equity, commercial papers and the deposit of the banks is monetary policy. To him, ability of banks to lend is curtailed by contractionary monetary policy, and this places restrictions on loans to prime borrowers and the business sector, excluding mortgages and consumption spending thereby contracting productive investment and demand.

The variation in money stock promote financial market, changing the interest rate, total output, investment, and employment. Modigliani (1963) in his position to support this view brought capital rationing concept where the monetary policy transmission mechanism is affected by banks' readiness to lend. Oliner and Rudebush (1995) in their analysis of response of monetary policy to the use of bank and non- bank funds, pointed out that either of them has no significant change but rather big firms crowd out small ones. Contractionary monetary policy lead to small businesses reduction in loan facilities. It adversely affects by changes in related bank aggregate such as broad money supply as supported by Gerlher and Gildrrist (1991). Further observation by Borio (1995) revealed that factors such as interest rate ,loans term, willingness to lend and the requirements for collateral affects credit structure to non-government borrowers when he examined the credit structure to non-government borrowers in fourteen(14) advanced countries. Ivrendi and Yildirim (2013) Using a structural VAR approach in evaluating macroeconomic parameters and monetary policy shocks in a cross-section of six (6) fast rising economies: South Africa, Russia, Turkey, China, Brazil, and India. Their studies revealed that increase in the value of legal tender, interest rate, and decline in inflationary pressure and output was a function of a tight monetary policy adopted in most of those countries. According to them, questions of price, exchange rate, trade and output was

inconclusive but rounded it up by establishing that the rate of exchange plays a significant role in the six (6) countries channels of transmission mechanism.

2.2 Nigerian Experience

The stabilization of the rate of exchange, domestic price and the foreign exchange reserve remains the primary objective of the Nigerian monetary policy based on its core role of advancing economic growth and external sector efficiency by Sanusi, (2002 pg.1). He highlighted some factors including the legal framework, institutional structure, and conducive political environment. These according to him are essential requirements for Central Bank of Nigeria to pursue a dynamic monetary policy in a modern and fast integrated financial market environment.

However, evidence from different countries indicate inconsistencies with theoretical expectations which is what economists always tagged "puzzle". The three puzzles identified in the most literature are the price puzzle, liquidity puzzle, and exchange rate puzzle. The price puzzle indicates that contractionary monetary policy via positive innovations in the rate of interest result to rise (rather than fall) in price. While the liquidity puzzle shows that a rise in monetary aggregate goes with an increase (rather than decline) in the rate of interest. Exchange rate remains the most common puzzle where a rise in the rate of interest is associated with depreciation (instead of appreciation) of the domestic currency.In recent investigations, researchers have come up with better ways of dealing with these three "evils ". Most of which is fashioned after the framework set by Lucas (1972) where rational expectation approach to the monetary policy study was recommended. Recent studies that have adopted the same approach include Zhang (2009), Kahn et al. (2002), and Cochrane (1998) to mention but a few.

In developed economies like the United States, (U.S) and other Europeans nations, there exist vast evidence on the impact of monetary policy innovations on macroeconomic parameters, Rafiq and Mallick (2008), Christiano et al, (1999) Mishkin (2002) Bernanke et al. (2005). But unlike in underdeveloped economy, the scenario is full of puzzles as well as a weak proof. For example Balogun (2007) adopted simultaneous equation models to examine the impact of monetary policy in Nigeria, his findings revealed that, rather than for monetary policy to advance economic growth, it resulted in stagnation and unabated inflation. With the same model, studies also showed that Gambia, Ghana, and Serra Leone, which are neighboring West African countries recorded similar evidence.

In their joint investigations of the relative influence of monetary and fiscal policy on economic behavior in Nigeria, Ajisafe and Folorunso (2002) adopted cointegration and error correction modelling approach and yearly time series data between 1970 and 2008. They found that monetary policy rather than fiscal measure exerted more effect on economic activities in Nigeria and submitted that much distortion has emanated in the economy as a result fiscal tool by the government of Nigeria. Adebiyi (2006) examined the reform in the financial sector, manufacturing sector and the rate of interest policy. He used Vector Autoregressive and Error Correction Mechanism (ECM) approach with quarterly time series data from 1986:1 to 2002:4. Unit root measure and cointegration technique were also adopted. The outcome showed that the growth realized in the manufacturing sub-sector is a function of inflation rate and real deposit rate.

Further to this is shocks and to a lesser extent, real deposit rate handle the fluctuations in the manufacturing production index in the period under review. Also

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reveal from the investigation was that in the long-run, the sensitivity of credit of the commercial banks, inflation rate, rate of interest and the exchange rate do not influence the production manufacturing index. Chimobi and Uche (2010) evaluated the correlation between money, output, and inflation in Nigeria. Using cointegration and Granger causality measure. The outcome did not establish any long-run relationship between the variables. In this case, supply of money Granger causes both inflation and level of output. They concluded that price stability remains a function of well-tailored monetary policy since the supply of money is a product of changes in the price level and that inflation remain a monetary phenomenon. In the same spirit Adefeso and Mobolaji (2010) employed error correction mechanism and cointegration method between 1970 and 2007 to scrutinize the capacity of fiscal and monetary policy on economic growth in Nigeria. They found that the monetary policy exerts more influence on growth in Nigeria than fiscal policy and that the conclusion was never affected by leaving out the degree of openness. Amasoma et al. (2011) used a simplified ordinary least squared method to explore the impact of monetary policy on macroeconomic parameters between 1986 and 2009 in Nigeria. The approach found positive impact on exchange rate and money supply, but it recorded no significant influence on price instability. Onyeiwu (2012) adopted the same econometric technique as Amasaoma et al. (2011) to evaluate the power of monetary policy on the Nigerian economic activities from 1981 to 2008.The outcome revealed that monetary policy proxy by the supply of money has a positive effect on economic growth and balance of payment. The work also indicates a negative influence on the inflation rate. The result of this investigation corroborates the money –price –output hypothesis for the Nigerian economy. Imoughale and Ismaila (2014) did justice to the extent to which monetary policy affect the manufacturing sector

between 1986 and 2012. They found that individual parameter: manufacturing sector's output was boosted by exchange rate, inflation rate, and external reserve. But the supply of broad money (M2), interest rate failed statistical significance on the output of the industry and manufacturing sector did not significantly add to economic growth, they submitted. The study conducted outside Nigeria indicated that inflation rate and the rate of interest were inversely proportional and provided more evidence on how the economies are affected by the variations in monetary policy by Okoro (2013).

Chipote and Makhetha-Kosi (2014) examined the capacity of monetary policy in advancing economic growth in South Africa. The investigation revealed a long-term relationship between macroeconomic variables. Money supply and exchange rate were not significant monetary policy tools that promote growth, but inflation was significant. In the same spirit, Veronica (2010) in her studies employed ordinary least squared, co-integration and error correction model (ECM) with time series data from 1970 to 2010 to appraise the effect of monetary policy on price stability in Nigeria .The result established a positive long-run relationship between monetary policy and general price level. And the short-run scenario was negative but has a significant correlation. The interest rate was revealed to have had a positive impact on the rate of inflation in the year under review. The study concluded by establishing a clear link between monetary policy instruments in controlling inflation in Nigeria where a rise in money supply results in an increase in savings, and therefore inflation declines. Thus, the controversial natural rate of the monetarists fails to hold. It's then apparent from the empirical evidence that Treasury bills, interest rate, and gross domestic product (GDP) are not active determinants of the rate of inflation in Nigeria. Olubusoye and Oyemade (2008) adopting VECM revealed that lagged consumer

price index (CPI) among other parameters promote active Nigerian inflationary process. Kogar (1995) explored the relationship between the monetary control and financial innovations. They concluded that, variation in the financial structure is not sufficient for Central Bank to achieve effective and efficient monetary policy without settling new measure and tools in the long-run. Because fresh instruments are created by profit-seeking financial institutions to evade regulations. In his paper, Nnanna (2001 pg.11) investigated the past few decades the monetary policy evolution in Nigeria. The Author stated that the level of success recorded so far as a result of financial sector reform, dominated by indirect rather than direct monetary policy tools has almost been wiped off by visible fiscal influence, political interference and legal framework where Central Bank operates. Busari et al. (2002) in their contribution affirmed that monetary policy stabilizes the economy better in the regime of floating exchange rate than administered exchange rate system, and advances growth more under flexible exchange rate but goes with depreciation capable of destabilizing the economy .It means that monetary policy does better when targeting inflation than using it to stimulate economic growth directly, he concluded. Baro (1991), Engen, and Skinner (1996) in their findings evaluated the influence of monetary policy action on nominal Gross National Product (GNP) as it gauges total expenditure on commodities and service by households, government, foreigners and business as it is believed that total spending is influenced primarily by policy action of the monetary authorities . The inflation rate, production of goods and services and the rate of unemployment is affected by total expenditure. They therefore establish that the monetary policy major concern is the achievement of GNP advancement that tallies with the overall objective of the monetary policy of

high employment, price stability, economic growth and enduring international transactions.

Meanwhile, the conclusion of Fischer (1977), and Wogin (1980) revealed that because wage and price contracts are rigid, the expected monetary policy has an impact on real economic parameters in the short-run.

Chapter 3

THEORETICAL FRAMEWORK AND THE NIGERIAN MONETARY POLICY

Monetary policy mechanism remains the benchmark designed to augment the cost, volume, availability and direction of money and credit in any economy in order to attain stated macroeconomic policy objective. To achieve specified broad macroeconomic objectives ,monetary authorities must deliberately tame the money supply and credit conditions in an economy .Monetary policy is described as goals set to reach stated objectives for necessary stability and desirable economic progress.

Monetary authority in Nigeria designs monetary policy as an instrument to attain targeted macroeconomic goals of price stability, the balance of payment equilibrium and steady economic growth among others. Monetary policy is defined as the use of change in reserved requirement, open market operation, minimum rediscount rate and another mechanism open to monetary stakeholders to regulate the growth of supply of money. Full employment, price stability, and desired economic growth are the major goals of the monetary policy.

John A Ranlett in his book' money and banking: introduction to analysis and policy (1965, pg.425) describe monetary policy as a conscious management and manipulation of the volume of money supply in an economy to achieving certain objectives such as price stability, full employment and sustainable economic growth.

Milton Friedman is the leader of monetarists' school of thought. They contend that not the interest rate should be regulated, but the supply of money since the level of the rate of interest remains inappropriate for policy guide. Monetarists argue that increasing the interest rate may aggravate expansionary rather than contractionary monetary policy.

Umole (1985) describe monetary policy through money supply control as a measure to attain general economic policy. According to him, flexible control of money supply by CBN can only guarantee the desired economic progress. Ezengo (1987) who shared the same view with Umole (1985) added that government uses monetary policy as a measure to boost and augment the economy to reach stated objectives including increased industrial output, full employment, control of inflation, balance of payment adjustment, saving mobilization among others.

3.1 Monetary Policy Techniques

Instruments of monetary policy are categorized broadly into: market approach and the control of portfolio approach. Market approach are indirect or traditional way of regulating money supply which include open market operation (OMO) and discount rate of Central Bank of Nigeria. The direct control or portfolio control approach involves the use of moral suasion, selective credit control, special deposit, required reserve ratio. They are both tools available to the monetary authorities to manipulate the cost, volume and reserve availability of money in Nigeria. These are discussed briefly below.

3.1.1 Open Market Operation (OMO)

This measure remains the primary tool of indirect monetary regulation in Nigeria .it was introduced in June 1993 and is conducted thoroughly in the sales of treasury

bills in Nigeria plus the agreement to repurchase .OMO involves the sales and purchase of Government securities in an open market to attend to the prevailing economic reality of deflationary or inflationary trend. Bank reserves reduce when securities are resold in an open market by monetary authorities and the vice versa. The open market sales and acquisition of securities boost and limit the capacity of the banking and financial sector to create more credit, monetary control especially in a developed money and capital market environment.

3.1.2 Discount Rate of Central Bank

The CBN charged the commercial banks what is referred to as discount rate on loans granted to them .The commercial banks are used by the monetary authorities to reduce and increase the liquidity in the circulation .The CBN increases the liquidity in the system by slashing the rate and commercial banks in turn reduce the cost of loans and hence increase the volume of liquidity in the circulation and investment and the vice versa.

3.1.3 Reserve Requirement Ratio.

Reserve ratio is a manipulative measure used by the monetary authorities to regulate the capacity of commercial banks to grant loans and advances to the investing public. The lending power of commercial banks increase when the ratio is reduced and they also mop up excess funds in the system by simply increasing the ratio. This measure plays dual roles of liquidity management and efficient regulation. Cash reserve ratio is a powerful tool and has been on the rise progressively from 6% in 1995 to about 13% in the first quarter of 2015.Monetary authorities deploy this instrument to regulate the cash holding capacity of commercial institutions. The banks according to the law are required to maintain minimum cash deposit which attracts below 2.5% interest rate from 5 to 12% of their total demand and time deposit.

3.1.4 Moral Suasion.

It involves the use of persuasive statements and outright appeal by the Central Bank requesting the commercial banks to tow a particular operational directive to attain a specified objectives of government. Monetary authorities in order to control credit expansion to avoid possible damage to both the financial sector and the entire economy for instance may appeal to commercial banks to exercise caution in their financial dealings in respect of lending to the general public.

3.1.5 Selective Credit Control

This device involves administrative order by the monetary authorities instructing the commercial banks on the cost and volume of a specified sectoral credit. Selective credit control demonstrates direct influence on the resource allocation by the monetary policy, indicating that the working of the market forces no longer in force. The major force responsible for the use of selective credit control remains to discriminate between various uses of credit, economic sectors from where credit flows from the banking sector thereby promoting factors that could assist in the entire economic stability .Meanwhile, credit flow to those channels or areas that pose no threat to the stability of the economy are denied.

3.2 Monetary Theories

Monetary policy has gone through a significant and wide evolution since the investigation of economic issues became a hot public discuss. Meanwhile, views of different scholars have been attracted to the role and dimension of money in achieving the macroeconomic objective. It has giving birth to a considerable number of investigations directed at affirming the affiliation between the money stock and other economic aggregates like output and inflation. Opinions and positions of some

school of thought regarding the monetary role in climbing policy objectives are discussed below.

3.2.1 Classical Theory of Money

Classists describe money as veil .Its impact on the overall economy is neutral, only has effect on the price level. If money supply increases then interest rate, real income and general level of real economic activities remain unaffected as the price level increases. The association between money and the general price level is explained by the quantity theory of money. They affirm that price level determines the supply of money. In an Algebra a form, they contend that MV=PT with MVPT defined as supply of money, money velocity, price level and transaction volume or real output respectively. Jhingan (1997) established that the equation of money exhibit the equality of money supply the (MV) and total volume of output (PT) in an economy. The belief of the classical economists lie in the long-run mechanism where full employment can only be achieved. They affirm that the event of downward rigidity of money wage can result in unemployment. Given the velocity of money and output level, if the Central Bank raises the stock of money, the increase in liquidity as a result of this will automatically increase the demand for goods and services which also raises the general price level .Incentives and more investments will occur if the Wage rate diminishes as price which in turn widen employment and production level towards the full employment.

3.2.2 The Keynesian Theory of Money

Keynes maintains that economic activities is largely effected by the key role exercised by the monetary policy in an economy. He postulates that interest rate, aggregate demand, level of employment, output and income are sensitive to change in the money supply .Aggregate supply function, fairly price –interest with perfect

competitive market and close economy are some of the assumptions of Keynesian model. Assumed also is non-existence of equilibrium employment in an economy which he believes works only in the short-term because in the long-term we are all dead, according to him. The analysis of his idea sees money as being exogenously determined if only one choice exist between holding bonds by wealth holders. The theory is practically based on one idea of price rigidity and economy possibly working or performing below full employment level of output, employment, and income. Keynes macroeconomic hypothesis emphasizes the issue of output rather than price as a function of variation in economic conditions. Put differently, quantity theory of money was not prominent in Keynesian macroeconomic idea.

3.2.3 The Monetarists Theory

Friedman (1963) spearheaded this approach. He noted that the supply of money plays a significant and dominant role in influencing the extent of the well-being of any economy. He therefore advocated fixed rate of money supply rather than allowing the monetary authorities to either alter or regulate its supply so as to enhance genuine economic progress. Though, Keynes has earlier punctured this position where he asserts that monetary policy works only through indirect mechanism of interest rate and therefore not effective alone. Friedman in His response to this establishes that money supply is not and cannot be only alternative for bonds but there are other commodities and services. He concluded that both direct and indirect impact on expenditure and investment in an economy is a function of variation in the supply of money.

Chapter 4

DATA AND METHODOLOGY

4.1 Data Type and Sources

Oil revenue (proxy for GDP), money supply (M2), real exchange rate (RER), interest rate (INT) and consumer price index (CPI) are examined in this study with the use of monthly data between the year 2000: 05 and 2015: 04. Data were sourced from Economist Intelligence Unit, International Financial Statistics via Data Stream. All the parameters were transformed into their natural logarithm to capture the impact of growth and to reduce the variance of the dataset and for more meaningful econometric analysis (Katircioglu, 2009). Monthly data is considered more effective and efficient because most time series data exhibit strong seasonality pattern and volatility. Therefore, higher frequency like monthly data tend to be more accurate and reliable because it captures more the effect of time than quarterly or annual data which is almost traditional among researchers. This is the motivation behind these findings.

4.2 Methodology

The research work engages the analysis of Augmented Dickey-Fuller test (ADF), Phillips –Perron (PP) test and Kwiatkowski Phillips Schmidt and Shin's (KPSS) as a confirmatory test to ascertain the stationarity properties of the parameters. The assessment of long-term equilibrium relationship between variables was also assessed with the aid of Johansen and Juselius (1990) co-integration approach. In order to account for the adjustment speed of the parameters towards their long-term

equilibrium path as well as possible short-term disequilibrium, analysis of Vector Error Correction Model (VECM) was employed.

4.2.1 Empirical Model

Theoretical and empirical studies abound on the potency of monetary policy on the economic growth in Nigeria via the application of various econometric measures. It is the suggestion of the present study that the Interest rate, Money supply (M2), real exchange rate, and Consumer Price Index (CPI)   as monetary policy measure will command influence on the economic growth in case of Nigeria. Oil revenue is adopted as the proxy for Gross Domestic Product (GDP) in this study.

Oil Revenue: The choice of oil revenue is as a result of the unavailability of monthly data on GDP. Oil revenue is a product of crude oil production and the prevailing international oil price of crude oil. In Nigeria, oil revenue accounts for almost 90% of the Nigerian export earnings and over 70% of Nigerian national revenue according to 2015 figure of National Bureau of Statistics (NBS). Therefore, the oil sector activities determine to a large extent the behavior of the Nigerian GDP, i.e. whatever affects the oil sector also affects the GDP directly.

Consumer Price Index: It measures changes in the price level of a market basket of goods and services purchased by households. Inflation measure changes in the level of retail prices paid by consumers and the retail prices are captured by the consumer price index.

Real Exchange Rate: Adjusted for inflation by appropriate foreign price level and deflate by domestic or home country's price level. Real exchange rates are nothing but the nominal exchange rates multiplied by the price indices of the two countries.

Interest Rate: The amount charged and expressed as a percentage of principal by lenders to a borrower for the use of assets typically noted on annual basis.

Money Supply: Broad money supply (M2) which measures the supply of money including cash, checking deposit (M1) as well as near money. Near money, in this case, is a product of M2 comprising money market mutual fund and saving deposit and other time deposit that are less liquid in nature.

Based on this background, the following econometric equation represents an expression of the functional relationship between economic growth and monetary policy for the purpose of this work.

$Rev_t = f(M2_t, RER_t, INT_t, CPI_t)$ (1)

Where:

Rev. = Oil Revenue (used as proxy for GDP)

M2 = Money Supply

RER = Real Exchange Rate

INT = Interest Rate

CPI = Consumer Price Index.

t = Time Series.

The equation can be explicitly transformed into the following log-linear specification as stated earlier to capture the growth effects.

$InRev_t = \beta_0 + \beta_1 InM2_t + \beta_2 InRER_t + \beta_3 InINT_t + \beta_4 InCPI_t + \epsilon_t$ (2)

With all the parameters defined earlier, In represents natural logarithm and the stochastic error term is $\in_t$. apriori criteria , oil revenue proxy for GDP is expected to relate positively to money supply (M2) while negative affiliation is projected between the oil revenue and consumer price index and interest rate and real exchange rate.

β_1, β_2, β_3, β_4 are the coefficients that represent the elasticity of all the explanatory variables in the long–term period (Katircioglu, 2010). Monthly data were collected between the 2000:05 and 2015:04. The data were sourced from Economist Intelligence Unit, International Financial Statistics via Data Stream.

4.2.2 Unit Root Test

Gujarati (2009) opined that often, data on time series do possess unit root. Stationarity in the series is defined if its joint distribution is time invariant. It means that the mean, variance and covariance that are cross-sectional moment's distribution do not rely on time and that relationship across time does not vary. Data on time series that contain unit root in an econometric analysis often translates to a misleading and spurious estimate of the relationship between variables. So, it is critical to consider the property dynamism of parameters and the data that measures them prior to evaluation. Diebold and Kilian (1997) affirm that ascertaining the stationarity of variables is good for forecasting prior to modeling. It also affords us the opportunity to ensure the order of integration of both dependent and independent parameters converge to the same level. The testing procedures for the unit root which are common and more acceptable are the Augmented Dickey-Fuller (ADF) test, Phillips- Perron (PP) tests and as well as Kwiatkowski Phillips Schmidt and Shin's (KPSS) test to validate both ADF and PP test results respectively .

Augmented Dickey-Fuller (ADF) Test.

Dickey and Fuller (1981) introduced the augmented version of Dickey-Fuller test for a complex and more expanded set of time series models. Dickey-Fuller test is amended to correct for its pitfalls and adjust for the unit root test where the error term $\in_t$ no longer white noise. In this case, there exist the possibility of error term correlation in the series.

ADF equation can be estimated thus:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta^* Y_{t-1} + \sum_{i=1}^{m-1} \alpha_i \Delta Y_{t-i} + \in_t \tag{3}$$

With

$$\alpha_i = -\sum_{k=i+1}^{m} \delta k \qquad \text{and} \qquad \delta^* = \left(\sum_{i=1}^{m} \delta_i\right) - 1$$

Where, the Gaussian white noise error term is represented as the term is $\in_t$, Y signifies the series for regressand; while t = time; β = intercept. To guarantee that error term are pure white noise, number of lags 'm' in the regress and variables must be defined by Akaike information criteria (AIC) for maximum and-and efficient lag. The Augmented Dickey –Fuller (ADF) test has the advantage of giving credence to a higher order autoregressive process (Green, 2003). The unit root equation above represents a universal form that gives room for intercept and trend, or trend alone and as well the least considered model, none, which could be without both trend and intercept. ADF estimation has its null hypothesis to be unit root (Ho:$\mathfrak{z}$ = o) and the alternative as stationary (H$_1$:$\mathfrak{z}$<o).

Phillips-Perron (PP) Test

This test for stationary of series was propounded by Phillips (1987) and Perron (1988) respectively as a substitute for Dickey-Fuller (ADF) test for the unit root. A non-parametric scheme for eliminating serial correlation of higher order in a series and it is also employed to guarantee the creation of fractional autocorrelation function procedure and modest first order autoregressive model, AR(1). This method engages the well-known Newey –West approach to estimate variance for correcting heteroscedasticity and autocorrelation.

Phillips –Perron unit root Barlett estimation coefficient can be derived in the following way.

$$\omega_k = \frac{1}{T} \sum_{s=k+1}^{T} \ell_t \ell_{t-s} \qquad k = 0,.., p = k^{\text{th}} \text{ autocovariance of residuals}$$

$$\omega_0 = \left[(T-K)/T\right]s^2 \qquad where \qquad s^2 = \frac{\sum_{t=1}^{T} \ell_t^2}{T-K}$$

$$\gamma = \omega_0 + 2 \sum_{k=i+1}^{n} \left(1 - \frac{k}{n+1}\right)\omega_k \tag{4}$$

Where

 n = regulated lag form for appraising the PP test statistics.

ω_k = correlation coefficient of variation in the residual.

The t- statistics of the coefficient from the AR (1) regression to justify the serial correlation in error term ($\in_t$) is corrected for with the aid of PP test (Katircioglu, 2007). The null and the alternative hypotheses testing procedures are similar to that of ADF.

Kwiatkowski Philips Schmidt and Shin's (KPSS) Test.

The outcomes of Dickey–Fuller (ADF) and Phillips-Perron (PP) are further confirmed by KPSS test, added to unit root testing procedure by Kwiatkowski et al in (1992).The process of hypothesis testing measure in KPSS is a reverse form of ADF and PP tests. While the null hypothesis (H0) in a series is stationary, the alternative (H$_1$) is unit root. In KPSS, Lagrange Multiplier (LM) approach is adopted to affirm the stationarity of the series which is given below:

$$Y_t = \rho t + r_t + \eta_t; \qquad\qquad\qquad 5$$

where t = (1, 2),....,t denotes observed series of Y_t. r_t depicts the random walk calculated by "$r_{t-1} + v_t$" .The acceptance of the null hypothesis is on the premise that the error term variance of the random walk σ_v^2 is expected to be zero (Kwiatkowski et al. 1992). Thus LM estimate is obtained as follows:

$$LM = \left.\sum_{t=1}^{T} S_t^2 \middle/ \sigma_\varepsilon^2\right. \qquad\qquad 6$$

S is the partial sum process of residual of the form;

$$S_t = \sum_{i=1}^{t} e_t$$

KPSS stationarity test can be either calculated with trend and intercept model or only trend model. In the same fashion ADF unit root test and PP unit root test is given below:

$$Y_t = \alpha_0 + \mu t + k\sum_{i=1}^{t} \xi_i + \eta_t \qquad\qquad 7$$

4.2.3 Cointegration Test

A strong seasonality patterns are often displayed by most time series data such as data on inflation, unemployment, gross domestic product (GDP) with the tendency of a unit root. There exist the need via Johansen Cointegration to ascertain the long term

relationship between the variable in the model after the order of integration of the parameters must have been proven .The co-integration procedure defines the long-run relationships among series according to Granger (1981), Engel and Granger (1987), Engel-Granger et al. (1987). In (1990), Johansen and Juselius also demonstrated how trace statistics could be used to detect integrating vector among several parameters. At least one co-integrating vector is required to guarantee cointegration among the variables. In cointegration test, Johansen trace test has the merit of more reliability than the maximum Eigenvalue (Kotircioglu et al., 2007).

The Johansen and Juselius approach can be formulated with the following VAR model.

$$\Delta Y_t = \Gamma_1 \Delta X_{t-1} + ... + \Gamma_{K-1} \Delta X_{t-K+1} + \Pi X_{t-K} + \mu + \in_t \qquad 8$$

Where:

Cointegrating rank number of the vector (i.e. r) is represented by $\prod$. It is calculated by simply evaluate if the Eigen value (Π_1) is statistically different from zero. Johansen (1988) and Johansen and Juselius (1990) postulate that the estimation of trace statistic can be determined with the aid of eigenvalue.

The trace statistic can be calculated with the following approach:

$$\lambda_{trace} = -T \sum Ln(1 - \lambda_i) \qquad 9$$

The null hypothesis is rejected if the absolute value of the trace statistic is greater than the critical value discovered by Osterwald-lenum (1992). And we can then conclude a co-integrating series and the vice versa.

4.2.4 Error Correction Model (VECM)

This approach represents a dynamic pattern with special characteristics that present state changes from its long-term relationship possess inbuilt mechanism to adjust with time into its short-term position. Meanwhile, the same level of co-integration is needed to guarantee a long-run association between variables. Error Correction term (ECT) must be statistically different from zero and at the same time negative under this approach. It demonstrates the adjustment speed of how the parameters re-unite towards their long-term values. The ECM equation is given as follows:

$$\Delta Y_t = \delta(\Delta X_t) + \tau(Y_{t-1} - \theta X_{t-1}) + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.10$$

The instability of Y_t close to its long run trend as triggered by, or connected to variation in X_t around its long run trend, and the ECT$\approx$ (Y_t - θX_{t-1}) is represented above.

Chapter 5

EMPIRICAL RESULTS AND DISCUSSION

As earlier discussed that the nature of the stationarity of all the parameters will be verified with the aid of widely used stationary test mechanism of Augmented Dickey-Fuller, Phillips-Perron test. Also Kwiatkowski Phillips Schmidt and Shins test to consolidate both ADF and PP test. As demonstrated in the table 5.1.

Table 5.1: Unit Root Test for ADF, PP and KPSS

Statistics (Level)	LREV	lag	LM2	lag	LINT	lag	LRER	Lag	LCPI	lag
τ_T (ADF)	-1.462	(0)	-1.258	(0)	-3.135	(1)	-2.680	(1)	-2.256	(0)
τ_μ (ADF)	-1.665	(0)	-1.864	(0)	-3.027	(1)	-1.677	(1)	-1.522	(0)
τ (ADF)	5.558	(0)	5.260	(0)	-0.887	(1)	1.644	(1)	7.758	(0)
τ_T (PP)	-1.475	(1)	-1.123	(3)	-2.816	(3)	-2.349	(4)	-2.288	(6)
τ_μ (PP)	1.676	(4)	-2.002	(5)	-2.736	(3)	-1.495	(3)	-1.901	(10)
τ (PP)	5.533	(2)	5.562	(2)	-0.827	(2)	1.892	(4)	7.596	(6)
τ_T (KPSS)	0235	(10)	0.268	(10)	0.268	(10)	0.110	(10)	0.255	(10)
τ_μ (KPSS)	1.733	(10)	1.723	(10)	0.531	(10)	1.387	(10)	1.727	(10)
Statistics (First Difference)	LREV	lag	LM2	lag	LINT	lag	LRER	lag	LCPI	lag
τ_T (ADF)	-13.495***	(0)	-14.369***	(0)	-9.835***	(2)	-9.517***	(0)	-12.329***	(0)
τ_μ (ADF)	-13.467***	(0)	-14.239***	(0)	-9.857***	(2)	-9.531***	(0)	-12.201***	(0)
τ (ADF)	-11.624***	(0)	-12.366***	(0)	-9.883***	(2)	-9.331***	(0)	-9.383***	(0)
τ_T (PP)	-13.497***	(4)	-14.447***	(4)	-9.857***	(4)	-9.471***	(2)	-12.976***	(11)
τ_μ (PP)	-13.420***	(3)	-14.265***	(2)	-9.879***	(4)	-9.485***	(2)	-12.289***	(9)
τ (PP)	-12.089***	(6)	-12.739***	(6)	-9.905***	(4)	-9.331***	(0)	-10.024***	(6)
τ_T (KPSS)	0.066***	(4)	0.085***	(6)	0.030***	(2)	0.080***	(3)	0.046***	(10)
τ_μ (KPSS)	0.245***	(3)	0.375**	(3)	0.041***	(2)	0.092***	(3)	0.237***	(8)

Table 5.1 above reveals that at levels, all the series failed ADF, PP, and KPSS stationarity tests. The unit root null hypothesis of ADF, and PP could not be rejected and that of KPSS too exhibited a rejection of null hypothesis since it operates in reverse order in relation to both ADF and PP techniques. To ascertain the stationarity of feature of all the parameters, we take the first difference. With this step, all the variables were stationary, meaning that the null hypothesis were rejected for ADF and PP at diverse critical levels. We could not also reject the null hypothesis at all levels as the confirmatory power of KPSS is in force validating ADF and the PP test. To sum it up, the entire series employed in this work demonstrated stationarity at the first difference and integrated of order 1(1).

5.2 Cointegration Test Results

After the stationarity of all the variables are integrated in similar order 1(1). Cointegration test is then put to use to establish the possible long –term affiliation between the parameters.

Table 5.2: Johansen Cointegration Test

Hypothesized No Of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	1% Critical Value
None**	0.262204	99.60671	76.07	84.45
At most 1	0.99610	46.39126	53.12	60.16
At most 2	0.81890	28.02892	34.91	41.07
At most 3	0.54907	13.07723	19.96	24.60
At most 4	0.018090	3.19422	9.24	12.97

Note: Trace test demonstrates 1 cointegrating equation(s) at both 5% and 1% level respectively .(**) Rejection of the hypothesis of the 5% and 1% level.

From the above, at both 5 percent and 1 percent level individually, the result of the cointegration test indicates 1 cointegrating equation. Consequently, we reject the null hypothesis of no cointegrating vector and conclude on a cointegrating equation (s) of the alternative as revealed by the none trace statistic which is greater than the critical value at both 1 and 5 % respectively. This shows therefore that the conclusion can be drawn that a long-term relationship do exist between economic growth proxy by oil revenue as dependent variable and the Nigerian monetary policy of money supply (M2), real exchange rate, consumer price index (CPI) and the interest rate as explanatory parameters. Afterward, we can proceed to test for Vector Error Correction Model with the establishment of cointegrating equation(s).

5.3 Vector Error Correction Model (VECM)

Based on the cointegration results, long-term vectors were disclosed between economic growth and monetary policy. Therefore, there arise the need to evaluate and ascertain the short-long run equilibrium adjustment path with the aid of Vector Error Correction Model approach. This technique measures the possible speed with which the variables under study converge towards their long-run equilibrium. Error Correction Term must be statistically different from zero and negative indicating a long-term evidence of equilibrium and efficiency of Error Correction tool.

Table 5.3: Vector Error Correction Model

Cointegrating Eq:	CointEq1				
LREV(-1)	1.000000				
LRER(-1)	0.600695				
	(0.20172)				
	[2.97792]				
LM2(-1)	-0.965586				
	(0.06889)				
	[-14.0154]				
LINT(-1)	-0.066707				
	(0.02173)				
	[-3.06913]				
LCPI(-1)	-0.577517				
	(0.15763)				
	[-3.66373]				
C	-5.772448				

Error Correction:	D(LREV)	D(LRER)	D(LM2)	D(LINT)	D(LCPI)
CointEq1	-0.267612	0.010340	-0.145496	0.611367	-0.023620
	(0.06485)	(0.01877)	(0.05875)	(0.25596)	(0.01622)
	[-4.12689]	[0.55076]	[-2.47659]	[2.38855]	[-1.45602]
D(LREV(-1))	0.184989	-0.015351	0.045756	-0.510499	-0.025967
	(0.12651)	(0.03663)	(0.11461)	(0.49935)	(0.03165)
	[1.46228]	[-0.41912]	[0.39923]	[-1.02234]	[-0.82052]
D(LREV(-2))	0.122804	-0.276788	0.187945	-0.598484	0.196930
	(0.13543)	(0.03921)	(0.12270)	(0.53457)	(0.03388)
	[0.90676]	[-7.05906]	[1.53177]	[-1.11956]	[5.81255]
D(LRER(-1))	-0.278637	0.303663	-0.078883	0.626493	0.072419
	(0.23576)	(0.06826)	(0.21359)	(0.93056)	(0.05898)
	[-1.18189]	[4.44889]	[-0.36933]	[0.67324]	[1.22791]
D(LRER(-2))	0.009998	-0.084683	-0.016378	-0.409707	-0.041470
	(0.23588)	(0.06829)	(0.21370)	(0.93105)	(0.05901)
	[0.04239]	[-1.24001]	[-0.07664]	[-0.44005]	[-0.70279]
D(LM2(-1))	-0.278170	0.005069	-0.157658	0.481016	-0.017531
	(0.14836)	(0.04295)	(0.13441)	(0.58559)	(0.03711)
	[-1.87500]	[0.11801]	[-1.17299]	[0.82142]	[-0.47235]
D(LM2(-2))	-0.193789	0.302453	-0.271589	0.206609	-0.159209
	(0.16165)	(0.04680)	(0.14645)	(0.63805)	(0.04044)
	[-1.19883]	[6.46260]	[-1.85449]	[0.32381]	[-3.93707]
D(LINT(-1))	-0.005527	-0.010378	-0.006815	0.294867	-0.007243
	(0.01981)	(0.00574)	(0.01795)	(0.07821)	(0.00496)
	[-0.27897]	[-1.80916]	[-0.37964]	[3.77031]	[-1.46131]
D(LINT(-2))	-0.016312	-0.006392	-0.003768	0.043779	0.000969
	(0.02015)	(0.00583)	(0.01825)	(0.07953)	(0.00504)
	[-0.80957]	[-1.09577]	[-0.20641]	[0.55046]	[0.19225]

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D(LCPI(-1))	-0.207511	-0.115991	-0.344955	0.373567	0.050168
	(0.28699)	(0.08309)	(0.26001)	(1.13281)	(0.07179)
	[-0.72305]	[-1.39597]	[-1.32671]	[0.32977]	[0.69876]
D(LCPI(-2))	-0.148083	-0.013100	-0.208831	1.185920	-0.069430
	(0.28868)	(0.08358)	(0.26154)	(1.13948)	(0.07222)
	[-0.51296]	[-0.15673]	[-0.79847]	[1.04076]	[-0.96140]
C	0.025994	0.004224	0.024684	-0.006501	0.008934
	(0.00580)	(0.00168)	(0.00525)	(0.02289)	(0.00145)
	[4.48290]	[2.51591]	[4.69883]	[-0.28404]	[6.15884]
R-squared	0.110594	0.354213	0.063005	0.135892	0.219224
Adj. R-squared	0.051300	0.311161	0.000539	0.078285	0.167173
Sum sq. resids	0.361107	0.030269	0.296392	5.626090	0.022599
S.E. equation	0.046782	0.013544	0.042383	0.184655	0.011703
F-statistic	1.865185	8.227477	1.008628	2.358949	4.211668
Log likelihood	297.0816	516.4784	314.5595	54.06093	542.3402
Akaike AIC	-3.221261	-5.700321	-3.418751	-0.475265	-5.992544
Schwarz SC	-3.005929	-5.484988	-3.203419	-0.259933	-5.777212
Mean dependent	0.020034	0.002886	0.016614	-0.002752	0.009398
S.D. dependent	0.048030	0.016319	0.042394	0.192337	0.012824

Determinant resid covariance (dof adj.)	1.10E-15
Determinant resid covariance	7.77E-16
Log likelihood	1823.268
Akaike information criterion	-19.86744
Schwarz criterion	-18.70105

Table 5.3 indicates that in general the short-run coefficients of all the variables are statistically insignificant. A 1% increase in consumer price index (CPI) will reduce the GDP by 0.207511% while GPD goes down by about 0.278637% with a percentage increase in the real exchange rate. If the interest rate increases by 1%, GDP will fall by 0.005527%, GDP will also diminish by 0.278170% with a percent increase in money supply. While the interest rate, real exchange rate, and consumer price index conform to apriori expectations, money supply fail to comply as it turned negative instead of positive expectation.

The figure of Error Correction Term (ECT) according to the result stood at -0.267612, approximately 26%. Based on the error correction principle, the figure is significant and negative which provides further evidence for the earlier assertion that

the GDP indeed cointegrating with the explanatory variables. The results indicate that if there is a deviation from the initial equilibrium, only 26% speed of adjustment is corrected   monthly as the variables move towards restoring equilibrium.

Long-term coefficients are significant statistically at all levels according to table 5.3 above. It shows that a 1% rise in money supply (M2) will reduce the GDP by 0.965586% while GDP goes down also by 0.066707% with a percent increase in interest rate. If the real exchange rate increases by 1%, GDP will increase by 0.600695% and GDP reduces by 0.577517% with a 1% rise in consumer price index (CPI). Again money supply fail apriori criteria test, in the long run, and the real exchange rate though significant but interest rate and consumer price index were negative as expected and statistically different from zero.

In monetary policy transmitting mechanism, the supply of money plays a pivotal role especially in developing countries like Nigeria where a strong monetary base is often advised by the stakeholders so as to allow for smooth transmitting adjustment within the system.

However, despite the significance of money supply in the monetary policy transmitting mechanism channels, there are still some empirical paper that actually disregard supply of money to find out the reaction of GDP with different econometric techniques (Owolabi and Adegbite 2014, Abaenewe and Ndugbu, 2012, Akujuobi 2010). Though, there is no consensus among them in terms of their findings but they all conclude on the important role of money supply in the channels of transmitting mechanism.

In this study, we also try that using different method with monthly data frequency mainly to find out if the outcome will be an improvement on our results if money supply (M2) is excluded from our model (see appendix A). Though the result shows one (1) cointegrating equation at both 5 and 1 % respectively but the short -run coefficients of (interest rates, consumer price index and real exchange rate) are not significant statistically. While the real exchange rate and the consumer price index are statically significant in the long-run, interest rates also fails the significant test. The Vector Error Correction term (ECT) though negative, but it is not significant in compliance with Vector Error Correction Principle.

We also went a step further to exclude the rate of interest from the model to actually ascertain if that will lead to a substantial improvement on our results or will leave it unchanged (see appendix B). The outcome demonstrates that with or without the interest rate the results remain the same. Like we have with the full model, the removal of interest rate still leaves the long-run coefficients statistically significant with one (1) cointegrating equation at both 1 and 5% for Vector Error Correction Model and cointegration mechanism respectively. The Error Correction Term is also significantly different from zero with the right sign (negative) in compliance with Error Correction principle.

The outcome of both scenarios have demonstrated the place and the crucial role of money supply in the transmitting mechanism channels especially in a developing economy like Nigeria where stakeholders often push for a strong monetary base to facilitate economic growth and stability.

Chapter 6

CONCLUSION AND POLICY IMPLICATION

This research work has focused on the potency of monetary policy instruments on economic growth in Nigeria between the year 2000:05 and 2015:04. The work also examines if the long-term association between the variables under investigation exist. The stationarity features of the entire variables were scrutinized with the aid of widely used ADF, PP test and KPSS for validation purposes. The test for the unit root indicates that all the parameters only became stationary at first difference and were integrated in similar order I(1) after 1 cointegrating equation was recorded at both 5% and 1% respectively. The outcome of the Johansen Cointegration mechanism suggests a long-term relationship between all the variables. The possible speed with which short-run equilibrium value converge to its long-term equilibrium path is captured by the Vector Error Correction Model (VECM). In general the short-run coefficients of all the variables were not statistically significant. The figure of Error Correction Term (ECT) according to the result stood at -0.267612, approximately 26%. In line with Error Correction mechanism, the figure is negative and statistically relevant. The value means that the short-run figure of oil revenue (proxy for GDP) will converge to its long-term value by about 26% as adjustment speed to its long-term equilibrium monthly by the input of all the independent parameters. Coefficients in the long-term were all statistically significant at all levels as observed from the table. The significant coefficients of consumer price index (CPI), real exchange rate ,interest rate as well as money supply in the long -run

signifies the efficacy of the parameters as crucial impulse transmitting mechanism of monetary policy to the Nigerian economic aggregate. While the coefficient of the supply of money is negative, Real Exchange Rate maintains positive relationship with GDP as against the apriori expectations. The possible reason for the fall or negative sign in the supply of money could be a ploy by the CBN to deliberately curb inflation within the economy (i.e tight monetary policy). The positive association recorded between exchange rate and economic growth could possibly be attributed to the treat of currency substitution, fiscal dominance and political influence in Nigeria among others.

The outcomes establish that there exist an automatic mechanism in the growth of Nigerian GDP and it reacts to fluctuation from equilibrium in a steady manner .The Error Correction Term (ECT) value of (-0.267612) indicates a not too high speed of adjustment to the tune of about 26% monthly.

The study also went further to establish how the oil revenue (proxy for GDP) will possibly reacts to the removal or exclusion of both money supply (M2) and interest rate from the model at different scenarios respectively (see appendix A and B). While the outcomes provides extra evidence of the importance of money supply in the transmitting mechanism by changing the results substantially, the scenarios B of the interest rate exclusion from the model leaves the results unchanged. These has further cemented the place of money supply in the monetary policy transmitting mechanism.

Generally, this research work has demonstrated monetary policy as a potent instruments to influence economic growth subject to policy variable adopted by the

monetary authorities. The study affirms that implementing monetary policy in less developed economy like Nigeria attracts extra challenges that are not common to developed countries such as treat of currency substitution, fiscal dominance and political interference.

We can therefore conclude that most times, the incapability of the monetary policies to efficiently and effectively exploit its policy objective could be a function of pitfall of policy instruments adopted which restricts its contributions to economic progress in Nigeria. It is on this premise we recommend the following:

1. Monetary-fiscal condition should attract more efforts from the Nigerian government via emphasis on fiscal rule in order to keep inflation and also inflation expectations at a minimal rate and stable. This is done in order to ensure stability in the system and guarantee sustainability.

2. Domestic production of exportable commodities should be promoted via deliberate policy by the Nigerian government so as to ensure stability in real exchange rate and positively contribute to the Nigerian economic growth.

3. Policy on massive and expansionary mechanism capable boosting money supply to the real sector should be pursued in order to boost economic activities and enhance openness in the economy.

4. The Nigerian government should as well strive to limit the volatility of the financial system and make it more viable, efficient and effective as we have in developed economies. This will automatically allow for smooth monetary policy execution by the Central Bank of Nigeria.

REFERENCES

Adebiyi, M. A. (2006). *Financial Sector Reforms and Impact of Monetary Policy Shocks in Nigeria*: Wageningen Academy Publishers, Manholt Publication Series Volume 1.

Adefeso, H. A., & Mobolaji, H. I. (2010). The Fiscal-Monetary Policy and Economic Growth in Nigeria: Further Empirical Evidence. *Pakistan Journal of Social Sciences*. *7*(2), 137-142.

Ajayi, I. (1999). Evolution and functions of Central Banks. *Central Bank of Nigeria Economic and Financial Review*. *37*(4), 11-27.

Ajisafe, R. A., & Folorunso, B. A. (2002). The Relative Effectiveness of Fiscal and Monetary Policy in Macroeconomic Management in Nigeria. *The African Business Review. 3(1), 23 -40*

Amassoma, D., Nwosa, P. I., & Olaiya, S. A. (2011). An appraisal of Monetary Policy and Its Effect on Macro-Economic Stabilization in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences*. *2*(3), 232-237

Balogun, E. D. (2007). Monetary Policy and Economic Performance of West African Monetary Zone Countries.

Barro, R. J. (1991). A Cross-Country Study of Growth, Saving, and Government. In *National Saving and Economic Performance* (pp. 271-304). University of Chicago Press.

Bernanke, B. S. & Kuttner, K. N. (2005). What explains the Stock Market's Reaction to Federal Reserve Policy? *The Journal of Finance*. *60*(3), 1221-1257.

Borio, C. E. (1995). *The Structure of Credit to the Non-Government Sector and the Transmission Mechanism of Monetary Policy: A Cross-Country Comparison*. Bank for International Settlements, Monetary and Economic Department.

Busari, D. T., Omoke, P. C., & Adesoye, B. (2002). Monetary Policy and Macroeconomic Stabilization under Alternative Exchange Rate Regime: Evidence from Nigeria.

Christiano, L. J. Eichenbaum, M. & Evans, C. L. (1999). Monetary Policy Shocks: What have we learned and to what end? *Handbook of Macroeconomics*, *1*, 65- 148.

Chimobi, O. P., & Uche, U. C. (2010). Export, domestic demand and economic Growth in Nigeria: Granger Causality Analysis. *European Journal of Social Science 13(2) 21-43*

Cochrane, J. H. (1998). *Where is the Market Going? Uncertain Facts and Novel Theories* National Bureau of Economic Research.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. *Econometrica: Journal of the Econometric Society*. 1057-1072.

Engen, E. M., & Skinner, J. (1996). *Taxation and Economic Growth* (No. w5826). National Bureau of Economic Research.

Engle, R. F., & Granger, C. W. (1987). Co-integration and Error Correction: Representation, Estimation, and Testing. *Econometrica: Journal of the Econometric Society*. 251-276.

Engle, R. F., Granger, C. W. J., Hylleberg, S., & Lee, H. S. (1993). The Japanese Consumption Function. *Journal of Econometrics*. *55*(1), 275-298.

Fischer, S. (1977). Long-Term Contracts, Rational Expectations, and the Optimal Money Supply Rule. *The Journal of Political Economy*. 191-205.

Folawewo, A. O., & Osinubi, T. S. (2006) Monetary Policy and Macroeconomic Instability in Nigeria: A Rational Expectation Approach. *Journal of Social Sciences*. *12*(2), 93-100.

Friedman, M. (1968). *Dollars and Deficits: Inflation, Monetary Policy and the Balance of Payments*. Englewood Cliffs, NJ: Prentice-Hall.

Friedman, M. & Schwartz, A. (1963). A Monetary History of the United States.

Gertler, M. & Gilchrist, S. (1991). *Monetary Policy, Business Cycles and the Behavior of Small Manufacturing Firms*. National Bureau of Economic Research.

Granger, C. W. (1981). Some Properties of Time Series Data and their Use in Econometric Model Specification. *Journal of Econometrics*, *16*(1), 121-130.

Greene, W. H. (2003). Econometric Analysis, 5th. *Ed.. Upper Saddle River, NJ*

Gujarati, D. N. (2009). Sangeetha. *Basic Econometrics. The McGrow-Hill Companies*.

Guseh, J. S. & Oritsejafor, E. (2007) Government Size, Political Freedom and Economic Growth in Nigeria, 1960-2000. *Journal of Third World Studies*. *24*(1), 139.

Ikhide, S. I. & Alawode, A. A. (2001) *Financial Sector Reforms, Macroeconomic Instability and the Order of Economic Liberalization: The Evidence from Nigeria*. African Economic Research Consortium.

Imoughele, L. E., & Ismaila, M. (2014). Empirical Investigation of the Impact of Monetary Policy on Manufacturing Sector Performance in Nigeria: 1989 to 2012. *International Journal of Education and Research*. *2*(1), 1-20.

Ivrendi, M., & Yildirim, Z. (2013). *Monetary Policy Shocks and Macroeconomic Variables: Evidence from Fast Growing Emerging Economies* (No. 2013-61). Economics Discussion Papers.

Johansen, S., & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics*. *52*(2), 169-210

Johansen, S., & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics*. *52*(2), 169-210.

Johansen, S., & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics*. *52*(2), 169-210.

Johansen, S. (1988). Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control*. *12*(2), 231-254.

Kahn, M. Kandel, S. & Sarig, O. (2002). Real and Nominal Effects of Central Bank Monetary Policy. *Journal of Monetary Economics*. *49*(8), 1493-1519.

Katircioglu, S. (2009). Tourism, Trade and Growth: the Case of Cyprus. *Applied Economics*. *41*(21), 2741-2750.

Katircioğlu, S. T. (2010). International Tourism, Higher Education and Economic Growth: The Case of North Cyprus. *The World Economy*. *33*(12), 1955-1972.

Keynes, J. M. (1930). *A Treatise on Money: In 2 Volumes*. Macmillan & Company.

Kilian, L., Diebold, F. X., & Centre for Economic Policy Research, London (United Kingdom). (1997). *Measuring Predictability: Theory and Macroeconomic Applications*. National Bureau of Economic Research.

Koğar, Ç. İ. (1995). *Financial Innovations and Monetary Control. The Central Bank of the Republic of Turkey Research Department* (No. 9515). Discussion Paper.

Kwiatkowski, D., Phillips, P. C., Schmidt, P., & Shin, Y. (1992). Testing the Null Hypothesis of Stationarity against the Alternative of a Unit Root: How Sure Are we that Economic Time Series have a Unit Root? *Journal of Econometrics. 54*(1), 159-178.

Laidler, D. E. (1985). *The Demand for Money: Theories, Evidence, and Problems*. HarperCollins Publishers.

Lucas, R. E. (1972). Expectations and the Neutrality of Money. *Journal of economic Theory. 4*(2), 103-124.

Mishkin, F. S. (2002). The Role of Output Stabilization in the Conduct of Monetary Policy. *International Finance. 5*(2), 213-227.

Nnanna, O. J. (2001). *Monetary policy framework in Africa: the Nigerian Experience*. Working Paper Series.

Ojo, K. O. (1989) Debt Capacity Model of Sub-Saharan Africa: Economic Issues and Perspectives. *Development Policy Review*. 7(4), 393-4.

Okoro, A. S. (2013). Impact of Monetary Policy on Nigerian Economic Growth. *Prime Journal of Social Science*. 2(2), 195-199.

Oliner, S. D. & Rudebusch, G. D. (1995). Is there a Bank Lending Channel for Monetary Policy? *Economic Review-Federal Reserve Bank of San Francisco*, (2), 3.

Olubusoye, O. E., & Oyaromade, R. (2008). *Modelling the Inflation Process in Nigeria* (Vol. 182). African Economic Research Consortium.

Onyeiwu, C. (2012). Monetary Policy and Economic Growth of Nigeria. *Journal of Economics and Sustainable Development*. 3(7), 62-70.

Osterwald-Lenum, M. (1992). A note with Quantiles of the Asymptotic Distribution of the Maximum Likelihood Cointegration Rank Test Statistics1. *Oxford Bulletin of Economics and Statistics*. 54(3), 461-472.S

Phillips, P. C., & Perron, P. (1988). Testing for a Unit Root in Time Series Regression. *Biometrika*. 75(2), 335-346.

Precious, C., & Makhetha-Kosi, P. (2014). Impact of Monetary Policy on Economic Growth: A Case Study of South Africa. *Mediterranean Journal of Social Sciences*. 5(15), 76.

Rafiq, M. S. & Mallick, S. K. (2008). The Effect of Monetary Policy on Output in EMU3: A Sign Restriction Approach. *Journal of Macroeconomics*. *30*(4), 1756-1791.

Sanusi, J. O. (2002). Central Bank and the Macroeconomic Environment in Nigeria. *Lecture Delivered to Participants of the Senior Executive Course*, (24).

Tobin, J. (1978). A Proposal for International Monetary Reform. *Eastern Economic Journal*. *4*(3/4), 153-159.

Turan Katircioglu, S., Kahyalar, N., & Benar, H. (2007). Financial Development, Trade and Growth Triangle: the Case of India. *International Journal of Social Economics*. *34*(9), 586-598.

Umole, J. A. (1985). *Monetary and Banking Systems in Nigeria*. Adi Publishers. Jhingan, M. L. (1997). Macro. *Economic Theory*.

Wogin, G. (1980). Unemployment and Monetary Policy under Rational Expectations Some Canadian Evidence. *Journal of Monetary Economics*. *6*(1), 59-68.

Zhang, W. (2009). China's Monetary Policy: Quantity Versus Price Rules. *Journal of Macroeconomics*. *31*(3), 473-484.

APPENDICES

Appendix A: (Removal of Money supply from the model)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.221938	73.74737	53.12	60.16
At most 1	0.074188	29.83126	34.91	41.07
At most 2	0.061277	16.34152	19.96	24.60
At most 3	0.029696	5.275468	9.24	12.97

Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels
*(**) denotes rejection of the hypothesis at the 5%(1%) level

Vector Error Correction Model (VECM)

Cointegrating Eq:	CointEq1
LREV(-1)	1.000000
LRER(-1)	4.378198 (1.16711) [3.75133]
LINT(-1)	-0.131241 (0.12918) [-1.01598]
LCPI(-1)	-3.525572 (0.32117) [-10.9773]
C	-26.40123

Error Correction:	D(LREV)	D(LRER)	D(LINT)	D(LCP
CointEq1	-0.020340 (0.01512) [-1.34492]	-0.003107 (0.00472) [-0.65887]	0.069840 (0.05782) [1.20795]	0.0096 (0.0037 [2.5907
D(LREV(-1))	0.002660 (0.07788) [0.03416]	-0.016167 (0.02428) [-0.66584]	-0.204497 (0.29773) [-0.68685]	-0.0389 (0.0191 [-2.0375
D(LREV(-2))	-0.003297 (0.07717) [-0.04273]	-0.065463 (0.02406) [-2.72059]	-0.475844 (0.29504) [-1.61280]	0.0827 (0.0189 [4.3684
D(LRER(-1))	-0.259435 (0.24511) [-1.05845]	0.344688 (0.07642) [4.51034]	0.529095 (0.93706) [0.56463]	0.0254 (0.0601 [0.4236
D(LRER(-2))	-0.004417 (0.24884) [-0.01775]	-0.126317 (0.07759) [-1.62811]	-0.454044 (0.95133) [-0.47727]	-0.0609 (0.0610 [-0.9989

50

D(LINT(-1))	0.000641	-0.010247	0.280685	-0.006959
	(0.02055)	(0.00641)	(0.07858)	(0.00504)
	[0.03116]	[-1.59899]	[3.57218]	[-1.37992]
D(LINT(-2))	-0.003610	-0.006580	0.015072	0.001943
	(0.02072)	(0.00646)	(0.07920)	(0.00508)
	[-0.17426]	[-1.01875]	[0.19030]	[0.38225]
D(LCPI(-1))	-0.103285	-0.128483	0.104856	0.056807
	(0.29674)	(0.09252)	(1.13444)	(0.07281)
	[-0.34807]	[-1.38873]	[0.09243]	[0.78017]
D(LCPI(-2))	-0.029740	0.047734	0.895677	-0.097532
	(0.29453)	(0.09183)	(1.12599)	(0.07227)
	[-0.10098]	[0.51981]	[0.79546]	[-1.34954]
C	0.022083	0.004648	0.002256	0.008945
	(0.00598)	(0.00186)	(0.02287)	(0.00147)
	[3.69187]	[2.49234]	[0.09864]	[6.09457]

R-squared	0.026239	0.180026	0.112498	0.177547
Adj. R-squared	-0.026239	0.135836	0.064669	0.133224
Sum sq. resids	0.395356	0.038433	5.778405	0.023805
S.E. equation	0.048656	0.015170	0.186014	0.011939
F-statistic	0.499992	4.073890	2.352073	4.005690
Log likelihood	289.0624	495.3443	51.69682	537.7379
Akaike AIC	-3.153248	-5.484116	-0.471151	-5.963140
Schwarz SC	-2.973804	-5.304673	-0.291707	-5.783697
Mean dependent	0.020034	0.002886	-0.002752	0.009398
S.D. dependent	0.048030	0.016319	0.192337	0.012824

Determinant resid covariance (dof adj.)	2.47E-12
Determinant resid covariance	1.96E-12
Log likelihood	1381.357
Akaike information criterion	-15.11137
Schwarz criterion	-14.32182

Appendix B: (Removal of Interest Rate from the model)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.255288	81.15075	53.12	60.16
At most 1	0.088337	29.56819	34.91	41.07
At most 2	0.053463	13.38325	19.96	24.60
At most 3	0.021301	3.767900	9.24	12.97

Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels
*(**) denotes rejection of the hypothesis at the 5%(1%) level

Vector Error Correction Model (VECM)

Cointegrating Eq:	CointEq1
LREV(-1)	1.000000
LRER(-1)	0.571893 (0.22286) [2.56621]
LM2(-1)	-0.895712 (0.07200) [-12.4408]
LCPI(-1)	-0.666477 (0.16974) [-3.92635]
C	-6.479153

Error Correction:	D(LREV)	D(LRER)	D(LM2)	D(LCP
CointEq1	-0.267272 (0.06542) [-4.08573]	0.019905 (0.01923) [1.03525]	-0.155782 (0.05905) [-2.63803]	-0.0191 (0.0164 [-1.1646
D(LREV(-1))	0.186041 (0.12597) [1.47691]	-0.018152 (0.03702) [-0.49026]	0.052725 (0.11371) [0.46367]	-0.0257 (0.0317 [-0.8116
D(LREV(-2))	0.130820 (0.13485) [0.97009]	-0.274108 (0.03964) [-6.91549]	0.197639 (0.12173) [1.62353]	0.1968 (0.0339 [5.7989
D(LRER(-1))	-0.273453 (0.23153) [-1.18107]	0.329169 (0.06805) [4.83697]	-0.075645 (0.20901) [-0.36193]	0.0785 (0.0582 [1.3482
D(LRER(-2))	-0.004823 (0.23342) [-0.02066]	-0.091611 (0.06861) [-1.33525]	-0.028455 (0.21072) [-0.13504]	-0.0511 (0.0587 [-0.8697

D(LM2(-1))	-0.265167	0.013725	-0.157232	-0.013075
	(0.14697)	(0.04320)	(0.13268)	(0.03700)
	[-1.80417]	[0.31771]	[-1.18507]	[-0.35338]
D(LM2(-2))	-0.186786	0.307806	-0.275880	-0.155603
	(0.16057)	(0.04720)	(0.14495)	(0.04042)
	[-1.16324]	[6.52170]	[-1.90323]	[-3.84938]
D(LCPI(-1))	-0.215339	-0.066747	-0.350925	0.068067
	(0.27941)	(0.08212)	(0.25223)	(0.07034)
	[-0.77070]	[-0.81275]	[-1.39131]	[0.96772]
D(LCPI(-2))	-0.164687	0.019399	-0.235043	-0.072407
	(0.28179)	(0.08283)	(0.25438)	(0.07094)
	[-0.58442]	[0.23421]	[-0.92398]	[-1.02070]
C	0.025784	0.003196	0.024771	0.008677
	(0.00562)	(0.00165)	(0.00507)	(0.00141)
	[4.58938]	[1.93522]	[4.88412]	[6.13519]

R-squared	0.107755	0.332279	0.066749	0.206831
Adj. R-squared	0.059670	0.296294	0.016454	0.164085
Sum sq. resids	0.362259	0.031297	0.295208	0.022957
S.E. equation	0.046575	0.013690	0.042044	0.011725
F-statistic	2.240932	9.233840	1.327159	4.838633
Log likelihood	296.7996	513.5224	314.9138	540.9464
Akaike AIC	-3.240674	-5.689519	-3.445354	-5.999394
Schwarz SC	-3.061230	-5.510076	-3.265910	-5.819951
Mean dependent	0.020034	0.002886	0.016614	0.009398
S.D. dependent	0.048030	0.016319	0.042394	0.012824

Determinant resid covariance (dof adj.)	3.38E-14
Determinant resid covariance	2.68E-14
Log likelihood	1760.990
Akaike information criterion	-19.40101
Schwarz criterion	-18.61146