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An Empirical Investigation on the Effectiveness of Open Market Operations (OMO) in Nigeria

Phebian N. Omanukwue and Magnus O. Abeng*

This paper attempts to investigate the effectiveness of the open market operations in Nigeria adopting an error correction methodology. The study showed that in the conduct of defensive open market operations, inflationary expectations, treasury bill rate, income and fiscal balances exert significant influences on the volume of bank reserves. The persistent effect of fiscal balances on the volume of bank reserves in the short-run shows that consideration of government activities remain important in developments in the financial sector. Findings from the study revealed that the system adjusts itself to equilibrium within three quarters in the event of a shock. The finding that sales of government securities in the secondary market do not exert effect in the long-run conforms to the Keynesian postulations that monetary policy becomes less effective in the long-run.

JEL Classification Numbers: E5, E44, E51, E52

Keywords: Open market operations, bank reserves, dynamic open market operations, defensive open market operations, error correction methodology.

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I. Introduction

Prior to 1914, the Bank of England was reckoned with as the only central bank that conducted its monetary policy using the open market operation (OMO) as a tool. From the 1970s, however, most industrial countries began transiting to the adoption of indirect monetary policy instruments, with most transiting and developing economies following suit. Today, OMO has become a fundamental and veritable instrument for the conduct of monetary policy for virtually all central banks in the world, owing largely to widespread financial reforms occasioned by the adoption of globalised market economy. Indeed, OMO has come to be adjudged as the most useful and flexible tool for influencing the level of bank reserves with a

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view to achieving the desired macroeconomic objectives of the country (Oduyemi, 1993).

In Nigeria, the maintenance of a stable financial system devoid of sharp changes in interest rates and other liquidity conditions has been identified as one of the most challenging functions of the central bank. The Bank has over the years, adopted several strategies and policies depending on the existing financial infrastructure to achieve this objective. For instance, before 1993, the direct or administrative strategy of credit and interest rate ceilings was adopted in the conduct of monetary policy, but in 1993, the Bank transited to the indirect method of monetary policy management with open market operations (OMO) as the primary instrument, complemented by other instruments. This paradigm shift was informed by the concern about the liquidity overhang which had been evident in the plethora of monetary management policies adopted by the Central Bank of Nigeria (CBN), over the years, aimed mainly at “mopping up” excess liquidity from the system. This, no doubt, raises questions about the efficacy of liquidity management tools in Nigeria, particularly since the adoption of indirect monetary approach in June 1993, using the open market operations (OMO), as a primary instrument.

In Nigeria, apart from Bogunjoko (1997), who undertook an empirical study using the cointegration error correction model on the monetary dimension of the Nigerian economic crises, most literature on monetary policy have concentrated on broad issues related to the development and efficacy of monetary policy/money supply, its evolution and growth. Moreover, most studies in this area were conducted prior to the introduction of the structural adjustment programme, (SAP)\(^1\). This study, thus, is a pioneering effort in this regard and is intended to fill this gap.

Specifically, the objective of this paper is to examine whether open market operations in Nigeria has been effective in the achievement of its primary

\(^1\)Notwithstanding, useful and instructive inferences were gleaned from these studies in the course of this study
objective of managing fluctuations in the banking system liquidity\(^2\). Thus, the success of OMO must be assessed based on how well this objective has been achieved. Unlike other studies that examine the efficacy of monetary policy using the trend approach, this paper takes a step further by estimating an empirical model, using the error correction technique. The essence of this is to situate empirically those short and long-run factors that impact directly on liquidity in the banking system, aside from open market operations. The use of quarterly datasets for this analysis comes as an additional innovation. The rest of the paper is organized thus: Section 2 examines some conceptual issues in the literature. Section 3 presents an overview of the open market operations in Nigeria. Section 4 appraises the open market operations with a preliminary trend analysis. Section 5 discusses the data, methodology and model specification. Section 6 analyses the results of the model and section 7 concludes the paper.

II. Literature Review

Conceptual Issues

There are two variants of monetary policy instruments, the direct and indirect, the adoption of any of which is largely determined by the level of development of the financial market. The direct instruments are quantitative controls, and are characterized by the setting of monetary targets by the monetary authority and requesting the financial operators to work towards achieving them. The predominant policy tools applied under the direct control are the regulation of interest rate, imposition of credit ceilings and sectoral allocation of credit. The commonly cited rationale for the application of this approach is the underdeveloped nature of the financial markets coupled with the scarcity of capital that brings about a sub-optimal pattern of resource allocation in the economy.

This approach dominated monetary management in Nigeria for over two decades. The indirect instruments, on the other hand, thrive in a market-based economy or well-developed financial market. They seek to influence bank

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\(^2\)Managing fluctuations in the bank reserves serves as a precondition for attaining other objectives of a central bank.
reserves, interest rates and money supply through the use of monetary policy tools like the open market operation; discount rate (the rate at which the central bank lends to banks as a lender of last resort); and the reserve ratio (a proportion of deposit liabilities of banks required to be kept with the central bank). This is based on the belief that the interaction in the market between these variables will influence both the volume and direction of credit availability and allocation.

Conceptually, open market operations (OMO) has been broadly defined as the purchase or sale of qualified debt/financial instruments by the central bank, in either the primary market (open market-type operations) or the secondary market (full-fledged open market operations) (Alexander, et al. 1995; Ojo, 1992). The term, “open market” connotes that the monetary authority can not decide ahead of time, and on its own, which discount house to conduct business with on a specific day. Thus, it is not a decision from the treasury or the monetary authority; rather the choice emerges from the “open market” by which the various securities dealers compete on a price or volume basis (Obaigbona, 2003). Instruments commonly used for this purpose include government securities, treasury bills, central bank bills, prime commercial paper and/or bankers' acceptances. However, the type of securities traded and overall market transactions would usually depend on the existence of a well-developed and efficient financial infrastructure/market, stability and competitiveness of financial institutions, number and types of policy instruments available to the central bank, sustained confidence on the financial sector, the central bank's control of the operating variable (e.g. monetary base, interest rate), existence of technical capacity, real time information on money market conditions, and a sophisticated legal and regulatory framework (Iyoha, 1995; Nnanna, 2003). In most underdeveloped and developing economies, where the financial system is lacking in depth, the emphasis is usually on the primary market, where regular auctions are held and the net amount traded is varied to achieve the desired objective of monetary policy.

In terms of classification, there are three broad variants of the open market operations. The outright (permanent), self-reversing (temporary/repurchase) transactions and reverse repurchase agreements. Outright transactions are
used to absorb or inject reserves over relatively long periods. Self-reversing (temporary transactions) are adopted over relatively short periods for making temporary additions to the level of bank reserves, through the purchase of securities from dealers who agree to repurchase them at a later date and a specified price. Reverse repurchase agreements implies that a contract for simultaneous purchase/sale of securities from participating dealers, are used to absorb temporary excess bank reserves (Oduyemi, 1993; Ojo, 1992; Obaigbona, 2003; Nnanna, 2003).

In most central banks, OMO is devoted to making small adjustments in credit conditions and interest rates in order to keep the banking system functioning smoothly. In doing this, they adopt two methods: defensive and dynamic methods. The technical adjustments in market conditions are often classified as defensive open market operations. These are operations taken to offset the effects of other factors influencing bank reserves. In other words, it is impossible to know the significance of a purchase or a sale without knowing how other factors are affecting reserves. Thus, the basic purpose is to preserve the status quo and to keep the present pattern of interest rates and banking liquidity at optimal levels. In contrast, when the central banks are more concerned about the pursuit of their broader monetary policies, dynamic open market operations is conducted. In a non-technical language, dynamic operations are those operations taken to increase or decrease the volume of reserves in order to ease or tighten credit. Unlike the defensive OMO, these operations are designed to shock the “status quo” and, thus, change money and credit conditions to a level the central banks believe are consistent with their broad monetary policy goals (Federal Reserve Bank of Richmond, 1998).

Through the OMO, monetary authorities directly alter the level of cash reserves of the banking system with the objective of meeting the bank reserve targets, while indirectly influencing the short-term interest rates, (money market rates, inter-bank rates) which, ceteris paribus, should adjust the availability of credit and money supply in the direction desired by the monetary authorities, (Mordi, forthcoming). Hence, the purchases (sales) of OMO securities increase (reduces) the reserves in the domestic banking system, thus, altering the cost and availability of loanable funds.
Theoretical Framework

Monetary policy is a key element of macroeconomic policy and its effective conduct is critical to the achievement of the broader macroeconomic policy objectives. While economists are in unison as to the primacy of achieving the broad macroeconomic objectives, the factors influencing economic stability as well as the modalities for attaining these goals have been subjects of an unending debate. At the helm of the controversial debate are the Monetarists and the Keynesians, who hold opposing views with respect to the role of money in influencing activities in the economy. While to the Monetarists, “only money matters”, the Keynesians hypothesized that “money does not matter”. In a nutshell, the kernel of the disagreement is over the most appropriate way of managing aggregate demand in order to moderate economic and social instability.

According to the monetarists, the economy is always stable and disequilibrium is predominantly induced by changes and growth of monetary aggregates. To them, inflation is essentially a monetary phenomenon. The monetarists, thus, argue that a change in money supply eventually affects expenditure and domestic output directly and that instability is produced dominantly by the operation of the government sector. They also argue that the private sector (businesses and households) is insulated from growth in money supply and cannot be responsible for the instability in the economy as according to Brunner (1998) the sector is “essentially a stock-absorbing, stabilizing and self-adjusting process”. The monetarists further argue that the government sector, through its interference with the nominal adjustment mechanisms in the private sector, causes variability in the economy. In this regard, the monetarists do not favour deficit financing (a fiscal tool) as a means of stimulating economic growth. Instead, they recommend that the central bank's monetary action through the open market operation involving the sale/purchase of securities with the public, would accomplish the same purpose i.e. effect a change in money supply without getting involved in the process of budget deficits or surplus (Oke, 2003).

The Keynesians, however, rebuffed the postulations of the monetarists and argue that “money does not matter” and describes fiscal policy as the more
potent tool in the process of maintaining economic stability than monetary policy. Keynesians refute monetarist arguments that changes in output are solely caused by changes in money stock, instead they believe that investment level is the overriding determinant of economic booms and bursts. To the Keynesians, money stock and aggregate expenditure are indirectly related through the influence of interest rate, thus, interest rate and what happens in the financial market become critical factors in the transmission mechanism. Hence, their submission that the real sector cannot be completely insulated as posited by the monetarist.

The theoretical framework for the conduct of open market operations is premised on the central bank's core mandate to efficiently maintain price stability, promote economic growth and sustain a virile balance of payments position. Currently, these three-pronged macroeconomic objectives are being rationalized to a single objective of inflation stability in some countries, which according to Iljas (1998) is “free from any policy trade-off; strengthens the implementation of monetary policy; increases transparency, accountability and independence of monetary policy; more realistic in a deregulated and globalized economic and financial system; and easier to determine the right instruments”.

In today's complex and dynamic economic environment, the achievement of monetary policy goals is far from trivial and, thus, requires a delicate policy balance and mix. For the reason that some of these objectives are not mutually exclusive, harmony amongst conflicting goals is achieved through trade-offs in the formulation and implementation process of monetary policy. The successful implementation of monetary policy requires the existence of well-trained economic technocrats, efficient utilization of resources and a deep financial system. There are complex webs or chain of events that link a monetary policy change with the subsequent changes in other sectors, some of which take quite a while to completely unfold. Indeed, every monetary policy effect has a lagged impact between when the policy is adopted and when the impulse is actually transmitted to affect the macroeconomy. Due to the differing views in determining exactly the process of how policy impulses are
transmitted in the economy, policymakers, therefore, set policy targets, closely monitor their effect and then fine-tune such policies until the perceived distortions are eliminated and the desired goal achieved. It, therefore, becomes compelling for monetary policy to be forward-looking via the most effective transmission channel.

A major interest is the transmission process of an OMO transaction, which proceeds first through the monetary base, in particular the reserves balances of commercial banks, thereby influencing their credit-creating ability (Campbell, 1982; Minsky and Okin, 1963; Berg et al, 2000). An open market purchase increases the monetary base and money supply, while an open market sales exerts a contra effect on the monetary base and money supply. In other words, a direct relationship exists between open market transactions and the monetary base/money supply in the economy, assuming a stable multiplier. This forms our a priori expectation. To the extent that the central bank does not have any control over currency outside banks, it follows that bank reserves balances are under the control of the central bank, more so, that the deposit money banks (DMBs) are statutorily required to keep a certain proportion of their reserves with the central bank.

The central bank, thus, controls monetary aggregates, consistent with the targeted economic growth rate based on the schematic construct depicted in Table (1), where monetary aggregates (intermediate targets) are influenced by reserve money (operational target), through open market operation transactions. Thus, monetary policy is conducted based on the relationship between the immediate (operational), intermediate and ultimate targets/objectives.

**Analytical Framework for the Conduct of OMO**

A cursory look at literature informs that the analytical framework for the conduct of the open market operations is rooted in the money supply model and derives from the relationship between money supply and base money,

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3For detailed studies on the transmission mechanisms of monetary policy, see Uanguta and Ikhide, (2002).  
4For detailed analysis of the functions of reserves, see Orphanides, (2001).
(Nnanna, 2003). This is best captured with the common expression:

\[ M_t = C_t + DD_t \] .................................(1)

\[ B_t = R_t + C_t \] .................................(2)

where

\[ M_t = \] Narrow Money Supply (M1)
\[ C_t = \] Currency in circulation
\[ DD_t = \] Demand deposits by the non-bank public
\[ B_t = \] Base Money
\[ R_t = \] Total Reserves of Banks (Excess reserves + required reserves)
\[ t = \] Time period

Taking reserves and currency in circulation as a proportion of total deposit liabilities produces an equation with the semblance:

\[ M_t = B_t \frac{(1+c_t)}{(r_t+c_t)} \] .................................(3)

Hence,

\[ M_t = m_t B_t \] .................................(4)

Where \( m \) represents \( \frac{(1+c_t)}{(r_t+c_t)} \), also, known as the money multiplier, \( c \) is currency-deposit ratio, and \( r \) is reserve-deposit ratio.

If \( c \) and \( r \) are stable, the central bank can influence \( B_t \) by ensuring that \( \Delta B_t \) and \( \Delta M_2 \) are in tandem. If the ex-post \( B_t \) is estimated to grow beyond the desired target, the central bank may swing into action by selling government debt securities through the open market operations. The converse would apply if the ex-post \( B_t \) is estimated to be lower than the desired target. Indeed, the direct aim of the OMO is to manage the reserve base of banks in a manner consistent with the achievement of the planned or ex-ante target growth for base money. Thus the relationship between base money and the money supply can be

\[ ^5 \text{In Nigeria, this is defined as } M2 \text{ (broad money supply), consisting of } M1 \text{ plus savings and time deposits} \]
captured through the equation below:

\[ M_t = m_t B_t \]

hence,

\[ B_t = M_t / m_t \] \hspace{1cm} (5)

Recalling that \( B_t = R_t + C_t \), it follows, therefrom, that \( R_t + C_t = M_t / m_t \). Basic arithmetic tells us that

\[ R_{t0} = M_t / m_t - C_t \] \hspace{1cm} (6)

Equation 6 defines the optimal demand for reserves by the banking system (Rto). The supply of reserve money derived from liabilities side is thus:

\[ B_t = C_t + VC_t + RC_t \] \hspace{1cm} (7)

Where

\[ VC_t = \] Vault cash

\[ RC_t = \] deposit money banks reserves at the CBN and others remain as previously defined.

Thus,

\[ R_t e = VC_t + RC_t = B_t - C_t \] \hspace{1cm} (8)

Equation 8 represents the total reserves of the bank (R_t e). The spread between the demand and supply of reserves forms the basis and estimates the need for the open market operations of the central bank. Thus when \( R_t e > R_{t0} \), there is an excess of reserves and central bank engages in the sale of treasury securities and where \( R_t e < R_{t0} \), the central bank engages in the purchase of treasury securities.

Certain factors that can affect the effectiveness of monetary policy implementation have, however, been identified in the literature. These factors include the ability of monetary policy instruments to achieve the targeted change in monetary and credit aggregates, the size of the money multiplier and
expectations on inflation, future income as well as the degree of public confidence (Zhiyong, 2003). In several empirical studies carried out, scholars have posited that the efficacy of OMO as a tool of liquidity management can be hindered by unstable macroeconomic conditions, wide variations in monetary aggregates from the stipulated targets, fiscal indiscipline as reflected by excessive budgetary expenditures, and technical factors, among others (Ojo, 1992; Iyoha, 1995; Demiralp and Jordá, forthcoming).

Monetary management in Nigeria since 1993 has been largely dependent on the OMO as the primary tool, complemented by such other instruments as reserve requirements, discount window facilities and moral suasion. However, the quest to determine the effectiveness of monetary policy has extended current analyses to include such other variables as developments at the international economic and financial markets, capital flows, investments, asset prices, etc., in addition to monitoring the traditional indicators.

### Table 1: General Framework of Monetary Policy

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Immediate target</th>
<th>Intermediate target</th>
<th>Ultimate target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Market Operations</td>
<td>Monetary Base (M1)</td>
<td>Money Supply</td>
<td>Growth</td>
</tr>
<tr>
<td>Reserve Requirements</td>
<td>Bank Reserves</td>
<td>Bank Lending</td>
<td>Employment / Inflation</td>
</tr>
<tr>
<td>Discount Facilities</td>
<td>Interest Rates (money market)</td>
<td>Interest Rates deposits lending</td>
<td>Balance of payments</td>
</tr>
<tr>
<td>Moral Suasion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Achjar (1998), Bank of International Settlements policy papers

The result is the emergence of output gap, exchange rate movements and interest rate differentials as significant variables in the transmission mechanism process. Among these, interest rate is particularly singled out as an indicator of monetary policy effectiveness especially with the current wide range of bank products and improved payments system. However, Iljas (1998) noted that the “speed of transmission and the magnitude of the pass-through of interest rates depend on market efficiency and the public's expectation of
future interest rates and inflation”. As an effectiveness indicator of monetary policy, interest rates are now gradually becoming policy target and are also closely monitored in addition to monetary aggregates.

Consequently, a new and more responsive monetary policy framework (monetary policy rate (MPR)) was adopted in December 2006, among other things to “remove the volatility in inter-bank rates, encourage inter-bank trading and engender a transaction rate that would improve the transmission of monetary policy actions” (CBN, 2006). The new framework, thus, replaced the minimum rediscount rate (MRR) as the anchor rate in the economy as well as repositioned the CBN as the lender of last resort.

III. Overview of the Conduct of Open Market Operations in Nigeria

The open market operations by the CBN are facilitated through its Banking Operations Department (BOD) and the transactions conducted exclusively through the authorized money market dealers. In Nigeria, there exist two types of transaction techniques in the market. The first is the outright or permanent transactions, involving the sale and purchase of government securities, which are designed to have long-term liquidity impact of about 7-90 days. The second is the temporary or self-reversing transactions, otherwise called repurchase agreements or repos, which are conducted to have short-term liquidity impact of between 1-7 days. The major instrument traded is the short-term Nigerian Treasury Bills with a maturity period of 90 days. The pricing of securities is based on the Dutch Auction System (DAS). However, in June 2007, with a view to further enhance the effectiveness and efficiency of the money market operations, the conduct of OMO transited to a two-way quote platform among the money market dealers (MMDs) on Reuters trading system, though the traditional auctions and tenured reverse repos continued on the Temenos Internet Banking (TIB). Under the two-way quote platform, the Bank bought and sold NTBs in the market with a view to moderating the auction rates. Similarly, “the multiple tenors offered ranged from 7 to 157 days and were structured to synchronize maturity with that in the primary market, in order to enhance the tradability of the instruments” (CBN, 2007).

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4 Hitherto, it was conducted through the discount houses
Daily Conduct of the OMO7
Outright transactions

Here, dealers are requested to submit offers to sell or bid to buy securities of the type and maturity that the CBN has selected. The process of the outright transaction begins by obtaining information and data about money market activities. The office in charge liaises with the money market to gauge the market situation along with the reserve forecasters in the Monetary Policy Department of the CBN for the OMO targets8. In the computation of the OMO target, the Department computes the optimal demand for reserves, determines the actual level of reserves and determines the surplus or shortage in bank reserves and, hence, the volume of securities to be traded. Upon receipt of the computed excess/shortage reserves, the security dealing office liaises with the settlement and control office to determine the volume and tenor of securities available for sale/purchase. After due consultations with the chief OMO dealer, notices about offers for sale are then sent to the money market dealers. Usually, the information to the dealers includes: security being sold; tenor of security; maturity date and value date of transaction. An auction process is then conducted in which the dealers are required to submit bids or offers for sale. After receiving the bids from the dealers, they are evaluated on a competitive best-price basis. Based on the bid rates received, the office then recommends the selling rates for the approval of the chief dealer; the Director, Banking Operations Department. Usually, the bids with the lowest discounts up to the CBN reserve price are accepted. On receiving the approval, the OMO result is prepared and distributed to all stakeholders. The OMO result usually contains the security type, maturity date, total amount of bids received, range of bid rates, issue rates, weighted average and the true yield, transactions at the primary market and transactions in other securities.

Temporary Transactions (REPOS)

Repos are used for temporary additions to bank reserves. With the repos,

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7 OMO was conducted on a weekly basis since 30 June 1993, but from November 26, 2003, it has been conducted on a daily basis.
8 The targets are the quantum of purchase or sales of securities that the CBN should conduct based on the reserve position of the banking system.
securities are bought from the dealers, who agree to repurchase them at a specified date and price. When the repos mature, the added reserves are automatically drained. On the other hand, if there is a temporary need to drain reserves, the CBN executes reverse repos. These transactions, on the reverse, constitute an immediate sale of treasury bills to the dealer with a matching contract for later purchase from the dealer. This repo process begins with the receipt of applications from the market operators, after which purchase or sale is conducted using specified tenors and approved repo rates. The relevant entries, such as crediting the operators with the proceeds, are then passed. The repo process is terminated by debiting the operators with the face value of the bills and crediting the NTB discounted account with face value of bills.

It becomes expedient to note at this stage that transactions involving repurchase agreements do not exert a direct influence on the money supply. Instead, the direct impact of such transactions is concentrated on the cash reserves of the banks and the impact on bank cash balances is reversed as soon as the repos mature.

IV. Review of OMO in Nigeria

The conduct of OMO since its inception in 1993 has largely been contractionary. An overview of OMO activities in Nigeria shows mixed developments. In its first six months of operation, the use of OMO was very successful, induced mainly by high yields (issue rates) on securities, which ranged between 25 per cent and 27.3 per cent. Other factors attributed for its success were the near collapse of the inter-bank market as well as the foreign exchange payments arrangement at the time, which compelled banks to back their foreign exchange demand with treasury bills holdings. By the end of the year of its inception, the total amount bidded stood at N61.7 billion compared with a total sale of N47.2 billion, representing an over subscription of 30.7 per cent (See Appendix, Table 1).

However, from 1994 - September 1998, OMO remained largely ineffective, as government reversed its deregulation policy, with the imposition of exchange rate and interest rate controls. The yield was also administratively set at between 10-12.9 per cent. Furthermore, transactions in the foreign exchange
market became more profitable, with the introduction of the autonomous foreign exchange market (AFEM) as funds were diverted to the foreign exchange market. Thus, in 1995, the total bids and sales declined by 38.1 percent and 29.2 percent to N178.8 billion and N158.2 billion, respectively, below the level in 1994. However, due to the injection of funds into the system by the defunct Petroleum Trust Fund (PTF), most banks invested in government securities in 1996 resulting in an increase in OMO activities as total bids and sales rose to N247.4 billion and N234.8 billion, respectively.

**Figure 1: Open Market Operations - Bids, Sales and Average Yield**

In 1997, total bids and sales declined sharply once again by 38.6 per cent and 52.5 per cent to N151.8 billion and N111.5 billion, respectively, which were lower than the levels in all the preceding years, except for 1993. In 1998, there was a further sharp reduction in the value of total bids and sales at the OMO transactions to N59.8 billion and N27.5 billion, respectively. The lackluster performance in the open market operations was attributed to the unattractive yields on the intervention security and in the inter-bank market, paucity of eligible securities as well as the increased preference for foreign exchange transactions by banks.
Activities in the open market, however began to pick up in 1999, as aggregate bids and sales rose to N181.8 billion and N167.6 billion, respectively. The most obvious reason for this astronomical increase in the OMO activities was the improved yield. Total bids and sale rose moderately from N924.6 billion and N794.6 billion, respectively, at commencement of the daily OMO sales in 2003 to N1,136 billion and N1,099 billion in 2004 and N2,270 billion and N1,808 billion in 2006, respectively. In 2007, while bids stood at N627.4 billion, sales rose significantly to a record high of N3,736.3 billion. The substantial increase in sales at the OMO was attributable to "the underwriting of the unsubscribed portion of the bills by the money market dealers (MMDs) in line with the operational guidelines for money market dealers in Nigeria; the introduction of over-the-counter (OTC) two-way quote trading system in government securities; and the aggressive liquidity mop-up during the year in order to meet the reserve money target under the Policy Support Instrument (PSI). Others were the market driven rates that prevailed at the two-way quote trading platform and the additional securities issued at the 182-day primary auction specifically for liquidity management" (CBN, 2006).

Figure 2: Primary and Secondary Market Rates

Open Market Operations and Economic Indicators

Given the primary objective of OMO as that of influencing the level of bank reserves balances before impacting on short-term interest rates (operating
target), money supply (intermediate target) and, hence, other macroeconomic aggregates (ultimate objectives), its effectiveness can be adjudged by its ability to impact on these variables in the desired direction. In this section, a preliminary trend analysis of these variables is presented. Two money market rates, the treasury bills and OMO rates (where available) or OMO sales as proxy for OMO rates, (where OMO rates are not available) are adopted pari-passu with the other economic indicators.

The chart below shows the growth rates of OMO sales, excess reserves and bank reserves during the review period (1993-2007). While a cursory look shows that bank reserves moderated throughout the period, the same cannot be said of excess reserves and OMO sales which witnessed high volatilities. Nonetheless, stability was witnessed from 2003 when the OMO sessions migrated from weekly sales to daily sales. The plausible explanation for the spikes for most of the period could be the exogenous nature of excess reserves, which is determined by several factors, including fiscal operations of governments that are outside the jurisdiction of the CBN. This largely accounts for the performance of OMO as a liquidity management tool. Since monetary and fiscal policies interact in the economy, a firm grip of one strand of policy without the other would always result in policy failures. This means that the success of OMO might have been eroded by the imprudence of the fiscal authorities.

**Figure 3: OMO Sales, Bank and Excess Reserves**
OMO Sales and Excess Reserves

Figure 4a pictorially depicts the trends of excess reserves of DMBs, OMO sales and the deviation between these two from July 1993 to December 2007. The figure indicates that prior to December 1997, the spread between OMO sales and excess reserves seemed to close up, giving rise to a marginal deviation. Excess reserves, however, rose astronomically in the following year due to a number of factors among which were increases in receipts from VAT, customs and excise duties, rapid injection of liquidity into the system by the activities of the Petroleum (Special) Trust Fund (PTF), federal government fiscal operations, the release of outstanding holdings of stabilization securities to DMBs, enhanced oil receipts by the government, increased payment of JVC cash calls to oil companies and net inflows of foreign assets. The growth in excess reserves reflected the restoration of public confidence in the system following sustained commitment to financial sector reforms and the moderation in inflation rate. However, the impact of CBN weekly intervention in the Autonomous Foreign Exchange Market (AFEM) which required authorized dealers to provide 100 per cent naira cover for their foreign exchange demand compelled DMBs to rediscount large proportions of their treasury bill holdings, consequently exerting significant contractionary influence on their reserve positions. Other factors that moderated the growth in excess reserves and accounted for the stability recorded in the subsequent years included the transfer of PTF placement from the DMBs to the CBN, the suspension of the phased release of stabilization securities and the delay in the release of federal government capital expenditure. However, from 2000, the trend was reversed following the expansionary fiscal operations of the three tiers of government, the substantial draw-down on federal government deposits with the CBN, and the monetization of crude oil receipts.

It is, therefore, evident from these experiences that the problem of excess liquidity in the system could not be effectively addressed through the conduct of OMO. Some of the identified constraints of OMO included the paucity of tradeable securities (even though this was temporarily remedied at some point with the conversion of treasury bonds to treasury bills), the uncompetitive rates which stagnated at an average of 12 per cent for most of the period, rapid injections of funds into the system through activities of the defunct PTF and government operations, repressive interest rate and the increased demand for foreign exchange at the AFEM.
FIGURE 4a: Deviations between OMO Sales and Excess Reserves

FIGURE 4b: Deviations between OMO Sales and Bank Reserves

OMO, TB and Prime Lending Rate

A graphical representation of the treasury bill, OMO and prime lending rates is shown in figure 5 below. A close look would reveal that the rates trended in the same direction during the review period, with prime lending rates above other rates for most of the period.

The significant rise in inter-bank rates in 1999 and 2001 is a reflection of tight liquidity regime in the banking system, the relatively high demand for foreign exchange at the AFEM and the impact of monetary policy action to reduce the
injection of official funds, particularly petroleum trust funds into the system. Nevertheless, the prime lending rate firmed somewhat before declining in 1997. It subsequently rose steadily, but slowly, until the end of 2002. It declined thereafter in 2003 and then maintained a gradual downward movement.

**Figure 5: Treasury Bill Rate, OMO Sales and Prime Lending Rates**

Generally, treasury bill rates and OMO rates moved in similitude throughout the review period except in 2001 where the rates diverged significantly. The adoption of universal banking system in 2001 greatly altered the portfolio structure of DMBs coupled with the impact of demand pressure and tight monetary policy. The upsurge in the demand for foreign exchange compelled banks to access the market for funds to cover their bids in the Inter-Bank Foreign Exchange Market (IFEM) as well as the partial funding of the Global System of Mobile communication (GSM). The decline in rates in the intervening years reflects mostly the downward adjustments in the minimum rediscount rates.

Bank reserves moderated during the review period as excess reserves and OMO sales witnessed high volatilities. Similarly, deviations between excess reserves and OMO sales moderated even though this stability was, however, rocked from Year 2000. Interaction of the rates in the market showed that all
the rates trended in the same direction with the prime lending rate maintaining an upper band over others throughout the review period. Treasury bills and OMO rates moved in similitude in the review period.

V. Methodology and Model Specification

V.I Methodology

The methodological framework for the analysis follows the money supply model defined in section 3. The variables were tested for unit roots using the Augmented Dickey-Fuller test. The tests were conducted at 1 and 5 percent significance levels. The results of the unit root tests are presented in Table 2. These tests and their respective order of integration are complemented with graphical analysis (See Appendix Figures 1 and 2). After determining the order of integration, the long-run models were then derived using the ordinary least square estimation technique. In order to examine the dynamic relationship between the exogenous variables and bank reserves, a test of stationarity was conducted on the residuals of the long-run regression model. The residuals of the series were found to be I(0), that is stationary, confirming that the variables are co-integrated, thus indicating that a dynamic model could be constructed incorporating the error correction mechanism, ecm (Table 2).

The Granger causality test is undertaken to establish the link as well as measure the information content between the past values of OMO sales on bank reserves and vice versa. This does not connote correlation or causality in the more common use of the term, but rather provides us with statistically significant information of past values of OMO sales on the future values of bank reserve.

Quarterly data on bank reserves, treasury bills rate, fiscal balances, open market operations sales and inflation expectations, for the period 1993-2007 were used. This defines the scope and period of analysis. For ease of analysis, the study categorized open market operations sales into quarterly sessions. This is done to ensure uniformity of all data sets, albeit OMO sessions were conducted on weekly basis from 1993-2003, and thereafter, on daily sessions. Data for this study were sourced from the CBN Statistical Bulletin, Annual
Report (several years) and the OMO database from the Banking Operations Department of the Central Bank of Nigeria. In all cases, "d" is the first difference operator, "ecm" is the residual estimated from the long-run static model. Nominal values were transformed into natural log and lower case letters represent the log series while variables preceded with a "g" are growth rates.

V.II Model Specification

Following from literature, the equation below is specified and estimated. Equation (1) specifies bank reserves (br) as a function of omo sales (omo), fiscal balances (fid); income proxied by gross domestic product (gdp), inflation expectations (infe) and treasury bill rates (tbr) (used as a measure of market operations in the primary market). In the Nigerian case, the use of data on OMO sales is adopted given its availability. Movement in bank reserves are apriori negatively related to OMO sales. It is expected that as income increases, people tend to deposit their nominal income increases in the banks. Developments in the fiscal sector and primary market for securities also influence bank reserves. Inflation is assumed to follow a backward pattern. This equation captures the defensive open market operations, which mirrors

\[ br = \alpha_0 - \alpha_1 \text{omo} - \alpha_2 \text{fid} + \alpha_3 \text{gdp} - \alpha_4 \text{infe} - \alpha_5 \text{tbr} \]

VI. Empirical Result, Analysis and Major Findings

Granger Causality Test

The causality test results are reported below

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBR does not Granger Cause LOMO</td>
<td>55</td>
<td>1.627</td>
<td>0.195</td>
</tr>
<tr>
<td>LOMO does not Granger Cause LBR</td>
<td></td>
<td>2.834</td>
<td>0.047*</td>
</tr>
</tbody>
</table>

*Significant at 5 per cent

*This study adopts the OMO sales as a measure of monetary policy intervention due to availability of data on the series.
The null hypothesis is that the quantum of bank reserves does not granger cause sales of government securities in the open market operations in the initial regression and vice versa in the second regression. From the test results above, the key issue that emerges is that changes in OMO sales are preceded by changes in the quantum of bank reserves. We cannot reject the hypothesis that bank reserve does not Granger cause sales of government securities in the open market operations, but we do reject the hypothesis that OMO sales does not Granger cause bank (excess) reserves. Therefore, Granger causality runs one-way from OMO sales to bank reserve. This test corroborates the framework for the conduct of open market operations.

**Results from the empirical model**

Model variables that were not statistically significant were scientifically eliminated using the various information criteria and diagnostic tests from the model results such as p-values, redundancy and omitted variables tests. Table 2 below shows the order of integration of the transformed variables and the error correction term employed in the model.

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF test statistics</th>
<th>Order of integration</th>
<th>Nuisance Factor</th>
<th>% Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lomo</td>
<td>-3.671</td>
<td>I(0)</td>
<td>TC</td>
<td>5</td>
</tr>
<tr>
<td>Lbr</td>
<td>-3.869</td>
<td>I(0)</td>
<td>TC</td>
<td>5</td>
</tr>
<tr>
<td>Tbr</td>
<td>-6.141</td>
<td>I(1)</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>Gfd</td>
<td>-8.301</td>
<td>I(0)</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>Infe</td>
<td>-4.318</td>
<td>I(0)</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>Lngdp</td>
<td>-5.698</td>
<td>I(1)</td>
<td>TC</td>
<td>1</td>
</tr>
<tr>
<td>ecm(-1)</td>
<td>-4.185</td>
<td>I(0)</td>
<td>TC</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note: C=intercept, TC: trend and intercept, N: No constant or linear trend*

Long-run model results (Table 3) from the estimated equation, which examines the defensive open market operations, show that only changes in nominal income and primary market rate significantly influence the volume of
bank reserves. In accordance with apriori expectations, a percentage point increase in nominal income increases bank reserves by 0.55 percentage point. This implies that bank reserves increase by 0.55 percentage point for every one percentage point increase in people's nominal income. Primary market rate, proxied by the treasury bills rate, was significant in affecting the quantum of bank reserves. It is expected that increases in treasury bills rate and hence its attractiveness should be sufficient to lure investors into the primary market, leading to a reduction in bank reserves. It, however, fell short of the apriori expectations as it was wrongly signed. Fiscal balances, though rightly signed, exerted an insignificant impact on volume of bank reserves. The sale of government securities in the open market operation and inflation expectations did not meet any of the apriori expectations.

### Table 3

**Long-run Static Model**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOMO</td>
<td>0.079120</td>
<td>0.076489</td>
<td>1.034386</td>
<td>0.3057</td>
</tr>
<tr>
<td>GFID</td>
<td>-0.054660</td>
<td>0.055846</td>
<td>-0.978767</td>
<td>0.3322</td>
</tr>
<tr>
<td>LNGDP</td>
<td>0.553810</td>
<td>0.056218</td>
<td>9.851186</td>
<td>0.0000</td>
</tr>
<tr>
<td>INFE</td>
<td>0.006732</td>
<td>0.007601</td>
<td>0.885748</td>
<td>0.3798</td>
</tr>
<tr>
<td>TBR</td>
<td>0.030990</td>
<td>0.009357</td>
<td>3.312145</td>
<td>0.0017</td>
</tr>
</tbody>
</table>

R-squared | 0.585582    | Mean dependent var | 4.674651
Adjusted R-squared | 0.553704  | S.D. dependent var  | 0.602393
S.E. of regression | 0.402431    | Akaike info criterion | 1.101046
Sum squared resid | 8.421450    | Schwarz criterion | 1.280261
Log likelihood | -26.37982   | Durbin-Watson stat | 1.067914
### Table 4
**Short-run Dynamic Model**

Dependent Variable: LBR  
Method: Least Squares  
Included observations: 54 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.192769</td>
<td>0.513935</td>
<td>0.375084</td>
<td>0.7094</td>
</tr>
<tr>
<td>LBR(-1)</td>
<td>0.885453</td>
<td>0.153455</td>
<td>5.770122</td>
<td>0.0000</td>
</tr>
<tr>
<td>LOMO(-3)</td>
<td>0.095302</td>
<td>0.068716</td>
<td>1.386913</td>
<td>0.1723</td>
</tr>
<tr>
<td>GFID</td>
<td>-0.080400</td>
<td>0.040369</td>
<td>-1.991614</td>
<td>0.0525</td>
</tr>
<tr>
<td>GFID(-1)</td>
<td>-0.083697</td>
<td>0.039203</td>
<td>-2.134971</td>
<td>0.0382</td>
</tr>
<tr>
<td>DLNGDP(-3)</td>
<td>-1.129939</td>
<td>0.532135</td>
<td>-2.123409</td>
<td>0.0393</td>
</tr>
<tr>
<td>INFE(-1)</td>
<td>-0.011629</td>
<td>0.005780</td>
<td>-2.012094</td>
<td>0.0502</td>
</tr>
<tr>
<td>DTBR</td>
<td>-0.027274</td>
<td>0.013277</td>
<td>-2.054301</td>
<td>0.0458</td>
</tr>
<tr>
<td>ECM(-1)</td>
<td>-0.491867</td>
<td>0.167949</td>
<td>-2.928669</td>
<td>0.0053</td>
</tr>
</tbody>
</table>

R-squared: 0.796363  
Adjusted R-squared: 0.760161  
S.E. of regression: 0.284890  
Sum squared resid: 3.652311  
Log likelihood: -3.894838  
Durbin-Watson stat: 1.843601

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean dependent var</td>
<td>4.722870</td>
</tr>
<tr>
<td>S.D. dependent var</td>
<td>0.581725</td>
</tr>
<tr>
<td>Akaike info criterion</td>
<td>0.477587</td>
</tr>
<tr>
<td>Schwarz criterion</td>
<td>0.809084</td>
</tr>
<tr>
<td>F-statistic</td>
<td>21.99765</td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.000000</td>
</tr>
</tbody>
</table>

### Table 5
**Further Diagnostic Tests**

<table>
<thead>
<tr>
<th>Serial Correlation</th>
<th>Arch LM</th>
<th>White Heteroskedascity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBR</td>
<td>0.7047</td>
<td>0.955</td>
</tr>
</tbody>
</table>

*Serial correlation test was performed with the Breusch-Godfrey LM test. Reported values are the P-values of the F-statistics of the individual test.*
The short-run model presented in Table 4 above revealed that past values of bank reserves, fiscal balances, nominal income, inflation expectations and treasury bills rate exerted significant effect on the quantum of bank reserves. Of the significant variables in the short-run, fiscal balances, treasury bills rate and inflationary expectations met apriori expectations. Fiscal balances in the contemporaneous and first quarter lag reduce bank reserves by 0.08 percentage points, each. The combined effect is a reduction in bank reserves by 0.16 percentage points. This implies that fiscal operations in the form of a deficit would usually impact on money market operations as lending by banks to government reduces the volume of bank reserves. Inflationary expectations of economic agents from the first quarter lag exert a minimal 0.01 unit change in
bank reserves. Contrary to the long-run results, nominal income did not meet apriori expectations, even though it was significant in explaining changes in bank reserve. In the short-run, the treasury bills rate conforms to apriori expectations as it impacts negatively on the quantum of bank reserves. A one percentage rise in treasury bills rate reduces bank reserves by 0.02 percentage points as investors shift their financial portfolio to the primary market. The minimal effect of this rate could be as a result of the paucity of a wide-range of primary market instruments. The finding that OMO sales did not meet apriori expectations could be that market participants do not find the rates as sufficiently attractive to invest and, perhaps, because of the use of complementary instruments such as the minimum rediscount rate (now monetary policy rate) and cash reserve requirement which may indicate a trade-off with activities in the open market. The model statistics are quite plausible and robust. The coefficient of determination indicated by the R-square indicates that about 80 percent of variations in bank reserves are explained within the model. The overall regression is significant indicating a good fit for the model. The error correction term indicates that the model adjusts to equilibrium within three quarters, with 49 percent of shocks corrected in each quarter. Further diagnostics show the absence of serial correlation, while the tests for heteroskedascity both for ARCH and LM are not rejected. The Jarque-Bera test of normality does not reject the null hypothesis.

VIII Findings, Recommendations and the Way Forward

- The study showed that in the conduct of a defensive open market operation, sales in the open market did not influence variations in bank reserves in the right direction and was insignificant in the long-run and short-run, perhaps, due to the complementary approach of liquidity management. This remains an area for further study.

- It was revealed that in the short-run, the effects of past values of bank reserves and fiscal operations largely influenced changes in bank reserves. Empirical results from the study also highlighted that income remains an important factor in determining the volume of bank reserves, exerting a 0.55 percentage rise in bank reserves, followed closely by fiscal operations and developments in the primary market.
The persistent effect of fiscal balances on the volume of bank reserves in the long and short run shows that consideration of the activities in the government sector remain important for financial sector development.

The finding that the open market sales did not conform to *apriori* expectations may result from the market participants not finding the rates attractive enough to invest compared with the more convenient, and rewarding standing deposit rates of the CBN. Perhaps this explains the huge patronage of the hitherto deposit window facility by money market operators which saw them earning interest on balances with the central bank and the subsequent elimination of this standing deposit facility serving as a disincentive for banks. Prior to the introduction of the new monetary policy rate in 2006, market rates were tied to the movement in the flow of funds, and such policies like the withdrawal of public funds from the DMBs and the sharing of the Federation Account by the three tiers of government often drive rates to unmanageable proportion. Those spikes caused distortions and rendered planning cumbersome. This volatility also affected activities in government securities market as interest rate crashes affected prices, driving inflation up, thus making the CBN to engage in liquidity mop-up exercises, sometimes at very high costs. The new policy is a welcome development and should be sustained as it offers the monetary authorities with an additional tool for effective monetary management.

There is also the need to broaden and deepen the money market activities in the economy. In this regard, the policy shift that expanded the number of market dealers/participants to 20 (17 Banks and 3 Discount Houses) in 2006 from the hitherto 5 dealers is commendable. This would further develop a vibrant, active and liquid market for government bonds market in Nigeria. Prior to this, the DMBs engaged in securities trading through the discount houses and in the process paying interest on this bridging function. The new policy does not only broaden the scope of operations in the market but also enables a level playing ground for all players. This transparency, of

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10 The old Minimum Rediscount Rate which was supposed to be the nominal anchor rate had been ineffective at imparting changes in other money market rates
course, breeds competition and engenders a healthy and robust money market with improved technology, quality services and other advantages of market-driven activities. In addition, though the rediscount facilities at the discount window were open to both the DMBs and discount houses, the rates were discriminatory against the DMBs. The rates for rediscounting by the DMBs were higher than those for the discount houses which again imposed additional costs on the banks. The new policy has redressed this, adding impetus and reduced cost to the activities in the market.

- The paucity of market instruments should be tackled holistically. The conversion of bonds to securities only provides temporary succour to the thorny issue. Given the cost and economic implications involved in the issuance of CBN Bills, the government could give an undertaking to the CBN to float more instruments of various tenors or use its own instruments (bills with more than 14 days tenor) for the purpose of structural liquidity management and thereafter transfer the cost to the treasury to manage. Government's recent strategy of converting short-term bills to longer term maturities should be sustained as this does not only reduce debt service cost but also promotes long term investment.

- The current system of a 2-way quote system using the Reuters in Lagos is a huge step in the right direction. Indeed, it has eliminated the physical presentation of making and acceptance of offers and, hence, optimizes the cost and time of transactions. Nevertheless, a further enhancement of these IT driven technologies that will also extend to other segments of the market should be encouraged.

- As a further step towards the deepening of the market, there is an immediate need to develop the derivatives market. This market has grown to be a major driver of most economy's development processes and holds huge potentials for the Nigerian economy. However, adequate understanding of the operationalities of this market cannot be overemphasized in order to forestall potential financial crises, reminiscent of the Asian crisis of the 1990s.

- The fiscal dominance prevalent in the Nigerian economy is underscored
and mirrored by the high and volatile swings often recorded in the inter-bank call rate which usually rise astronomically in the week preceding the Federation Accounts Allocation Committee (FAAC) meeting but dip to the lowest ebb after the disbursement of the monthly allocation to all the tiers of government. As a corrective measure, the CBN should consider the conduct of repo in the week preceding the meeting and reverse repos in the following week, with a view to moderating the rate in the market. This would certainly ameliorate the distortionary impact and shocks often associated with the fiscal activities of government.

Appendix

Table 1: Open Market Operations (OMO) Weekly Session* in N billion, (except otherwise stated)

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount Bided</th>
<th>Amount Sold</th>
<th>Sales/Bids ratio (%)</th>
<th>Average Tenor (days)</th>
<th>Average Yield (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>61.69</td>
<td>47.27</td>
<td>76.63</td>
<td>43.1</td>
<td>26.0</td>
</tr>
<tr>
<td>1994</td>
<td>289.02</td>
<td>223.68</td>
<td>77.39</td>
<td>41.2</td>
<td>12.9</td>
</tr>
<tr>
<td>1995</td>
<td>178.77</td>
<td>158.19</td>
<td>88.49</td>
<td>47.6</td>
<td>12.6</td>
</tr>
<tr>
<td>1996</td>
<td>247.39</td>
<td>234.84</td>
<td>94.93</td>
<td>43.8</td>
<td>12.2</td>
</tr>
<tr>
<td>1997</td>
<td>151.84</td>
<td>111.53</td>
<td>73.45</td>
<td>37.6</td>
<td>10.1</td>
</tr>
<tr>
<td>1998</td>
<td>59.84</td>
<td>27.45</td>
<td>45.87</td>
<td>28.0</td>
<td>12.1</td>
</tr>
<tr>
<td>1999</td>
<td>181.78</td>
<td>167.60</td>
<td>92.20</td>
<td>35.8</td>
<td>17.6</td>
</tr>
<tr>
<td>2000</td>
<td>482.60</td>
<td>318.10</td>
<td>65.91</td>
<td>40.7</td>
<td>15.2</td>
</tr>
<tr>
<td>2001</td>
<td>403.30</td>
<td>386.94</td>
<td>95.94</td>
<td>32.9</td>
<td>17.0</td>
</tr>
<tr>
<td>2002</td>
<td>656.36</td>
<td>591.99</td>
<td>90.19</td>
<td>44.7</td>
<td>18.8</td>
</tr>
<tr>
<td>2003</td>
<td>924.56</td>
<td>794.65</td>
<td>85.95</td>
<td>32.4</td>
<td>14.1</td>
</tr>
<tr>
<td>2004</td>
<td>1136.14</td>
<td>1099.45</td>
<td>96.77</td>
<td>34.0</td>
<td>13.5</td>
</tr>
<tr>
<td>2005</td>
<td>1247.32</td>
<td>989.84</td>
<td>79.36</td>
<td>44.65</td>
<td>7.0</td>
</tr>
<tr>
<td>2006</td>
<td>2270.20</td>
<td>1808.42</td>
<td>79.66</td>
<td>135.0</td>
<td>8.6</td>
</tr>
<tr>
<td>2007</td>
<td>627.42</td>
<td>3736.30</td>
<td>595.50</td>
<td>82.9</td>
<td>6.7</td>
</tr>
</tbody>
</table>

*OMO sessions were conducted on weekly basis from 1993-2003, and thereafter, on daily sessions.
VI. Conclusion

The open market operations have largely achieved its objective of containing liquidity surfeit. For example, it was instrumental to the country meeting the Policy Support Instrument, (PSI) of the International Monetary Fund (IMF). The pressure from favorable oil prices coupled with the build-up of excess crude oil earnings could not have been contained if open market sales were retained at weekly auctions. It afforded the monetary authorities the opportunity to determine what the market needed and the ability to offer long and short term instruments to meet the various maturity obligations.

The operators in the sector need to be empowered to take advantage of the dynamism of the market, hence, the need for intensifying capacity building in the money market segment. Now that the country is contemplating transiting to Inflation Targeting, the institution of a dynamic and robust money market is a necessary prerequisite for the success of achieving price stability -low inflation rate.

Figure 1: Time Plots of Variables in their levels

![Time Plots of Variables](image-url)
Figure 2:
Time Plots of Variables at First Difference (except otherwise inferred from table 2)
Reference & Bibliography


“Central Bank of Nigeria Annual Report and Statement of Account, various issues”.


http://www.rich.frb.org/pubs/frtoday/monetary.html


Mundell, R. A. (1962) “The Appropriate use of Monetary and Fiscal Policy for Internal and External Stability”. International Monetary Fund Staff Papers, IX.


