Monetary policy and exchange rate stability in Nigeria

Okwu Joseph Nnanna

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Dr. O. J. Nnanna*

I.   INTRODUCTION

This paper examines the interplay between monetary policy and exchange rate regime in an import dependent economy. In choosing their monetary policy and exchange rate regimes, policy makers are bound to make tradeoffs among three values: credibility, flexibility and stability. The need to maintain a high interest rate regime in order to sustain an overvalued exchange rate, or the adoption of a fixed exchange rate in order to fight inflation, implies the maximization of policy credibility vis-a-vis flexibility.

The centrality of exchange rate in the formulation of monetary policy derives from the fact that for most countries, the overriding objective of monetary policy is price stability. Consequently, volatility in the exchange rate is generally counter-productive to the goals of price stability. This explains the political sensitivity of exchange rate regimes in both developing and developed economies.

Nigeria's monetary policy is anchored on the monetary targeting framework and price stability represents the overriding objective of monetary policy. This represents a significant departure from the past, when the promotion of rapid growth and employment represented the major objective of policy. The focus on price stability derives from the overwhelming empirical evidence that sustainable growth cannot be achieved in the midst of price volatility. There is indeed, a general

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*Dr. O. J. Nnanna is Director of Research, Central Bank of Nigeria.

consensus that domestic price volatility undermines the value of money as a store of value, and frustrates investments and growth.

The framework and strategies, which have been adopted by the CBN in achieving the goal of price and exchange rate stability, is the main objective of this paper. The rest of the paper is organized as follows; section II discusses the theoretical issues in monetary policy and exchange rates. In section III a review and appraisal of monetary and exchange rate policies in Nigeria from inception is presented. An empirical analysis, using the VAR modeling technique, evaluates the main determinants of exchange rate stability in Nigeria in section IV, while section V discusses the limits of monetary policy. Section VI concludes the paper.

II.   MONETARY POLICIES AND EXCHANGE RATE STABILITY

II.1   Theoretical Review

Several scholars (Mundell, 1968 and Mckinnon, 1971) consider exchange rate policy as a facet of monetary policy. Views on the appropriate choice of monetary policy framework and exchange rate regime have gone full circle. Despite the plethora of theoretical and empirical works, a general consensus on the "right" policy framework is yet to emerge. Thus, as Van't dack (2001) observed, a right strategy under a particular economic and financial environment in which it is deployed, stands to enjoy acceptability and in turn , will grant the central bank the credibility which would further amplify its effectiveness.

Numerous regimes have been considered in the literature, ranging from the extreme regimes, such as the fixed exchange rates (currency board and unions) to a completely free float, to intermediate regimes (adjustable or crawling peg and target zones/crawling bands). There are a number of theoretical arguments and experiences about the relative stability of the exchange rate under these regimes. However, the choice of regime has great implications for the monetary policy of a country.

The early literature focused on the question whether a country would be better off or otherwise, under a fixed or flexible exchange rate arrangement. Most of the empirical works suggest that small open economies are better served under a fixed exchange rate regime. Similarly, it has been argued that: the less diversified a country's export and production structure and more geographically concentrated its trade, the stronger the case for the country to adopt a fixed exchange rate regime (World Economic Outlook, October 1997 and Flood et al, 1989). Consequently, policy makers adopt a fixed exchange rate regime in the hope of gaining credibility in

their fight against inflation. The use of fixed exchange rate as a commitment technique to control inflation is relatively common in Latin American countries (Frieden et al, 2000). Nevertheless, while fixing the exchange rate may provide price stability, it however, undermines policy flexibility, which can have serious implications for internal and external balance.

A major consideration as to the choice of an exchange rate regime focuses on the effect of various random shocks on the domestic economy. Thus, the optimal regime is that which ensures macroeconomic stability. Overall, there is a general consensus in the literature that a greater degree of fixity is preferred if the source of macroeconomic instability is predominantly endogenous. Conversely, a flexible regime is preferred if disturbances are predominantly exogenous in nature.

Generally, a fixed exchange rate regime entails the pegging of the exchange rate of the domestic currency to a reference currency. Pegging generally implies the loss of monetary discretion. The advantages and disadvantages of the pegging regime have been discussed extensively in the literature (Greene, 2000 and Nnanna, 2001). Overall, a fixed exchange rate regime has become increasingly hard to defend in a globalised financial market as the recent Argentine experience demonstrates.

The floating exchange rate regime on the other hand implies that the forces of demand and supply will perforce, determine the exchange rate. A floating exchange rate regime serves as a "buffer" for external shocks and allows monetary policy makers full discretion in the manipulation of monetary aggregates. Several disadvantages of the floating regime have been documented. These include persistent exchange rate volatility, higher inflation, and transaction cost.

By far the greatest advantage of the floating regime is monetary policy independence. This is based on the claim that monetary policy independence can be achieved under a freely floating exchange rate regime. Monetary policy independence is defined in terms of a country's ability to control its monetary aggregates and influence its domestic interest rate.

II.2 Monetary Targeting: Conceptual Issues and the Computation of Excess Liquidity.

Monetary targeting involves the use of market (indirect) and non-market (direct) instruments to control key monetary aggregates. Thus, it entails setting and continuously, monitoring the changes in one or more definitions of money supply. Under this framework, the ultimate objective of monetary policy is to control inflation. Generally, the operational target is base money, while the intermediate target is broad money (M2). Monetary targeting is predicated on the empirical

evidence, which has established that inflation, is invariably, a monetary phenomenon. Hence, the need for monetary authorities to restrain excessive growth in money supply.

Lessons of experience have shown that macroeconomic stability (low inflation rate, exchange rate stability and low interest rate), has always been achieved whenever, excessive growth in money supply is contained. As an illustration, consider for example, this basic demand for money equation[1].

$$M_t = p_t + ky_t - \eta i_t + qnfa_t + v_t \quad \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where:

M_t = Money demand
p_t = Price level
y_t = Output level
i_t = Interest rate
nfa_t = reserve accretion
v_t = error term, assumed white noise

It can be readily seen that given projections for (y_t), (i_t), $qnfa_t$ and (p_t) the conditional behaviour of (M_t) can be forecasted using equation (1) above. Typically, a further manipulation of the equation will result in the derivation of the probability intervals for (M_t) which may depend on the stochastic process, which drive (v_t). Thereafter, we can then compare the forecasted values with the actual computed money supply. Accordingly, any deviation between the two would translate to either overshooting/ undershooting of the M2 target, which would naturally signal for corrective policy action.

Operationally, the derivation of the optimum level of liquidity is a highly technical process, which involves the use of elaborate econometric modeling and manipulation of the Central Bank's balance sheet. The key variables in the model, include:

$\hat{Y}$ = The predicted output growth rate
$\hat{II}$ = The predicted inflation rate
$\hat{R}$ = The predicted interest rate
$\widehat{NFA}$ = The assumed accretion to reserve.

Given these variables and holding constant the velocity of money, one can readily compute the optimum level of liquidity and the aggregate net domestic credit to the economy, using CBN's balance sheet as follows:

$$NDC = M2 - NFA - OAN \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

[1] The CBN's model for monetary targeting is quite elaborate and beyond the focus of this paper.

$$\Delta NDC = \Delta M2 - \Delta NFA - \Delta OAN \quad \text{.............................} (3)$$

Where,

NFA = Net Foreign Asset

OAN = Other Assets Net

The aggregate domestic credit can be further decomposed into credit to Government (DCG) and credit to the private sector (DCP). Having determined the level of government deficit to be financed by the banking system, credit to the private sector can be derived as a residual:

$$\Delta DCP = \Delta NDC - \Delta DCG \quad \text{...............................} (4)$$

The DCP so derived becomes the maximum amount of increase in credit to be extended to the private sector. The framework just described had formed the basis of the credit ceiling imposed on individual banks until they were dispensed with in September 1993.

Under the indirect approach, the level of liquidity, which is consistent with the achievement of macroeconomic objectives, has continued to be determined by the CBN but the achievement of the target is through the control of base money (B). Under the monetary targeting framework described above, base money, is the operational target, M2 the intermediate target, while inflation is the ultimate target. The feasibility of controlling bank credit and hence money supply in this way hinges on the empirical evidence that deposit money banks generally maintain a stable relationship between their reserves (vault cash and deposit with CBN) and the amount of credit they extend to the public.

Conventionally, base money is made up of currency with non-bank public (Cp) and cash reserves of banks (R) comprising vault cash and balances held with the CBN. The main sources of base money (B) are: Net CBN Claims on Government (NCGCB), Net Foreign Assets (NFACB), and Other Assets (net) of the CBN (OACB). Thus, the balance sheet identity of the CBN can be written as:

$$NCGCB + NFACB + OACB = Cp + R + B \quad \text{........................} (5)$$

The process of money creation derive from the knowledge that banks can and do expand money supply by a multiple of reserves available to them. This is exhibited in the relation:

$$M2 = m.B \quad \text{...} (5a)$$

where,

$M2$ = Money Supply broadly defined

$$m \quad = \quad \text{Money Multiplier}$$

$$B \quad = \quad \text{Base Money}$$

Also, $M2 \quad = \quad Cp + D$ .... (5b)

From (4), (5a), and (5b), the multiplier may be derived as:

$$m \quad = \quad M2/B = (Cp + D) / (Cp + R) \quad .... \quad (6a)$$

Dividing both the numerator and denominator of the R.H.S of equation (6a) by D, we have;

$$M \quad = \quad (Cp/D + D/D)/(Cp/D + R/D) \quad .... \quad (6b)$$

Or

$$M \quad = \quad (1 + c)/(c+r) \quad .... \quad (7)$$

Where,

$$D \quad = \quad \text{Deposits held by banks}$$

$$c \quad = \quad \text{ratio of currency to deposits}$$

$$r \quad = \quad \text{ratio of bank reserves to deposits;}$$

all other variables are as previously defined.

Following from equation (7), equation (6a) may be re-written as follows:

$$M2 \quad = \quad \{(1+c)/(c+r)\}(R+Cp) \quad .... \quad (8)$$

Equation (8) can be used to estimate the level of money supply arising from a given level of base money (B) and the multiplier. Consequently, the Central Bank can control money supply (M2) through changes in bank reserves (r) and currency outside banks (Cp) which, as shown above, is comprised of its known liabilities. The Central Bank can also influence the multiplier (m) in the desired direction. The currency-to-deposits ratio (c) is a function of the preference of economic agents for holding money either in the form of currency or demand deposits. While this ratio is generally thought to be outside the control of the Central Bank, it is known to be sensitive to interest rate movements. Thus, bank reserves to deposit ratio (r) may be influenced by monetary policy instruments such as interest rate and Open Market Operations (OMO). More importantly, (r) can be directly influenced by the Central Bank through the use of reserve requirements.

III. REVIEW OF MONETARY AND EXCHANGE RATE POLICIES IN NIGERIA

III.1 Pegging Regime

The CBN did not have an independent monetary policy during its first decade of existence. The instrument of monetary policy at that time was the exchange rate, which was fixed at par with the British Pound. This was very convenient, as fixing the exchange rate provided a more effective mechanism for the maintenance of balance of payments viability and controlling inflation in the Nigerian economy. The fixed parity system lasted until 1967 when the British Pound was devalued. Thereafter, the Nigerian currency was pegged to the US dollar.

However, following the international financial crisis of the early 1970's, which led to the devaluation of the U.S. dollar, Nigeria abandoned the dollar peg and once again kept faith with the pound, until 1973, when the Nigerian currency was once again pegged to the US dollar.

With these developments, the severe drawbacks in pegging the Nigerian currency (naira) to a single currency became obvious. A clear case was that the naira had to undergo a de-facto devaluation in sympathy with the dollar when the economic fundamentals dictated otherwise, in 1973 and 1975 respectively. It was against this backdrop that the need to manage the exchange rate of the naira was firmly established. Hence, in 1978 Nigeria pegged her currency to a basket of 12 currencies of her major trading partners. This experiment led to a considerable stability in the naira exchange rate but there was ample evidence, following the economic crisis in 1981 that the exchange rate was overvalued against the US dollar. With respect to macroeconomic outcome, historical data (fig. 1 and 2) showed that changes in monetary aggregates and prices were fairly stable, while growth in output and budget deficit were very significant.
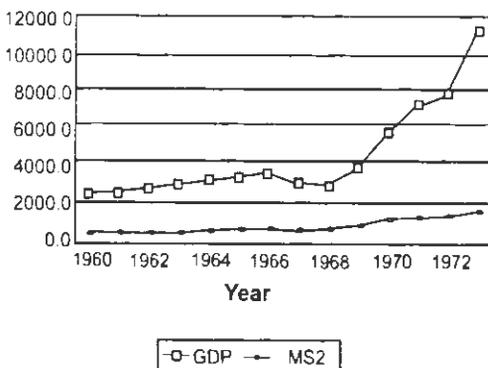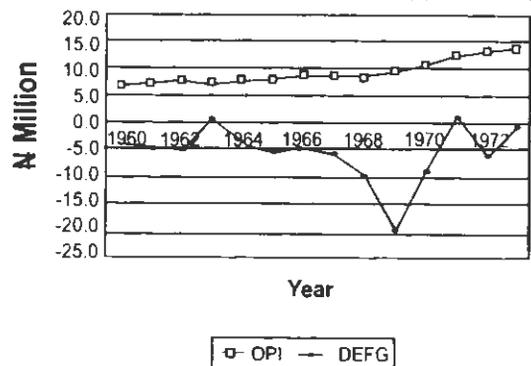

Fig. 1
Money Supply and Output (1960 - 1973)

Fig. 2
Prices and Budget Deficit (% of GDP) (1960 - 1973)

III.2 Monetary Targeting Regime (1974 -date)

The Central Bank of Nigeria (CBN) relied on the monetary targeting policy framework, for the conduct of its monetary policy under two regimes at different periods, namely, during the direct control regime and under the indirect control regime.

III.2.1 Direct Control (1974 - 1992)

The main objective of monetary policy during this period was to promote rapid and sustainable economic growth. Consequently, the monetary authorities imposed quantitative interest rate and credit ceilings on the deposit money banks, and enforced sectoral credit allocation to the various sectors of the economy. Overall, the "preferred" sectors of agriculture, manufacturing and construction were singled out for the most favoured treatment, in terms of generous credit allocation and below market lending rate.

The most important instrument of monetary control the CBN relied upon was the setting of targets on aggregate credit to the domestic economy and the prescription of low interest rate. With these instruments, the monetary authority attempted to direct the flow of loanable funds with a view to promoting rapid development through the provision of finance to the "growth" sectors of the economy. The pro-active stance of monetary policy was justified especially, as the country's financial markets were undeveloped. The credit ceiling on individual banks to the "preferred" sectors of the economy, which was fixed at 30-40 per cent of banks' aggregate loans and advances in the early 1980s, was later reduced to 7 per cent in 1985, while the number of sectors was reduced from about 18 in the early 1970s to 4 sectors in 1986.

The level and structure of interest rates were administratively determined by the CBN. Both deposit and lending rates were fixed in order to attain by fiat, the social optimum in resource allocation. These rates were typically below the CBN's minimum rediscount rate (MRR), and were not determined by market forces.

Empirical evidence during the control regime era revealed that the flow of credit to the priority sectors did not meet the prescribed targets and failed to impact positively on investment, output and domestic price level. For instance between 1972 and 1985, banks' aggregate loans to the productive sector averaged 40.7 per cent, of total credit, about 8.7 percentage points lower than the stipulated target of 49.4 per cent.

A major factor, which impaired the effectiveness of monetary policy during the era of control regime, was lack of instrument autonomy by the Central Bank.

During this period, monetary policy was largely dictated by the Ministry of Finance and as such, was influenced by short-term political considerations. The need for instrument autonomy is predicated on the fact that Central Banks' autonomy has strong positive influence on its monetary management and its ability to achieve its monetary policy objective. There is ample empirical evidence to support the goals of Central Banks autonomy (Fisher, 1994; Ojo, 2000).

The emergence of severe economic difficulties in 1985 forced Nigeria to adopt the Structural Adjustment Programme (SAP), as a policy option to put the economy back on the path of sustainable growth. The programme entailed, among others, reforming and dismantling the control regime which was characterised by a system of fixed credit allocations, subsidized and regulated interest rate regime, exchange controls and import licensing. Overall, the emergence of SAP ushered a regime of financial sector reforms characterised by free entry and exit of banks and the use of indirect instruments of monetary controls, which marked the start of the current monetary policy framework as discussed hereunder.

III.2.2   *Indirect Monetary Control (1993 - date)*

Beginning from September 1993, the CBN embarked on selective removal of all credit ceilings for banks that met some set criteria under the (Basle Committee) prescribed prudential guidelines. While the Ministry of Finance continued to exert influence on the conduct of monetary policy, efforts were made by the political leadership to strengthen the Central Banks' Act and to render the Bank less dependent on the Ministry of Finance. The first of such law was the CBN Decree 24 of 1991 and the Banks and Other Financial Institutions Decree (BOFID) 25 of 1991. This was followed by the CBN (Amendment) Decree Number 37 of 1998 and Banks and Other Institutions, BOFI. (Amendment) Decree Number 38 of 1998. Overall, the CBN Act as amended granted it more discretion and autonomy in the conduct of monetary policy.

The operational framework for the indirect monetary policy management involved the use of market (indirect) instruments, namely, the open market operations (OMO), to regulate growth in major monetary aggregates. Under this framework, only the operating variable, viz. the monetary base, or its components is managed while the market is left to determine the interest rates and credit allocations.

Open Market Operations (OMO)

The major instrument of indirect monetary control in Nigeria is the Open Market Operations (OMO). The OMO was introduced at the end of June 1993

and is conducted wholly on Nigeria Treasury Bills (NTBs), including Repurchase Agreements (REPOS). This operation entails the sale or purchase of eligible bills or securities in the open market by the CBN for the purpose of controlling base money, which in turn, influences deposit money banks's reserve balances. By targeting bank reserves (through OMO), the CBN attempts to keep the base money and eventually, broad money supply (M2) at levels adequate for non-inflationary economic activities, as described in equation (1) and elaborated in equations 2-8 above.

The targeting of OMO begins with the computation of the optimal level of liquidity in the banking system as earlier shown. Optimality implies that the level of liquidity is related to the absorptive capacity of the economy. This is followed by the estimation of the total supply of bank reserves. Any excess supply of bank reserves over demand is sterilised, using OMO.

Reserve Requirements

The CBN complements the use of OMO with reserve requirement. In this connection, reserve requirement is both an instrument for liquidity management and prudential regulation. The reserve requirements are the Cash Reserve Ratio (CRR) and the Liquidity Ratio (LR). While the former is computed as a proportion of the total deposit liability of banks, which are deposited with the CBN, the latter refers to the proportion of banks' liquid assets to their total deposit liabilities. The CRR is a very potent instrument and has been progressively increased from 6 per cent in 1995 to 8 per cent in 1997 and then to 12.5 per cent in April 2001. Similarly, the liquidity ratio has been increased from 30 per cent in 1998 to 40 per cent in April 2001.

The Minimum Rediscount Rate (MRR) is also used to influence the level and direction of other interest rates in the domestic money market and thus, its rate of change determines whether the monetary authorities wish to adopt a policy of monetary ease or otherwise. It was recently reviewed upwards from 18.5 per cent in June 2001 to 20.5 per cent in September 2001 in order to contain the rapid monetary expansion, arising from the expansionary fiscal policy of the three tiers of government.

To date, other instruments such as the CBN certificate, as well as Moral Suasion have been used. Overall, CBN's experience with monetary targeting has been characterised with the problem of target overshooting as shown below:

Variables	1993	1994	1995	1996	1997	1998	1999	2000	2001
Money Supply (M2)									
Performance	49.8	39.1	19.4	25.7	16.9	23.3	31.0	48.1	28 0
Target	*18.0*	*14.8*	*10.1*	*16.8*	*15.0*	*15.6*	*10.0*	*14.6*	*12.2*
Money Supply (M1)									
Performance	59.7	45.9	16.3	26.3	18.2	20.5	18.0	62 2	26.1
Target	*20.0*	*21.4*	*9.4*	*14.5*	*13.1*	*10.2*	*4.1*	*9.8*	*4.3*
Aggregate Credit (net)									
Performance	91.4	52.6	7.4	-23.4	-2.8	46.8	30.1	-23.1	87.8
Target	*17.5*	*9.4*	*11.3*	*12.0*	*24.8*	*24.5*	*18.3*	*27.8*	*15.8*
Credit to Govt. (Net)									
Performance	121.6	63.0	-9.5	-55.6	-53 5	144.9	32.0	-162 3	153 2
Target	*14.5*	*0.0*	*5.6*	*0.0*	*0.0*	*0.0*	*10.2*	*37.8*	*2.6*
Private Sector Credit									
Performance	51.6	31.7	48.0	23.9	23 9	27.4	29.2	30.9	40 7
Target	*20.0*	*32.0*	*21.7*	*29.5*	*45.4*	*33.9*	*19.9*	*21.9*	*22.8*

Fiscal dominance is largely responsible for the non-achievement of targets.

III.3 Exchange Rate Regimes under the Monetary Targeting Framework
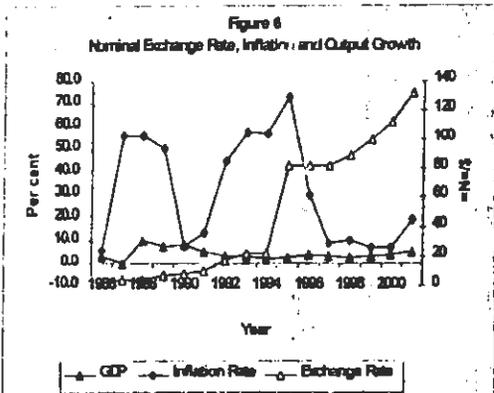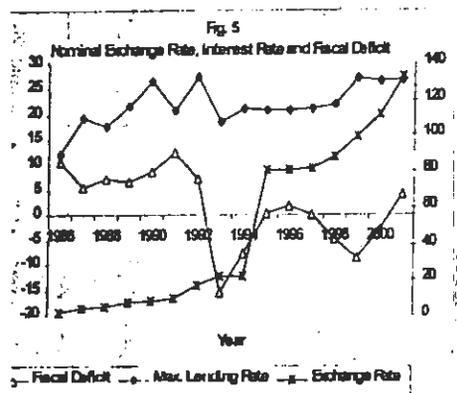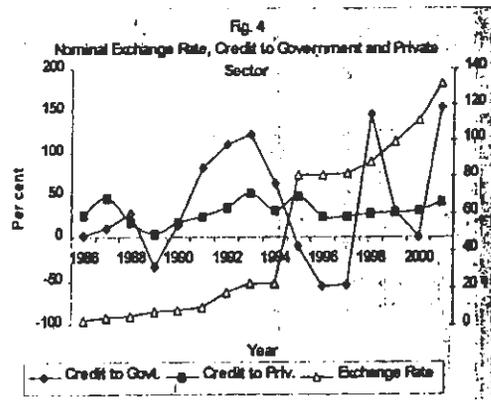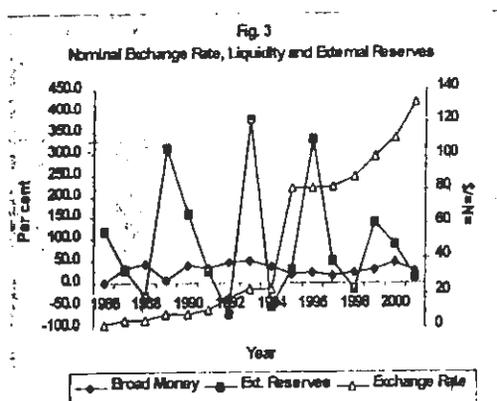
Since the deregulation of the economy in 1986, there has been a shift from controls, including quantitative restrictions in the form of import and export-licensing requirements to a market determined exchange rate. The objective of exchange rate policy in the monetary targeting era has been the maintenance of balance of payments viability and exchange rate stability. Consequently, a managed flexible exchange rate regime was adopted without strong commitment to defending any particular parity. This policy objective was briefly undermined during the Buhari and Abacha regimes. The exchange rate systems and its management under the monetary targeting framework are discussed below.

The Dual Exchange Rate System

The naira was floated under the Second-Tier Foreign Exchange Market (SFEM). At its commencement, a dual exchange rate for the allocation of foreign exchange was adopted, in which transitional transaction items such as: debt service payments and official transfers were settled at the first-tier rate. The SFEM rate was determined under an auction system. The SFEM witnessed several changes, with constant fine-tuning of the operational modalities in order to ensure a stable and realistic exchange rate of the naira.

The first phase of the auction ran from September 26, 1986 to October 2, 1986, under which bidding was done weekly and the exchange rate was arrived at through the average of all bids submitted (Average Rate Pricing System). This was

later modified and the auction was then based on Marginal Rate Pricing Principle owing to the downward trend noticed in the nominal exchange rate. Between March 1987 and December 1988, the "Dutch Auction System" (DAS) was adopted and the frequency of bidding was changed from weekly to fortnightly. The depreciation experienced during this period was largely attributed to the inability of the government to maintain fiscal discipline. As shown by figures 3 and 4 below, growth in liquidity was substantial. Indeed, money supply (M2) grew from 19.2 per cent in 1986 to 42.6 in 1988 before declining to 8.0 in 1988. While, aggregate credit to the domestic economy also grew from an initial 12.7 per cent in 1986 to 87.8 in 2001. An examination of the composition of aggregate credit revealed that private sector credit declined, while credit to government increased substantially and was a major source of liquidity in the system. The monetary policy of direct control meant that domestic interest rate was not responsive to changes in exchange rate as shown in figure 5. However, with respect to the ultimate objectives of monetary policy at that time, the economy witnessed output growth, while inflation rose substantially, in response to the volatility in the exchange rate.

Fig. 3
Nominal Exchange Rate, Liquidity and External Reserves

Fig. 4
Nominal Exchange Rate, Credit to Government and Private Sector

Fig. 5
Nominal Exchange Rate, Interest Rate and Fiscal Deficit

Figure 6
Nominal Exchange Rate, Inflation and Output Growth

The Unified Exchange Rate System

In July 1987, the first and second-tier markets were merged into the Foreign Exchange Market (FEM). This merger increased demand pressures and contributed to the persistent depreciation of the naira. Thus, in 1988 banks were allowed to transact official foreign exchange business among themselves and an autonomous market for privately sourced foreign exchange emerged with its own rate.

The Autonomous Foreign Exchange Market (AFEM)

The autonomous foreign exchange market (AFEM), was introduced in 1995 in order to redress the distortions occasioned by the introduction of a fixed exchange rate regime under the Abacha administration. The AFEM was the window, which catered for the foreign currency needs of private economic agents. It operated side-by-side with the official foreign exchange window in which the exchange rate was fixed. The AFEM was introduced to minimise market distortions. The AFEM witnessed less demand pressure because of its numerous documentation requirements - as a result, the exchange rate was relatively stable. However, the naira was generally very volatile in the parallel market during the AFEM system.

Inter-Bank Foreign Exchange Market (IFEM)

In October 1999, there was a transition from the AFEM to IFEM. In the AFEM, the CBN was a major source of supply of foreign exchange while the authorised dealers only purchased on behalf of their customers at the rate determined by the Bank. Although relative stability was maintained in the AFEM, the need to broaden and deepen the foreign exchange market prompted the introduction of the IFEM. The market was envisaged to be purely private sector funded. In terms of performance, a review of developments in the IFEM revealed that stability prevailed at the inception. However, exchange rate instability has since re-emerged, as a result of the persistent expansionary fiscal policy and excess liquidity in the system. Figure 3 shows that the rate of depreciation was generally higher at low levels of reserve. Thus, the level of reserves is also a determinant of exchange rate stability. It is therefore not surprising that from 1996 when the country started recording low and sometimes negative growth rate in external reserve vis-a-vis its external commitments, the exchange rate has become unstable, particularly during the IFEM than AFEM.

IV.   DETERMINANTS OF EXCHANGE RATE INSTABILITY

This section attempts to support the main quantitative deductions in the previous section with empirical evidence of the main causes of exchange rate instability in Nigeria. As has been observed, the fiscal actions of government, the concomitant actions of the monetary authority through its monetary policy (tight or expansionary), and the reaction of economic agents to these actions have profound effect on the stability of the exchange rate. Thus, exchange rate performance can be attributable to various shocks. This could be external shock, consequent on changes in external reserves for purposes of fiscal adjustment, domestic shocks such as liquidity, domestic prices, shocks and other financial shocks, associated with monetary intervention instruments. Thus, variables such as liquidity (proxied by base money), intervention rate (treasury bills rate), price level (inflation rate), external reserve, and parallel market rate form the main determinants.

The theoretical explanations for the use of the above variables as determinants of exchange rate stability abound in the literature (Ndekwu, 1997; Ray and Chatterjee, 2001; Longworth and Murray, 1988). The exchange rate in the parallel market is often more depreciated than the official rate and provides a reasonable indication of the degree of misalignment in the official exchange rate. Thus, movements in the parallel market rate, which drive the premium, have great implication to the stability in the official exchange rate.

The hypotheses above was tested using a four equation unrestricted vector autoregression (VAR) model. A choleski-type identification scheme was also used to discern the impulse responses. The data for the model was obtained from the CBN databases and covers the period coinciding with the beginning of the new monetary policy framework. That is, from first quarter of 1993 to the last quarter of 2001.

IV.1   Empirical Results [2]

The empirical analysis tested for the time series properties in the data. Here, we employed the standard Augmented Dickey-Fuller (ADF) and Philips-Peron tests. All the variables — exchange rate, inflation rate, treasury bills rate, external reserves and base money were difference stationary, while the parallel market rate was levels stationary (Appendix table 1).

Results from the VAR are presented in Appendix table 2. However, it is worth mentioning that the VAR was very stable (Chart 1). The variance decomposition analysis is shown in table 3.

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[2]Other supporting results relating to lag order selection, VAR stability test, etc are available on request.

Impact of CBN's Monetary Actions on Exchange Rate

Results show that there was indeed an inverse relationship between exchange rate and the CBN intervention rate (treasury bills rate). Consequently, higher treasury bills rate results in exchange rate appreciation after one quarter but more significantly after four quarters. Thus, the exchange rate/money market trade-off was confirmed in the model. Indeed, the impulse response indicated that, a one-standard deviation shock or innovations to interest rate appreciates the exchange rate with a one-quarter lag and after four quarters the effect tapers off and an upward trend was observed. The variance decomposition showed that 60 per cent of the variation in exchange rate was explained by own shocks, and that from the fifth period an equivalent variation in exchange rates was explained by monetary shocks (CBN intervention). This variation diminishes thereafter but was still very substantial at about 54 per cent. Overall, a one-percentage increase in treasury bills rate will induce a 0.02 and 0.04 percentage point appreciation in exchange rate in the first and fourth quarters, respectively.

Liquidity (proxied by base money) on the other hand was properly signed and significant only at the 10 per cent level. This is not surprising because of the strong relationship between base money and the CBN intervention rate.

Impact of Inflation on Exchange Rate

Inflation outcomes are closely associated with exchange rate expectations. The VAR result confirmed the existence of a significant relationship between inflation and exchange rate. Indeed a one-percentage point increase in inflation induced 0.02 percentage depreciation in the exchange rate with a one-quarter lag. This result was also confirmed by the impulse response of exchange rate to a one standard deviation shock to prices and vise versa. The variance decomposition also reveals a 12 per cent variation in exchange rate as a result of price shock and this remains constant through out the forecasts horizon.

Impact on Foreign Reserve on Exchange Rate Fluctuations

An increase in reserve was found to induce significant appreciation after the first quarter. The response of exchange rate to positive changes in external reserve can be explained by expectation, and is depicted clearly in the impulse response graph, which showed an appreciation in the exchange rate after the first quarter. Thereafter, relative stability was observed. The variance decomposition also

indicated that a greater variation in the exchange rate was due to changes in reserve at least in the medium term.

Impact on Parallel Market Rate on Exchange Rate Fluctuations

An inverse relationship between the parallel market rate and the official rate was confirmed in the model. In other words, government intervention in the foreign exchange market to stabilize the rate is always induced by an observed depreciation in the parallel market. Thus, our results confirmed that in Nigeria the parallel market rate is the lead indicator of the exchange rate.

V.   LIMITS TO EFFECTIVENESS OF MONETARY POLICY

Despite efforts in the last few years to evolve a suitable monetary policy framework and a concomitant foreign exchange rate regime, in order to achieve price and exchange rate stability in Nigeria, the exchange rate has remained largely unstable while the war on inflation is yet to be won. The analysis above shows that movements in the exchange rate since the inception of the market- determined exchange rate management system in the country have been influenced by monetary and fiscal conditions. In this section we briefly examine the limits of monetary policy in Nigeria.

Fiscal Dominance

Fiscal expansion and the concomitant large fiscal deficits have militated against the efficiency of monetary and exchange rate policy in Nigeria. Government's fiscal operations, especially inflationary financing of large budgetary deficits and the monetisation of deficits have continued to pose serious challenges to monetary management. The setting of strict limits on the financing of government deficits by the CBN had not been successful despite its operational autonomy. A comprehensive review of public debt management programme, suggested in Alexander et al (1995), would facilitate the observance of borrowing limits.

Liquidity Overhang

Sources of liquidity in the economy are varied. However, credit to government has played a predominant role. Other sources include the monetisation of enhanced

oil export receipts, particularly in 2000; the minimum wage adjustment in 2000; and the fiscal operation of the states and local governments in Nigeria. The brand of political federalism, which Nigeria practices, is a serious constraint on the Central Bank's ability to control money supply in the economy.

Oligopolistic Banking System

The Oligopolistic structure of the Nigerian banking system constraints the efficiency of monetary policy instruments. Very few large banks control the liquidity of the banking system. Thus, they dictate the interest rates in the market irrespective of CBN's manipulation of its discount rate.

Data

Poor data quality is a major constraint in the formulation of monetary policy in Nigeria. The lack of high frequency and reliable data renders econometric analysis difficult. Similarly, weak data base gives rise to parameter uncertainty, which also undermines the setting of accurate targets.

Dualistic Financial and Product Market

The informal sector in Nigeria accounts for about 30 per cent of the GDP. The existence of a large informal credit and exchange rate markets in Nigeria has a lot of implications on the transmission mechanism of monetary policy. For instance, a divergence between the official and parallel market exchange rates induces, in the short run, a chain of speculative activities, which invariably undermine the efficiency of monetary policy instruments.

Inefficient Payments System

The payments system is a vital link between the financial system and the real sector of the economy. The preferred payment instrument in Nigeria is cash. The prominence of cash for transaction increases the volume of currency in circulation or high-powered money, which impairs the success of the monetary policy. There is a general consensus in the literature that an inefficient payments system distorts the transmission mechanism of monetary policy even when the "design and objectives are laudable (Nnanna, 1999).

VI.   CONCLUDING REMARKS

The paper has endeavoured to provide evidence on the implication of monetary policy actions on the naira exchange rate. In particular, an attempt has been made to link the instability in the exchange rate to the adverse monetary policy outcome over the years. We also linked the failure of monetary policy to fiscal dominance. The influence of monetary policy on exchange rate stability appeared to be very overwhelming during the period of financial system liberalisation. Regarding external balance, we also showed that the periods of low foreign exchange reserves are generally associated with exchange rate instability and vise versa.

In conclusion, therefore, CBN's monetary policy actions are capable of producing effects that could stabilize the exchange rate. The paper, therefore, notes that sustained instability in the exchange rate may make the price stability objective of the CBN difficult to achieve.

REFERENCES

Alexander, W.E. et al. , 1995, *The Adoption of Indirect Instruments of MonetaryPolicy*. Occasional Paper 126. Washington: International Monetary Fund.

Fischer S, 1994. *Modern Central Banking. in: The Future of Central Banking, the Tercentenary Symposium of the Bank of England*. Cambridge University Press.

Flood et a, 1989. "Evolution of Exchange Rate Regimes, IMF Staff Papers Vol. 36. No.4.

Frieden, J. et al (2000). *"Politics and Exchange Rates:* A cross-country Approach to Latin America Inter-American Development Bank.

Greene, J., 2000. Exchange Rate and Trade Policies: An Overview. IMF Institute Lecture Paper. Washington: International Monetary Fund.

International Monetary Fund, .1997. *"Exchange Rate Arrangements and Economic Performance in Developing Countries"*. World Economic Outlook, October 1997, Chapter IV, World Economic and Financial Surveys. Washington.

International Monetary Fund, 1997. *" Trade Liberalisation in IMF-Supported Medium-Term Programmes in Sub-Saharan Africa"*. Washington: International Monetary Fund.

Mckinnon, R. I., 1971). *"Exchange Rate Flexibility and Monetary Policy"*. Journal of Money, Credit, and Banking, vol. 3, No.2

Mundell, R. A., 1968. *International Economics*. New York: Macmillan.

Ndekwu, E. C, 1997. *Bank Liquidity, Exchange Rates and Monetary Policy in Nigeria*. NISER Monograph Series No. 14, 1997. Ibadan: *Nigerian Institute of Social and Economic Research* (NISER).

Nnanna, O. J., 1999. *"Policy Options for Improving the Efficiency of the Nigerian Payments System"*. Bullion. Vol. 23 No.' 2.

Monetary Policy Framework in Africa: *The Nigerian Experience"*. *Proceedings: Conference on Monetary Policy Frameworks in Africa*. Reserve Bank of South Africa. Pretoria.

Longworth, D and J. Murray., 1988. *"Canadian Exchange Market Management and Monetary Policy"*, in Exchange Market Intervention and Monetary Policy. Basle:Bank for International Settlements.

Ojo, M. 0, 2000. *The Role of Autonomy of the Central Bank of Nigeria (CBN) in Promoting Macroeconomic Stability.*

Ray, P and S. Chatterjee, 2001 *"The Role of Asset Prices in Indian Inflation in Recent Years: Some Conjectures*. BIS papers No.8. Basle: Bank for International Settlements.

Van't dack, J., 2001. *"The Framework of Monetary Policy: An Overview of Issues. Proceedings: Conference on Monetary Policy Frameworks in Africa*. Reserve Bank of South Africa. Pretoria.

Appendix Tables and Charts

Table 1: Unit Roots Test on Variables

Variable	Levels		Difference		Remark
	ADF	P – P	ADF	P – P	
Log Base Money (BM)	-0.6245	-0.5274	-5.0874	-8.4877	1(1)
Log Exchange Rate (ER)	-1.6421	-1.7560	--3.0176	-6.2736	1(1)
Log External Reserve (RES)	-1.0259	-1.5339	-3.9242	-8.3268	1(1)
Log Parallel Market Rate (PMR)	-3.8402	-4.3200			1(0)
Inflation Rate (IFR12)	-2.3158	-1.0373	-3.3628	-2.5259	1(1)
Treasury Bills Rate (TBR)	-2.1108	-2.0129	-4.1095	-5.7855	1(1)

Table 2: Results from VAR Model With lag length of 4.

Variable	ER				IFR12			
	1	2	3	4	1	2	3	4
ER	-0.540	-0.1895*	0.0888	-0.3306	0.9474	-3.0845	-7.2365*	-0.9105
IFR12	0.0169	-0.0188	0.0072	0.0004	1.0227*	-0.221	-0.2360	0.0408
TBR	0.0214*	0.0048	0.0110	0.4418*	0.1094	-0.4433*	-0.0722	-0.1700
RES	0.1168*	-0.0398	-0.1284*	-0.1905*	-0.1038	1.6192	-1.3850	-0.0546
C	0.3670*				2.1311			
BM	-0.2868**				6.1430			
PMR	-0.0642**				-0.4977			
R^2	0.95				0.94			
F	18.50				15.66			

*= significance at 5% ** = significance at 10%*
Full details of the results are available on request.

Response to Cholesky One S.D. Innovations
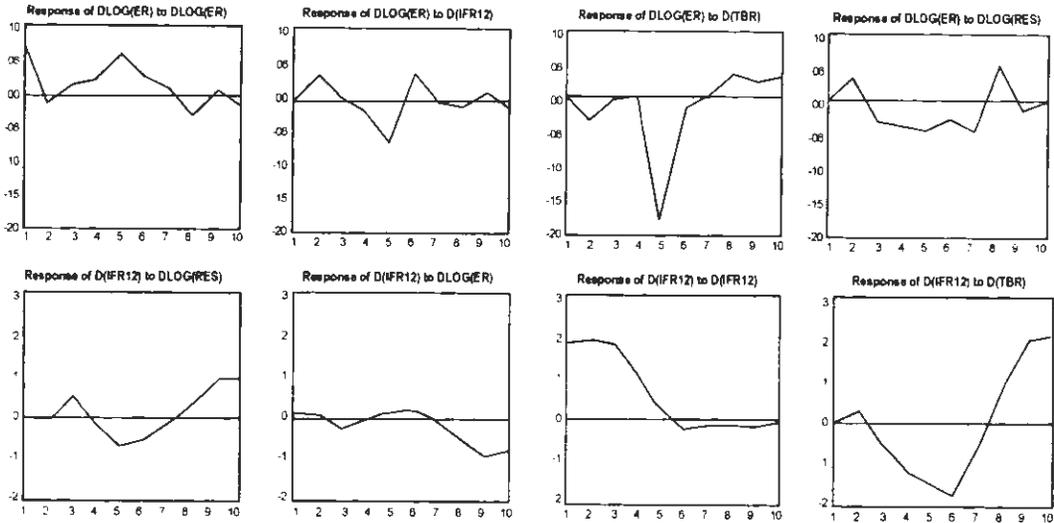
Table 3: Variance Decomposition of ER and IFR12

Period	S.E.	DLOG(ER)	D(IFR12)	D(TBR)	DLOG(RES)
1	0.070372	100.0000	0.000000	0.000000	0.000000
2	0.092714	60.37513	12.42031	12.13935	15.06522
3	0.097801	56.14079	11.27876	10.93616	21.64428
4	0.109214	48.38110	13.64355	8.934839	29.04051
5	0.233030	17.01830	11.99357	61.13723	9.850903
6	0.238750	17.19323	13.72143	58.50328	10.58206
7	0.242932	16.67884	13.39714	56.57556	13.34846
8	0.255119	16.92011	12.60277	53.76517	16.71195
9	0.256882	16.73081	12.49749	54.00551	16.76619
10	0.260168	16.61654	12.66621	54.37161	16.34564

Period	S.E.	DLOG(ER)	D(IFR12)	D(TBR)	DLOG(RES)
1	1.820247	0.251037	99.74896	0.000000	0.000000
2	2.670003	0.286186	98.63127	1.068189	0.014351
3	3.344420	0.876698	93.02322	3.292636	2.807441
4	3.748425	0.703309	83.56365	13.24985	2.483192
5	4.098084	0.708661	70.32344	24.05318	4.914716
6	4.503506	0.746727	58.48664	35.26377	5.502867
7	4.552282	0.750548	57.30679	36.46448	5.478182
8	4.680921	2.092278	54.25743	37.99173	5.658563
9	5.247532	4.945895	43.26227	44.11080	7.681036
10	5.777028	6.059196	35.70066	49.18234	9.057800