MONETARY AGGREGATE TARGETING AND INFLATION IN NIGERIA

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ABSTRACT
In a capitalist economy, monetary aggregate policy instruments are normally employed by monetary authorities. This attempt is to achieve counter cyclical policy objectives like the level of inflation, a reasonable level of price stability, an equitable distribution of income and wealth, a favourable balance of payments and acceptable rate of economic growth and development among others. To the financial analysts, if the direction of the volume of money supply into a given economy and the velocity and output of good and services remain constant, there is bound to be an impact on prices. The significant role of monetary aggregates in tackling the problem of inflation in any economy can not be under estimated. However, the continued over reliance on the use of monetary aggregates in addressing the issue of inflation in Nigeria is the main thrust of this paper which posits that rewarding answers to the problem of inflation in Nigeria is a joint efforts of monetarists and fiscal analysts. It further examines how money supplied can be used as an intermediate target variable to face the governments monetary recklessness.

Key words: Inflation, Monetary Management and Central Bank

INTRODUCTION

The linkage between monetary aggregates and the pursuit of minimal inflation objective has been influenced by the axiom that says "you can only make use of what you want." In any economy, the Central Bank has the sole resposnsibility of controlling monetary aggregates to pursue its macroeconomic objectives. Knowing fully well that fiscal operations of the economy are in most cases outside their control. The Central Bank often relies on the use of monetary aggregates to influence the ultimate objectives/targets of growth of output, employment, balance of payment conditions and inflation. Most developing countries are faced with the problem of indirect linkage between monetary policy instruments and the ultimate targets. A strategy for obviating this problem is the targeting of such intermediate variables as the money supply, credit, short term interest rates and perhaps exchange rate. The use of money supply as an intermediate target variable assumes greater significance where the interest rate channel of monetary policy is weak and where the exchange rate market is mostly driven by speculations with high level of instability like that of Nigeria. Maintaining relative price stability in the face of fiscal recklessness of government has become a daunting challenge for many developing countries. This, among others, has made most Central Banks in developing countries to play the role of leaning against the wind by using what they have, to counter or accommodate the fiscal behaviours of government with a view to controlling inflation. For effective monetary aggregate targeting, some prerequisites need to be established. The first is the stability and predictability of money velocity as espoused by the classical quantity theories. Second, there should be stable relationship between nominal incomes in the short run and monetary aggregates and prices in the long run (Lindsey, 1991 and Goodhart, 1991).

In spite of the significant role of monetary aggregates for targeting inflation, literatures are replete with the conclusion that monetary targeting is inherently difficult to master because of domestic and international sources of instability. This violates stability of the relationship with the nominal GDP. Several factors could impair the stability assumption of the multiplier; such factors

include rapid changes in the financial system and credit relationship with real activities. The experience in transition economies has shown that they better serve as constraints on public finances and inflationary expectations than a very good instrument for targeting inflation. Despite this, many countries still use monetary aggregates as a nominal anchor for targeting inflation. Does it show the continued relevance of this framework in many other countries? The continued reliance on the use of monetary aggregates for targeting inflation in Nigeria tends to suggest its relevance. This then raises the question of how relevant is monetary aggregate targeting to inflation expectations in the country? The need to answer this question underscores this paper.

MONETARY AGGREGATES TARGETING IN NIGERIA.

One of the primary responsibilities of the Central Bank of Nigeria as explicitly stated in its enabling Act is the promotion and sustenance of monetary stability and a sound financial system. Thus, the task of formulating and implementing monetary policy in the country rests squarely on the Central Bank. Saddled with this responsibility, the evolving monetary policy framework has shifted emphasis on its developmental functions that were stressed in the 1970s and 1980s to the maintenance of price stability through the instrumentality of monetary aggregates targeting. Monetary aggregates are the liabilities of the banking system and they, represent the counterpart of the economy's assets, namely the sum of foreign assets (estimated in local currency), domestic assets and net 'other' assets (Onyido, 2001 and Odusola, 2002). Within this framework, the components of broad money, are narrow money (currency outside banks, private sector demand deposits with the Central Bank and Commercial Banks), quasi money (savings and time deposits at Commercial and Merchant Banks), net domestic credit, net foreign assets, and net 'other' assets.

To effectively discharge this role, several institutional and regulatory changes have taken place. A critical component of this is the shift away from direct monetary controls to indirect one with emphasis on market-base instruments to keep the operating variable within targets. Such instruments include the open market operations, flexible and dynamic interest rate policy, proactive adjustments of the minimum rediscount rate as a barometer to guage market conditions, reserve requirements (both cash and liquidity) and discounting window operations. The use of market-base techniques does not only enhance market competition and efficiency but also allows for flexibility in smoothening swings in bank reserves relative to demand, to keep the inter-bank rate within the desired bound. The need to be more focused on this made the Bank to adopt broad money as the intermediate target of monetary policy.

Effective targeting cannot be undertaken without supportive operational and administrative environments. To this end, several amendments were made to the Central Bank of Nigeria Act of 1957. To improve operational environment, the CBN Act NO. 24 and the Bank and Other Financial Institutions Act No. 25, both of 1991, were enacted. The 1998 and 1999 amendments also conferred operational autonomy on the Bank. To further enthrone transparency and credibility in the conduct of monetary policy, the Monetary Policy Committee was established in January 1999.

Right from the inception of Central Bank in 1959, monetary targeting has been an anchor of monetary policy framework with either or both the narrow and broad money serving as intermediate targets. Following the rapid institutional changes in the Nigerian financial environment, narrow money has ceased to be the intermediate targets from the late 1980s. When the narrow money (M1) was being used, merchant banks were not considered as a part of the institutions accounting for the economy's money stock. The rapid increase in the number of merchant banks after the liberalization of the financial system in July 1987 swole up the quantum of quasi money in the economy. The number of merchant banks, for instance, rose from 12 in 1985 through 1992 to 54 with the number of branches rising from 25 to 116 correspondingly. During the same period, quasi money rose from N10.55 billion to N53.11 billion representing 403.41 percent. This suggests that the activities of

merchant banks can no more be ignored particularly given their increasing influence on the liquidity conditions. Prior to the inception of the indirect monetary policy, bank credit served as the operational target but subsequently changed to base money thereafter; with inflation control and economic growth serving as the ultimate policy goals.

The commencement of open market operations (OMO) in June 1993 ushered in OMO as the primary instrument of monetary management while the introduction of CBN Certificate in February 2001 was geared towards complementing the use of Nigeria's Treasury Bill as the intervention instrument. It was originally operated weekly before it was rescheduled to a bi-monthly operation.

The supply of credit to the economy was very erratic during the period. Despite the adoption of the private sector as the engine of growth of the economy, credit to government was very dominant. In most cases, the actual credit was far above the targets. In fact, in some cases where zero public credit was targeted as high as 199.3 percent was experienced (Table 1). Out of the 11 years under consideration, the actual credit to the private sector was far below the targeted whereas actual credit to government was more than the target in 8 years.

The inability to pursue the targeted monetary aggregates as expected led to the gyration of money supply and consequently inflation. As indicated in the upper panel of Figure 2, broad money supply was very volatile. It was particularly volatile between 1993 and 1997. The associated monetary lag of the fiscal deficit of 1998 and the over bloated spending of the first half of 1999 weakened the efficacy of monetary management in the country. The implications of these developments on inflation can be gleaned from the upper panel of Figure 2. Evidence from the figure further reiterates the claim of the monetary authorities that monetary policy actions affect the ultimate objectives with substantial lags (CBN, 2002)

LITERATURE REVIEW

This section provides a brief review of the empirical linkages between monetary aggregates and inflation with a view to putting the relevant issues in the appropriate context. (Dwyer & Hafer 1998) examined linkage between monetary aggregates and inflation and GNP movements in the United States in the 1960s and 1970s. Apart from providing the balance of the wide divergence between real GNP growth and fiscal deficit, monetary aggregates correlated with the movements in inflation and real income. Here, monetary policies performed the leaning against the wind function through contractionary and expansionary frameworks during periods of business booms or recessions. For the monetary authorities to clearly distinguish between the wind it is leaning against and thrust of its own actions, it is important to use long term monetary aggregates as an anchor for preventing undesirable inflation.

Evidence from Bullard (1994) tends to suggest that the strength of the linkage depends on the measure of money used and the time horizon covered in the investigation. Broader aggregates produce striking results while narrow ones mimic the equi-proportional relationship posited by the quantity theory. Extension of sample size, particularly when series of monetary innovations took place could have some significant bearing on the outcomes.

Empirical evidences from cross-country data have also shown that inflation and money growth rates are typically averaged over many years. This is a good indication that monetary aggregate can be a veritable policy target for managing inflation.

Morande and Schmidt (2002) examine the role of inflation targeting in achieving price stability in Chile using vector autoregressive models. The VARs models use six endogenous variables (interest rates, wages, GDP, consumer price index, money supply and nominal exchange rate) and two exogenous variables (the terms of Trade and the US consumer price index). The empirical evidence reveals that announcement of an explicit inflation target and adoption of a supportive monetary policy and a floating exchange rate regime that lend credibility to that target were instrumental to achieving price stability.

The experience from Peru as presented by Dorich and Triveno (2001) shows that the behaviour of the monetary policy, as reflected in the monetary base, causes higher variability in the country's observed inflation. Other variables of interest are the interest rate and exchange rate depreciation. Similarly, Boschen and Talbot (1987) observe that outside money growth is the dominant monetary factor causing inflation in the United States. The evidence from inside money is relatively very weak.

The role of monetary aggregates in price movements in Nigeria was also stressed by Akinlo and Odusola (1994) using simultaneous models. Given the focus of Akinlo and Odusola (1994), they see inflation as a structural phenomenon with the monetary variables playing some ancillary role. In a more dynamic form, Odusola and Akinlo (2001) and, Akinlo and Odusola (2003) extract the influence of money supply on the behaviours of prices in Nigeria. Emphasis was placed on the linkages among output, inflation and exchange rate depreciation. They did not, however, pay attention to how monetary targeting can be used as a veritable weapon for controlling inflation.

THEORETICAL FRAMEWORK AND METHODS OF ESTIMATION
Theoretical Framework

The theoretical underpinning of the linkage between monetary aggregates and price level originated from the crude quantity theory of money. The theory assumes that the price level will change proportionately with changes in quantity of money. This belief is often summed up in the phrase, 'money is long run-neutral". The rate of money creation is reflected in the rate of inflation in the long run. It further posits the existence of the classical dichotomy between relative and absolute prices determination. The crude quantity theorists, focusing on long run relationship, posit that the theory of value explains the relative prices (because they are determined in the real sector) while monetary theory explains absolute prices. A change in quantity of money will only change the general level of absolute prices; it will not affect outputs, or relative prices (Luckett, 1980). While the proposition of the traditional proportinates relationships between absolute prices and monetary aggregates are upheld, it is however objected to the classical equality between money and income (Struthers and Speight, 1986).

The empirical validations of Mllton Friedman between 1956 and late 1970s provide a dynamic linkage between changes in money stock, prices and nominal income. His empirical findings show that changes in money stock have effects on prices and nominal income. These changes are brought about by expected prices and expected output. He argues that changes in money supply do not bring about any change in the first six months, except possibly on interest rates. After the first six to nine months, the rate of growth of GNP will increase. Some eighteen months after, the whole effects will have shifted to prices. After about one year or so, the rate of growth of output will fall back to, or below, it's natural level and in the long run prices will rise faster than the nominal income. Friedman finds a close relationship between changes in the quantity of money and changes in nominal income and the real forces determining real income. The empirical validations of Friedman led to a common dictum that inflation is always and everywhere a monetary phenomenon and that lags are long and variable (Dwyer and Hafer 1988).

The main contention is whether the use of monetary aggregates in controlling inflation should be a long or short-term issue. As argued by (Duck 1993), the main pre-occupation of the monetary authorities should be that of long run price stability and not offsetting the short term movements. The central banks only know enough to keep inflation within bound, but not to fully stabilize the price level. As such it is a long run phenomenon as oppose to the short run perspective of Fredman. The poor performance of the short run model of Friedman in the 1980s further makes this approach less desirable.

Method of Estimation

A common approach to estimating the linkage between monetary targeting and inflation is the polynomial distributed lags (PDLs) (Batten and Thornton, 1983; Yue and Fluri, 1991). A major limitation of this approach is the possible existence of the significant serial correlation in the PDLs framework. One limitation, as pointed out by Lucas (1980) is determining which monetary aggregate to use. Theoretically, all variants of monetary aggregates are plausible, but the relevance of each to a particular economy is an empirical and a policy issue.

The econometric limitation associated with carrying out the long run neutrality of monetary aggregates on inflation on a single country data often informed the preponderance of cross country evidence. Lucas (1980) obviated this problem by introducing filter to capture the long run movements, which are often referred to as 'Lucas filter procedure'. The filter extracts the long run data from the time series data. The restricted parameter for generating the filter was not modeled. On the other hand, it is also affected by serial correlations associated with PDLs. This unobservable filter may be cumbersome to compute. Monetary targeting poses some communication problems when the relationship between money growth and inflation is affected by shocks.

An interesting development in modeling monetary policy targeting, in recent times, is the emphasis on the use of vector autoregressive models (VARs). This is based on its ability to provide comprehensive information about the dynamics of the interactions without losing the desired long run attributes. Also since shocks are common phenomena of the operations of the financial markets, earlier models like the PDLs and Lucas procedure have not been able to treat this very explicitly. Shocks, through the instrumentality of innovations have been imbedded into the VAR framework. The relevance of the framework has informed its applications to monetary and inflation targeting (Morande and Schmidt Hebbel, 2002; Landerietcha, Morande and Schmidt - Hebbel, 2000)

DATA AND ANALYSIS OF RESULTS
Data and Sources

The three variable model uses the quarterly series of real income (y), prices (P) and broad money (m) over the period 1987: 1 to 2001:4. The choice of broad money as opposed to narrow money informed by the discontinuation of the narrow money as a target variable sequel to the liberalization and deregulation of the financial sector from July 1987, while data for prices and money are available on quarterly basis. GDP is only available annually. Following Bernanke (1986) and Akinlo and Odusola (2003), quarterly GDP was interpolated through the index of industrial production. In line with the proposition of the crude quantity theory, real GDP was used as opposed to nominal GDP. The nominal output was deflated by the composite consumer price index (CPI). The three variables were obtained from the various issues of the Central Bank of Nigeria's Statistical Bulletin. All the variables are in logarithmic form.

Analysis of the Results

Evidences from Tables 3 and 4, and Figure 3 show the responses of income, prices and money to innovations and forecast error variance in any of the three variables. The classical proposition that inflation is everywhere a monetary phenomenon seems to be evident in Table 3. Changes in money supply have a monotonically increasing relationship with prices but with some appreciable lags. Rather the relationship is of a long run one. Evidence from Table 3 shows monetary aggregates as good predictor of price movements in Nigeria. Appreciable impacts become glaring from the third quarter and are stronger thereafter. The non-contemporaneous effects of money supply on inflation tends to confirm the general view within the monetary authorities that monetary policies are inconsistent with time due to undue lags in the transmission mechanism. The spontaneity of the response of the ultimate targets to the immediate targets matters a lot in monetary

policy management.

Expectation appears to be very important in price formation process and not solely a monetary phenomenon as predicted by the quantity theorists, expectation predominates the price formation process. Inflation is incorporated into the future price formation process; this behaviour is even stronger as time horizon becomes longer. The relationship between real income and inflation is hyperbolic. Increase in real income, in the short run, dampens inflation but due to wealth effect and the associated increase in purchasing power and enhanced demand, prices go up in the third quarter but latter tend to stabilize towards its long run value. This finding supports Milton Friedman validation of the empirical relevance of the crude quantity theory in the 1970s and 1980s.

Table 3 shows the fraction of the forecast error variance for each variable that is attributable to it own innovations and to innovations from other variables in the system. Innovations from own sources predominate the variations in predictions of all the variables. Prices are explained by past values of own, real income and money (in order of importance). This shows that predicting inflation accurately is more important than targeting it. In Nigeria, full knowledge of inflation accounts for between 93.35 and 98.08 percent of the forecast error variance innovations from inflation.

This not withstanding, the forecast error variance of money has significant influence in predicting real income. Its importance becomes stronger as we move from the short to medium to long terms. It ranges between 0.81 and 19.68 percent between the first 9 quarters; albeit with limited role for inflation (Table 4). The forecast error variance of real income in money is stronger in medium term than both the short and long terms. The leaning against the wind approach of monetary policy management shows the relative importance of prices in forecasting money supply.

CONCLUSION

Best practices in monetary policy tend to suggest that keeping monetary growth in tandem with real growth trends is an important way of eliminating inflation trends. The Nigerian monetary authorities have tried to do this through monetary aggregates targeting but with limited success. The gap between the actual and targeted aggregates is often too wide for effective control of inflation in the country. The broad money supply for instance, turnover in a more volatile manner. This underscores weak monetary policy instrument autonomy and a leaning against the wind behaviour with a view to accommodating the fiscal recklessness of government. The unorthodox method of financing deficit and the instant monetization of oil windfall make monetary targeting quite daunting.

The classical proposition that inflation is everywhere a monetary phenomenon seems to be partially evident in the results. Changes in money supply have a monotonically increasing relationship with prices although with some lags. Evidence from impulse response functions tends to show monetary aggregates as good predictors of price movements in Nigeria. However, the results from variance decomposition recognize the significance of full information about inflation and past values of real income, with money playing an ancillary role. Issues that should preoccupy the attention of monetary authorities in Nigeria are why is money playing an ancillary role and why is real income playing such an important role in predicting prices in Nigeria? This underscores the need for the monetary authorities to pay adequate attention to predicting inflation as opposed to stressing its targeting in the first instance. The need to revisit the set of policy instruments that could facilitate faster and effective monetary transmission mechanism with a view to promoting the linkage between monetary policy and prices is necessary. This is important because monetary policies are more transparent and devoid of political undertone that characterizes fiscal and other macroeconomic policies management.

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Table 1: Monetary Aggregates (Target and Actuals), 1993 – 2003.

	'993		'994		'995		'996		'997		1998		1999		2000		2001		2002		2003	
	Target	Actua.	Target	Actua.	Target	Actua.	Target	Actua.	Target	Actua.	Target	Actua.	Target	Actua.	Target	Actual	Target	Actua.	Target	Actua.	Target	Actua.
1 Broad Money	20.0	54.0	14.8	36.3	10.1	18.8	10.0	31.6	14.5	48.1	12.2	27.0	15.3	21.5	15.0	21.2	16.8	19.1	15.0	15.8	15.6	21.2
2 Narrow Money	18.0	57.5	21.4	46.7	9.4	15.4	4.1	18.0	9.8	62.2	4.3	28.1	12.4	15.9	13.8	19.8	14.5	18.0	13.5	15.6	10.2	17.2
3 Aggregate Credit	17.5	62.7	9.4	34.3	11.3	22.0	18.3	30.0	27.8	-23.1	15.8	79.9	57.9	56.5	25.7	28.5	2.0	-25.8	24.8	169	24.5	55.7
4 Credit to Federal Govt.	14.5	89.1	0.0	21.6	5.6	7.7	10.2	32.0	37.8	-162.3	2.6	95.2	96.6	6,320.6		47.0	0.0	-61.6	0.0	-325	0.0	199.3
5 Credit to private sector	20.0	19.9	32.6	72.8	21.9	49.4	19.9	29.2	21.9	30.9	22.8	43.5	34.9	11.8	23.3	14.5	29.5	23.3	45.4	39.3	33.9	27.3
6 Inflation	25.0	57.2		57.0		72.8	9.0	6.6	9.0	6.9	7.0	18.9	9.3	12.9		10.1	30.0	23.9	15.0	8.5	9.0	10.0

Note: ( )   Government Inflation target for 1995 was to significantly reduce the rate of inflation and hence did not indicate any figure

Figures for 2003 are for January – June.
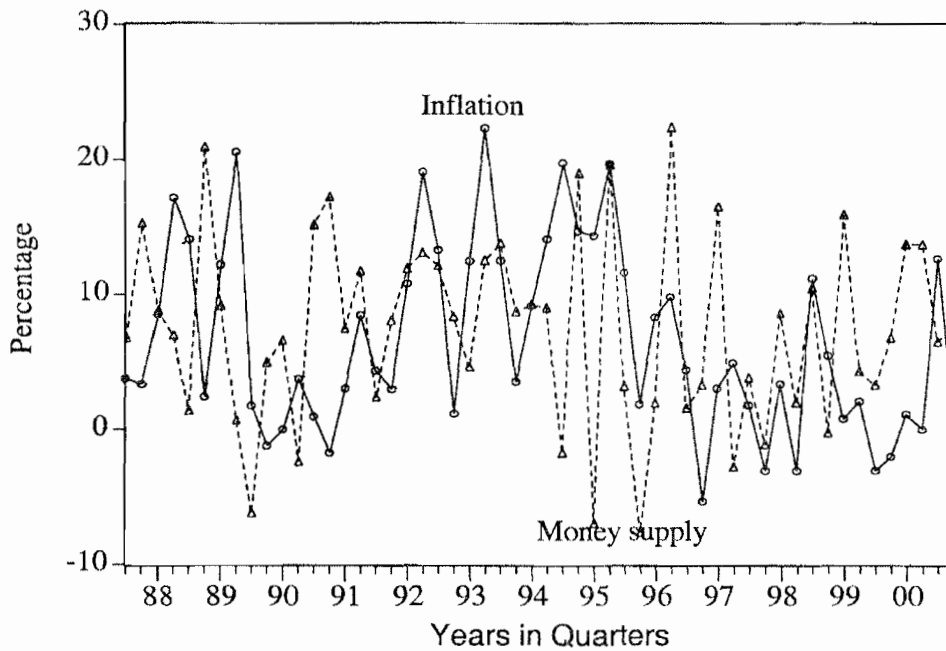
Source: CBN Annual Reports and Statement of Accounts (Various Issues).

Figure 1: Monetary Aggregates Deviations from Targets (%) (1993 - 2003)
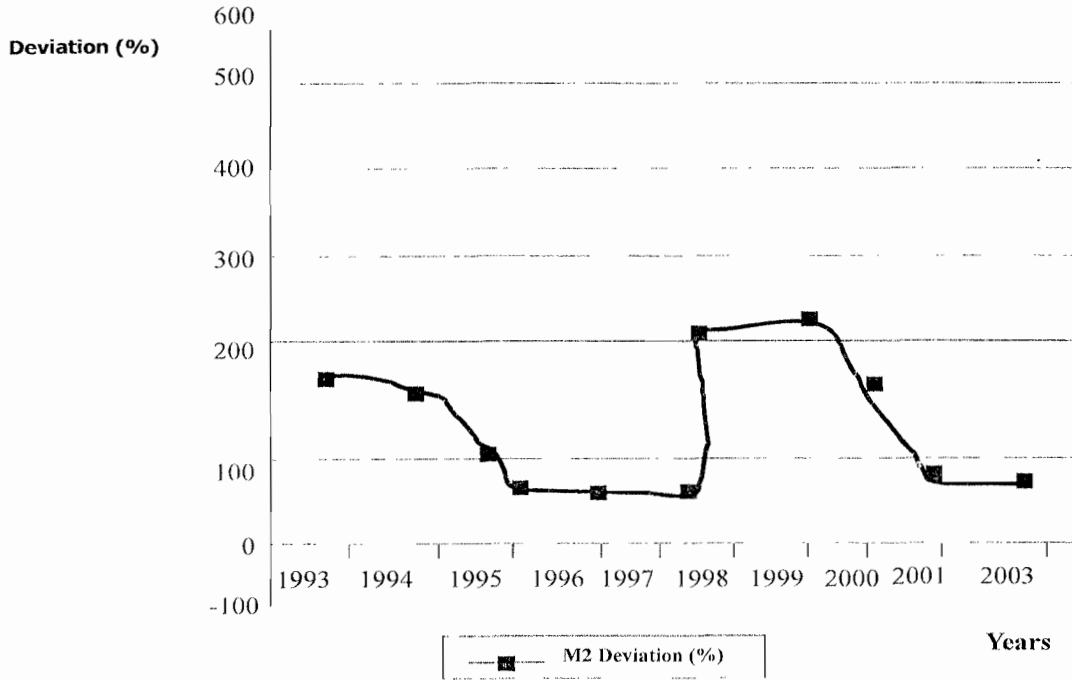
Source: CBN Annual Reports and Statement of Account   (Various Issues)

Figurre 2: Money Supply and Inflation in Nigeria (1970 - 2001)

Source: CBN Annual Reports and Statement of Account
(Various Issues)

Table 2: Summary of the Vector Error Correction Model (VECM) Estimates, 1987 - 2004

	Output	Prices	Money
Cointegrating equation	-0.437	-6.6 E -05	0.158
	(3.593)	(0 001)	(2.115) ´
Goodness of fit statistics			
adjusted R^2	0.482	0.317	0.012
Standard error of equation	0.109	0.052	0.067
F-Statictistic	8.845	4.922	1.105

Source: **CBN Annual Reports and Statement of Account (Various Issues)**

Note: The cointegrating equation presents the cointegrating vectors from the three variable model with the t – statistics in parenthesis.

Table 3: Impulse Response Functions from the VECM Estimates, 1987 - 2004

Type of Innovation / Horizon in quarters		Income (y)	Prices (p)	Money (m)
€y	1	10.19	-0.67	0.57
	3	0.15	1.75	1.80
	6	1.76	0.95	2.65
	9	1.29	0.70	2.78´
€p	1	0.00	4.81	1.13
	3	-5.27	8.62	0.65
	6	-4.91	10.18	0.77
	9	-4.59	10.50	0.74
€m	1	0.00	0.00	6.15
	3	-0.32	2.09	4.37
	6	0.78	2.47	4.19
	9	0.43	2.75	4.15

Source: CBN Annual Reports and Statement of Account (Various Issues)

Notes: Entry (i.j) is the dynamic response of variable j to a one standard deviation shock in variable i. All variables are percent increases of the level of each variable from baseline.

Table 4: Variance Decomposition from the VECM Estimates, 1987- 2004

Variable/Horizon		ey	ep	Cm
Income (y)	1	100.00	0.00	0.00
	3	68.64	27.77	5.58
	6	54.99	41.69	3.31
	9	44.60	52.70	2.69
Prices (p)	1	1.91	98.08	0.00
	3	2.69	94.23	3.15
	6	1.59	93.69	4.48
	9	1.16	93.35	5.48
Money (m)	1	0.81	3.25	95.93
	3	8.64	3.07	88.29
	6	15.41	2.98	81.59
	9	19.68	2.73	77.59

Source: CBN Annual Reports and Statement of Account (Various Issues)

Note: Entry (i.j) is the percentage of forecast error variance of variable i at different horizons attributable to innovations in variable. J.