Domestic Government Debt Structure, Risk Characteristics and Monetary Policy Conduct: Evidence from Nigeria*

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1. INTRODUCTION

Since the early 1980s, the ratio of domestic government debt to gross domestic product (GDP) in Nigeria has risen sharply. By 1964, the level of domestic debt was 5.5 percent of GDP. A decade later (by 1974), this ratio went up slightly to 6.9 percent of GDP. But by 1984, the domestic debt /GDP ratio was over 40 percent. Although it declined slightly in the 1990s, it has since 2000 moved upwards.

Nigeria has not been alone in experiencing escalating levels of government domestic indebtedness, but in comparison to other countries in Sub-Saharan Africa, Nigeria's domestic debt to GDP ratio is clearly on the high side. For the non-HIPC in sub-Saharan Africa, the domestic debt/GDP ratio averaged 23 percent between 1995-2000, and if we exclude Nigeria, it drops to 18 percent (see Christenesen, 2004).

The dramatic growth in the domestic debt /GDP ratio has raised many doubts about fiscal sustainability of the current economic policy. The concerns about sustainability have also been compounded by those related to the very short maturity of most of the government domestic debt, and also the fact that the Central Bank of Nigeria(CBN), still remains the dominant holder of federal government debt instruments. These concerns are further fuelled by the fact that government domestic debt is the major interest bearing financial instrument in circulation and therefore plays a major role in monetary policy implementation.

The rising domestic debt profile, its excessive short-term nature and the narrow investor base therefore raises a number of important questions. First, given that the CBN has relied mainly on Open Market Operations (OMO) in government debt securities as a transmission channel of monetary policy since 1993, how will the narrow investor demand affect the conduct of the needed transactions. This is even more worrisome, given the fact that government securities market still constitutes the predominant portion of the domestic debt market in Nigeria[1]. Second, what are the current levels of macroeconomic risk exposures associated with the present structure of government domestic debt?

Existing studies on domestic debt analysis in Nigeria are still scanty. Few that exist, focus on the analysis of the structure, especially the composition and investor base (see for eg. Okorunmu, 1992, Odozi, 1996, Garba, 1997; 1998). None has gone further to analyse the risk features, and more importantly the implications of these risk features for monetary policy.

In this study, we address a number of central issues that are important to understanding the evolution and basic characteristics of government domestic debt portfolio in Nigeria. Very importantly we analyse several aspects pertaining to the management of government domestic debt in Nigeria. Since short-term debt constitute over 60% of total domestic debt in Nigeria, we focus on market and rollover risks which mainly affect such short term government instruments. Moreover as these short-term debt instruments are about the only interest bearing financial instruments in the money market, changes in its risk characteristics can have far reaching impact on monetary policy conduct.

In sum, this study contributes to the general literature by analysing the implications of the structural and risk characteristics of government domestic debt for monetary policy conduct. The issues raised herein are therefore germane for financial sector development in general.

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[1] There are two main segments of the domestic debt market in Nigeria: -the domestic government debt market, and the domestic corporate debt market.

1.1 Historical Evolution of Domestic Government Debt in Nigeria.

What constitutes domestic government debt in Nigeria?

In Nigeria, domestic government debt is defined as debt instruments issued by the Federal government and denominated in local currency. In principle, State and Local governments can also issue debt, but they are still limited in their ability to issue debt instruments. Therefore government domestic debt refers to debt instruments issued by the federal government, and does not include contractor debts and supplier credit by the government. It therefore consists of:

- Nigerian Treasury Bills
- Nigerian Treasury Certificates
- Federal Government Development Stocks
- Treasury Bonds
- Ways and Means Advances

Out of these, treasury bills, treasury certificates and development stocks are marketable and negotiable, while treasury bonds, ways and means advances are not marketable, but held solely by the CBN. Of the three marketable government debt instruments, only treasury bills are currently traded in the money market, since treasury certificates was discontinued in 1996. Development stocks are traded in the capital market, but since1987, the federal government has not issued any new development stock.

The beginning of the existing market for domestic government debt in Nigeria is the financial reforms introduced by the colonial government in 1958. These reforms saw to the creation of the Central Bank of Nigeria (CBN) and the creation of marketable public securities to finance fiscal deficits. According to paragraph 35 of the CBN ordinance 1958:

> "The Bank shall be entrusted with the issue and management of federal government loans publicly issued in Nigeria, upon such terms and conditions as may be agreed between the federal government and the Bank"

The Central Bank in the course of discharging its functions with respect to debt management plays an important role in both the primary and secondary markets for government securities. In the primary market, the Central Bank readily guarantees the issue of these securities and absorbs any amount not subscribed by the banks and the non-bank public. Thus even if the non-Central Bank subscriptions were zero, 'mandatory take-up' guarantees the government the full amount of any issues of treasury bills, treasury certificates or development stocks required to finance its budget.

The CBN also provides a secondary market for government securities whereby those securities held by the Bank are offered to the public for sale. Table 1 below shows the historical evolution of the instruments of domestic government debt in Nigeria. Apart from treasury bonds, all the instruments have statutory limits(upper bounds) to the size of federal borrowing that they can support. But as Garba(1998) argues, since the CBN is not autonomous, it cannot effectively resist orders to issue new debt.

Table 1 : Evolution of Domestic Debt Instruments in Nigeria

Debt Instrument	Primary Legislation	Statutory limit	Purpose	Amendments of borrowing limits	Maturity	Explicit Costs
Ways and Means Advances	CBN Act 1958(Cap 30 as amended)	25% of estimated recurrent expenditure	To finance the budget before government revenue starts accruing	CBN Decree of 1991	Amount outstanding must be redeemed at end of year	Interests
Treasury Bills	Treasury Bills Ordinance of 1959	10% of estimated federal retained revenue	To finance federal budget deficit	20%(1961) 40%(1962) 50%(1965) 85%(1968) 100%(1969) 150%(1970)	91 days	Interests
Treasury Certificates	Treasury Certificates Decree of 1968	50% of estimated federal retained revenue	To finance federal Budget deficit	60	1-2 years	Interests
Development Stocks	General loans and stock ordinance of 1951	N200 million (internal loans Act, 1962)	To finance development projects and on-lending to (regions) states	75% of CBN's total demand liabilities (1969)	5-20 years	Interests
Treasury Bonds	1989	None	Reduce burden of debt service	None	20 years	Interests

Source: Okorounmu, 1992; Omoruyi, 1993, Garba, 1998

One can analyse the evolution of the domestic debt from its size, or by considering its different components. Often the stock of government debt is measured relative to national output. Figures 1, 2 and Appendix 1 show the size of the domestic debt structure both in nominal terms, as a percentage of total debt and as a percentage of GDP. The outstanding level of government domestic debt has grown tremendously from N,0.023 billion at inception in 1960 to N,1.111 billion in 1970. In 1980 it stood at N8.23 billion when compared to the level of external debt which moved from N0.094 billion 1960 to N0.175 billion in 1970 and further to N1.86 billion in 1980. As shown in Appendix 1, it was in 1986 at the inception of the structural adjustment programme that the level of external debt for the first time became larger than the level of domestic debt. Ever since then, the stock of external debt has consistently been larger than domestic debt.

Figure 1: Nigeria's domestic government debt/GDP (1960-2003)

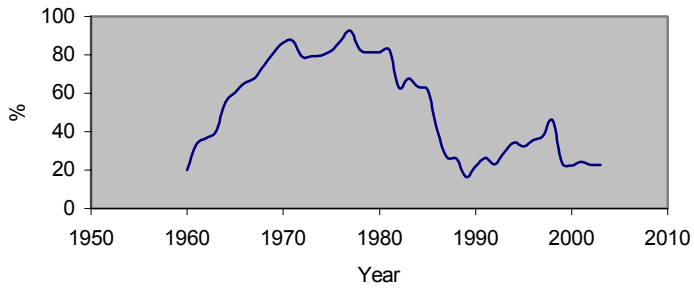


Figure 2: Nigeria's domestic government debt/total debt(1960-2003)

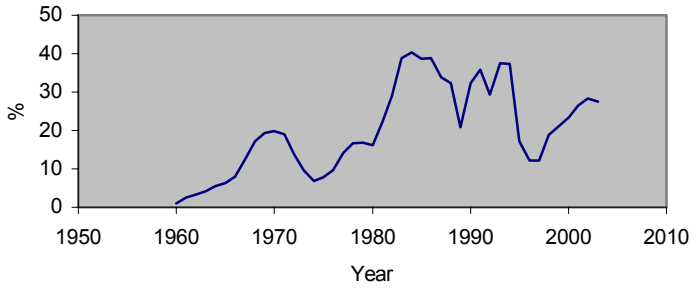


Figure 1 shows that though the nominal domestic debt levels has been high, it was relatively low level as a percentage of GDP between the periods 1960-1967. This reflects the fact that the nominal GDP rose at a faster rate than the level of debt during that time; and the two have grown broadly in line since then (although varying over the cycle) until 1983 when it jumped again. The ratio between 1995 and 1998 appear closer to that in the years prior to 1981.

1.2 Reasons for Rising Domestic Government Debt Profile in Nigeria.

Theoretically, there are three reasons often advanced for government domestic debt (Alison et al, 2003) The first, is for budget deficit financing, the second is for implementing monetary policy (buying and selling of treasury bills in the open market operations), and the third, is to develop the financial sector(supplying tradable financial instruments so as to deepen the financial markets) .It should be noted that despite a variety of theories of domestic debt markets developments, there have been relatively few empirical analysis of actual developments in many countries especially in sub-Saharan Africa. Our intention here is not to test the various hypothesis of domestic debt market development advanced in literature, but rather to provide in passing likely influencing variables with respect to Nigeria.

In Nigeria, several factors have been advanced to explain the changing domestic debt profile between the 1960s and now (see Odozi, 1996, Rapu, 2003). The major factors include: high budget deficits, low output growth, large expenditure growth, high inflation rate and narrow revenue base witnessed since the 1980's. (see table 2).

Inflation rate measured in terms of percentage change in consumer price index(CPI) escalated from an average of 1.6 percent in 1960-1969 to an average of 20.5 percent in 1980-1994, and 25.4 percent in 1995-1999 periods respectively. Generally, low inflation is deemed to be important for creating the right incentives for investors and for facilitating the development of markets in fixed income securities (see IMF and World Bank, 2001). However cross-country relationship between inflation and the size of the domestic debt appears still to be weak (see Mihaljek et al, 2002). There are countries with low increases in inflation but have large amounts of domestic debt(Korea and Malaysia), and some with low inflation but with small debt markets(Argentina and Hong-Kong). There are still others like Nigeria with large increases in inflation but with large amounts of domestic debt.

Output growth declined as it recorded annual average values of 5.9 percent in1980-1989, 4 percent in 1990-1994, and 2.8 percent in 1998-1999 periods respectively. However growth was recorded in 2003 (see table 1). It is usually expected that as countries expanded their output, they also tended to rely more heavily on

domestic public debt issuance to finance growth. There is thus a strong cross-country relationship between economic growth and the total size of the debt market.

Table 2: Key economic variables influencing domestic government debt in Nigeria(%)

Year	Inflation rate	GDP growth rate	Public expenditure/ GDP	Fiscal deficit/ GDP	Savings/ GDP	Retained revenue/ GDP	Primary surplus/ GDP	Real interest rate
1960-1969	1.6	3.6	13.0	-5.2	Na	Na	Na	na
1970-1979	15.3	7.6	35.9	-0.8	6.5	19.5	18.1	-11.6
1980-1984	20.5	-7.1	38.2	-5.1	14.5	12.6	10.5	-13.8
1985-1989	25.4	5.9	31.7	-7.2	12.9	12.3	2.6	-8.5
1990-1994	24.4	4.0	29.7	-10.0	11.9	13.3	0.3	-20.0
1995-1999	25.4	2.8	19.7	-2.3	-0.8	14.5	9.5	-18.5
2000	6.9	3.8	15.1	-2.9	Na	25.6	13.5	6.1
2001	18.1	4.7	18.7	-4.1	Na	14.5	15.9	1.0
2002	12.9	2.9	17.1	6.2	Na	11.0	-3.2	5.5
2003	13.8	10.2	15.3	-2.8	Na	12.1	2.5	7.6

Source : Rapu(2003), CBN Annual Report (various years), na= not available

Public expenditure as a percentage of GDP increased from 13 percent in the 1960-69 period to 29.7 percent in the 1990-94 periods. This increased public expenditure to GDP ratio resulted from fiscal policy expansion embarked upon during the oil boom era of the 1970s . However as the oil boom declined in the 1980s, priorities of government expenditure did not change. In addition, the revenue base of the federal government in relation to the GDP declined continuously during the review period(Rapu, 2003:49). From 19.5 percent of GDP in the 1970s, this declined to 11 percent of GDP in 2002 and further to 9 percent in 2003. Consequently, the fiscal operations of the federal government resulted in large deficits. From an average of 0.8 percent of GDP in the 1970-1979 period, the level of deficit increased persistently averaging 5.1 percent in 1980-1994 and 10.0 in 1990-94. A very remarkable feature of the government fiscal expansion was the financing of the excess expenditures from domestic sources averaging 79.2 percent between 1980 and 2002, since foreign loans was difficult to obtain. Cross-country relationship between fiscal deficits (as a percentage of GDP) and the size of government debt markets confirms that countries with larger fiscal deficits have issued more government securities in domestic markets(Mihalijek et al 2002).

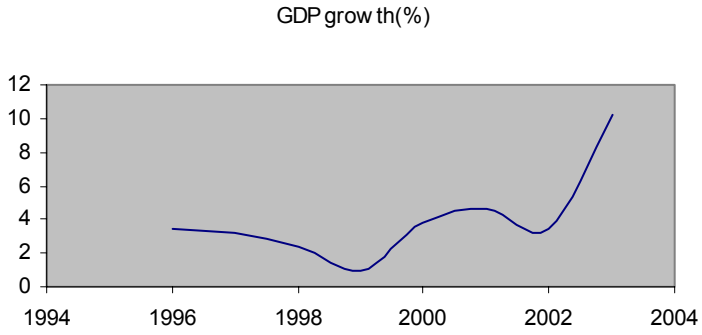
Generally declines in government revenue were met by borrowing from the Central Bank through the instrument of Ways and Means Advances. These advances were never defrayed by the federal government but refinanced by the floatation of treasury bills and treasury certificates. In addition, the practice whereby matured treasury bills and treasury certificates are rolled-over by issuing new ones to pay holders of maturing debt instruments contributed to the continued growth of the debt stock.

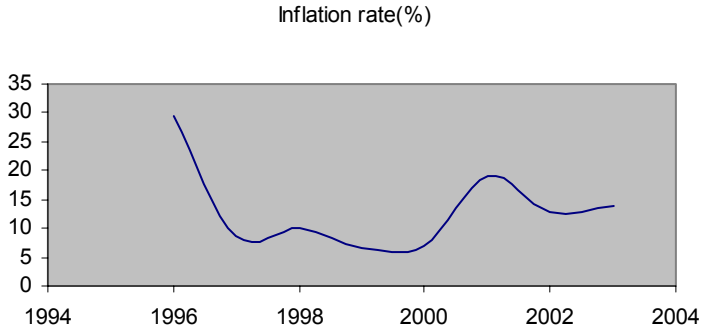
1.3 The Policy Context:

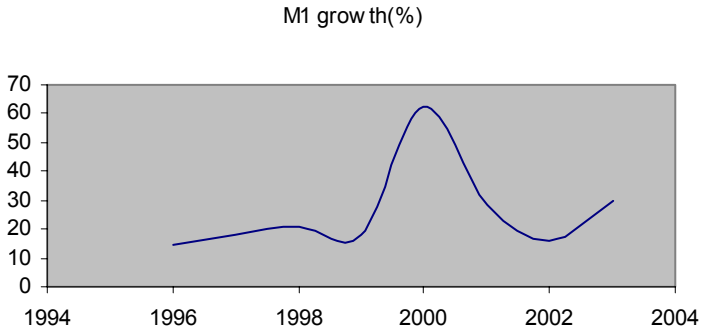
Exploring the empirical answers to some of the questions raised earlier requires an understanding of the macroeconomic environment and the structure of the financial sector, especially the regulatory and supervisory frameworks. We explore these elements plus a rich database on government domestic debt profile to analyse how the domestic debt characteristics affect monetary policy conduct.

The Macroeconomic Background:

Nigeria has not had a stable macroeconomic background since the late 1990's up to the early 2000. The GDP growth has been fluctuating widely, peaking at an all time high of 10.2% in 2003. The inflation rate, which had reached an all time high of 29.3% in 1996, dropped in the early part of 2000 but has kept fluctuating. The performance of major monetary aggregates did not show any appreciable improvement. They have grown very rapidly in most of the years, exceeding set targets, sometimes by wide margins. The excessive fiscal operations of the three tiers of government were financed principally through increased aggregate bank credit to the economy.







The Financial Sector

Since the introduction of the Structural Adjustment programme in 1986, there has been phenomenal growth in the number and types of institutions operating and the volume of activities in the financial system. The number of banks have increased from 12 in 1960 (at independence) to about 120 at the end of 1992, but declined to 89 in 2004, owing to large period of distress during the late 1990's.

Today, with government divestiture of its ownership in major enterprises, the ownership structure in the banking industry has tilted in favour of private individuals with some foreign presence.

In addition to banks, there are development finance institutions and some specialized banks that operate in the system. Thrift institutions have also achieved some prominence in the financial system. These comprise mainly of insurance companies, pension funds and savings banks. The investment portfolio of some of the institutions has in several times found interest in such instruments as the federal government of Nigeria Development Stocks and Treasury Bills.

Apart from these major financial institutions, the financial sector is also inundated by a collection of small institutions that also play major roles in the intermediation process. These include finance companies, leasing companies, mortgage, savings and loans associations and venture capital companies. Most of these have come into prominence in the wake of the financial innovation that pervaded the system with the onset of financial liberalization.

Discount houses are another set of special non-bank financial institutions aimed at providing discounting and rediscounting facilities in government short-term securities. Presently, there are five discount houses, which are expected to help in promoting the growth and efficiency of the money market. The discount houses help in th implementation of Open Market Operations (OMO) by facilitating the issue and sal of short-dated government debt instruments by tender and also accommodate banks short term financial needs. The size of the financial sector has increased substantially both in terms of the number and types of instruments traded. In the money market, some of the instruments traded include; treasury bills, treasury certificates, (both government debt instruments), interbank fund's, certificates of deposits, commercial papers, bankers acceptances.

In the capital market, there is the fixed interest securities market(debentures and bonds) and the shares market. The government dominates the bonds market, whereas private enterprises dominate the shares market. In general, two groups of transacts place their securities in the market- he government and the incorporated enterprises. However, government securities dominate the market, which is made possible by a number of legislative actions which supports the market for government securities.

In terms of institutions, the capital market consists of a primary market, which is dominated by the investment banks, brokers, dealers and venture capitalists and a secondary market, dominated by the stock exchange.

The Regulatory and Supervisory Framework

The main regulatory and supervisory agencies of the Nigerian Financial System are the Central Bank of Nigeria(CBN), the Nigerian Deposit Insurance Corporation(NDIC), the Securities and Exchange Commission(SEC), the Federal Mortgage Bank and the Federal Ministry of Finance. Basically the CBN regulates investment intermediaries an all depository institutions except mortgage firms. It performs banking supervision and examination through examining the books of accounts, and statutory returns submitted by regulated institutions. It also grants licenses, imposes reserve requirements,

prudential guidelines and monetary policy guidelines because of its mandate for overall economic management. The CBN therefore has pervasive oversight responsibility over the entire financial system. The current regulatory focus of the CBN include minimum capital requirements, asset securitization and market discipline.

The NDIC was set up to provide limited insurance coverage on the deposit liabilities of all licensed banks. The Federal Mortgage Bank of Nigeria is the principal regulatory and licensing agency for mortgage institutions while the Securities and Exchange Commission regulated the operations in the capital market. It licenses stock brokers and issuing houses.

There have been several reforms in the regulatory and supervisory framework for the financial sector in Nigeria. These reforms were aimed at granting the CBN operational autonomy as well as streamlining the powers and responsibilities of the CBN and the NDIC so as to address distress expeditiously in the financial services industry.

2: DOMESTIC GOVERNMENT DEBT IN NIGERIA: STRUCTURE AND CHARACTERISTICS.

Domestic government debt instruments play an important role in any economy, as they provide economic agents with alternative options to banking for allocating their savings accordingly. It is a key part of the collateral used in financial markets, and as such plays an important role in monetary policy implementation.

Significant changes in the size, structure and composition of government debt instruments may influence financial stability. In order to maintain financial stability, it is therefore important to monitor the structure, characteristics and the level of risk inherent in the debt portfolio. Reliable statistics on the composition, investor's base and maturity structure is necessary to assess these risks. In this section, we shall analyse the structure and characteristics of domestic government debt portfolio in Nigeria.

2.1 Composition

Figure 3 and 4 below and appendix 2 show the changes in government domestic debt composition over the past decade. Treasury Bills constitute the main component of the outstanding stock of government debt accounting for 77.4 percent of total domestic debt in 1960, declining to 51 percent by 1970 but climbing up to 62 percent in 2003. The decline in the percentage share of treasury bills in the mid 1970's was as a result of the decision not to issue new treasury bills because of the boost in government revenue in the mid 1970's as revenue from the oil sector improved substantially (Okunrounmu, 1992). As soon as there was a decline in revenue from this source, government reliance on credit from the CBN through the issue of treasury bills resumed as from 1981.

The growth in the level of treasury bills also reflected the practice of rollover of maturing securities and continuous recourse to conversion of ways and mean advances outstanding at the end of the year to treasury bills as a way of funding the fiscal deficit.

Fig. 3 Government domestic debt by type of instrument

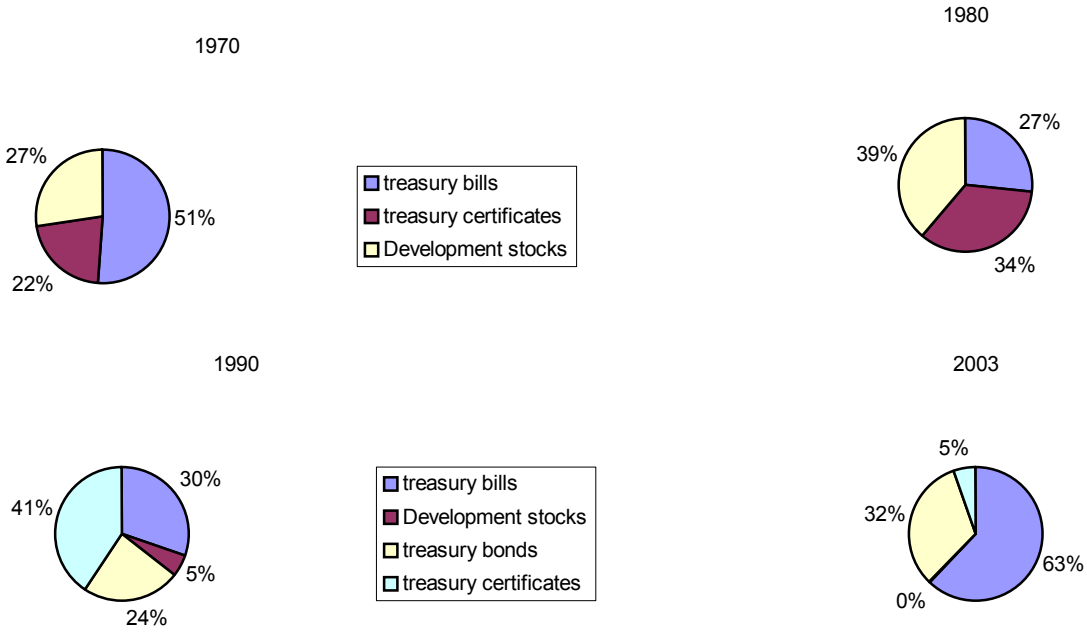
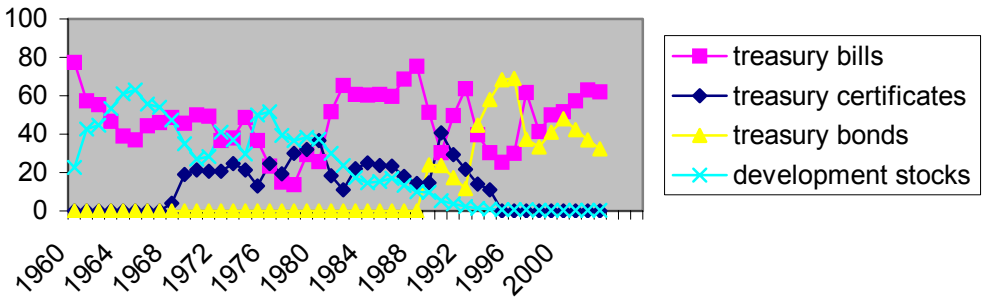


Figure 4 Composition of domestic debt outstanding (% of total)



Treasury certificates, which were first issued in 1968, constituted one of the largest securities between 1983 and 1988. It even surpassed treasury bills between the period 1976-1980. It was first issued to further deepen the domestic money market by increasing short-term investment options available. In 1995, the federal government decided to convert treasury certificates outstanding to non- tradable treasury bonds in an attempt to further reduce its debt service obligations on domestic debt. Treasury certificates was therefore abolished in 1996.

In 1989, the monetary authorities at the inception of the auction bid system for flotation of treasury bills and certificates introduced treasury bonds, as another instrument in the portfolio of domestic debt. The objective was to minimise debt service obligations on domestic debt arising from the liberalization policies. Thus in 1989, 20 million Naira worth of treasury bills, representing 58.6% of treasury bills outstanding were converted to treasury bonds of fixed interest rates. The bonds styled as " 5% Federal Republic of Nigeria treasury bonds 2004-2015" are to carry a fixed interest rate of 5% and are wholly held by the CBN. As a result of the flotation of new issues of treasury bonds and conversion of part of the treasury certificates outstanding, treasury bonds accounted for up to 69% of total domestic debt as at end 1996.

Development stocks were apparently the first government instrument to be issued. It was floated largely to provide development finance either directly to meet the needs of the federal government or as loan on lent to the state governments. The colonial administrators floated the first registered debt stocks 1956/61 in 1956. Development stocks outstanding increased between 1960 and 1987. It started to decline as from 1988, as no new stocks were made. The Development Stocks were traded in the secondary market of the Nigerian Stock Exchange.

In line with government's policy of reducing reliance on monetary financing of deficits, the federal government through the Debt Management Office (DMO) in 2003 raised funds through the capital market to meet its financing needs by issuing the 1st FGN Bonds. The government was able to raise N72.6 billion, out of the N150 billion worth of bonds issued representing about 5.4% of total domestic debt stock (see appendix. 2)

2.2 Investor Base

An important component of debt management is to stimulate a diverse investor base and develop instruments, trading facilities and distribution network that best suits the needs of the investors(World Bank and IMF, 2001). Infact it is crucial to have a diversified investor base in terms of time horizons, risk preferences and trading motives, especially for fixed income securities(Sidaou, 2000). This will help ensure high liquidity and a stable demand. Table 3 below shows the evolution of the investor base of government domestic debt in Nigeria.

During the period 1960 to 1980, non-bank holders comprising a wide range of both private and public institutions as well as individual investors dominated the investor base of domestic debt instruments in Nigeria. These include; insurance companies, savings type institutions, state and local governments etc. Between 1960 and 1977, non-bank public holdings of debt instruments averaged 52.1% , holdings by commercial banks averaged 26.7% and Central Bank, 20.8%, while Merchant banks held 0.4%.

Surprisingly, as from 1978, the investor base of domestic government debt instruments changed and from then onwards became dominated by the Central Bank of Nigeria(CBN), while the holdings of other investors declined in relative terms. For example between 1978 and 1989, the CBN holdings of government securities averaged 52.2%, holdings of the non-bank public and commercial banks averaged 24.3% and 22.4% respectively, while merchant banks held 1.1%. Between 1990 and 2001, there were further declines in the relative holdings of government securities by banks and non-bank public as CBN holdings averaged up to 75.5% of debt stock during these period.

Table 3: Investor Base(Domestic Debt Holdings, 1960-2003) (N'million)

Year	Central Bank		Commercial Banks		Merchant Banks		Others(non-bank)		Total
	Holdings	% share of total	Holdings	% share of total	Holdings	% share of total	Holdings	% share of total	
1960	2.7	11.6	4.5	19.3		0.0	16.1	69.1	23.3
1961	20.7	34.9	9.4	15.9		0.0	29.2	49.2	59.3
1962	21.8	25.1	12.7	14.6		0.0	52.2	60.2	86.7
1963	31.6	24.6	10.6	8.3		0.0	86.2	67.1	128.4
1964	41.0	23.5	11.7	6.7		0.0	121.7	69.8	174.4
1965	63.1	29.2	13.9	6.4		0.0	139.2	64.4	216.2
1966	100.6	34.9	27.3	9.5		0.0	160.2	55.6	288.2
1967	155.8	42.8	35.9	9.9		0.0	172.5	47.4	264.2
1968	90.3	18.3	199.1	40.5	0.6	0.1	202.1	41.4	492.1
1969	100.6	13.5	338.3	45.5	2.2	0.7	301.9	40.6	743.0
1970	178.7	16.4	507.4	46.5	3.9	0.4	401.9	36.8	1091.9
1971	249.8	20.4	299.6	24.4	2.9	0.2	674.7	55.0	1227.0
1972	158.7	12.1	387.4	29.5	4.1	0.3	761.8	58.1	1312.0
1973	175.3	12.3	387.8	27.3	6.9	0.5	853.1	59.9	1423.1
1974	109.5	7.4	766.0	51.7	3.3	0.2	601.9	40.6	1480.7
1975	313.7	16.8	801.3	42.9	13.4	0.7	740.3	39.6	1868.7
1976	459.7	17.1	1196.8	44.5	14.3	0.5	1015.9	37.8	2686.7
1977	456.9	13.4	1348.1	39.6	38.3	1.1	1563.3	45.9	3406.6
1978	2071.5	43.0	1096.5	22.8	14.6	0.3	1630.9	33.9	4813.5
1979	2483.8	34.4	2416.4	33.5	53.3	0.7	2260.5	31.3	7214.0
1980	2859.3	36.1	2978.9	37.6	60.1	0.8	2017.3	25.5	7915.6
1981	6046.6	52.8	2135.8	18.7	72.9	0.6	3187.3	27.9	11442.6
1982	8022.5	54.0	3168.5	21.3	176.5	1.2	3477.1	23.4	14844.6
1983	11347.4	51.1	5459.7	24.6	388.8	1.7	5025.5	22.6	22221.4
1984	10701.4	41.7	8998.2	35.0	895.0	3.5	5080.4	19.8	25675.0
1985	11521.9	41.2	10669.1	38.2	1165.1	4.2	4595.9	16.4	27952.0
1986	17721.6	62.3	4968.3	17.5	159.9	0.6	5601.4	19.7	28451.2
1987	19197.2	52.2	8109.9	22.0	290.5	0.8	9.93.0	25.0	36790.6
1988	27682.7	58.9	7714.5	16.4	181.5	0.4	11452.4	24.4	47031.1
1989	38391.3	67.3	3607.6	6.4	98.2	0.2	14891.0	26.1	57051.1
1990	56546.1	76.3	8917.3	12.0	355.8	0.5	8255.4	11.1	74074.3
1991	89412.6	76.9	6847.7	5.9	679.4	0.6	19261.2	16.6	116200.2
1992	122028.3	75.4	5881.2	3.6	1027.0	0.6	32963.7	20.4	161900.2
1993	189773.4	72.7	29348.8	11.2	9451.1	3.6	32522.3	12.5	261095.6
1994	251552.1	73.6	39184.2	11.5	8644.8	2.5	42432.6	12.4	341813.7
1995	340471.0	83.1	18007.6	4.4	2105.3	0.5	49014.1	12.0	469598.0
1996	247461.0	72	40026.0	11.6	5081.0	1.5	51106.0	14.9	343674.0
1997	260257.0	73.32	35066.0	9.9	6384.0	1.8	53346.3	15.0	355053.3
1998	435132.0	81.0	49540.0	9.2	4574.0	0.9	48244.9	9.0	537490.9
1999	522820.0	65.8	226092.0	28.4	16210.0	2.0	29684.3	3.7	794806.3
2000	713933.0	79.5	132682.0	14.8	9311.0	1.0	42327.9	4.7	898253.9
2001	738585.0	72.6	199261.5	19.6	0.0	0.0	79127.5	7.8	1016974.0
2002	532453.0	45.7	460230.0	39.5	0.0	0.0	173318.0	14.9	1161001.0
2003	686802	51.7	482225	36.3	0.0	0.0	160694	12.1	1329722

Source : CBN Annual Reports, Debt Management Office reports

In comparison to other sub-Saharan African countries, Nigeria has the highest percentage of Central Bank holdings of domestic debt and the lowest non-bank sector holding of domestic debt in sub-Saharan Africa. (see Christensen, 2004). Only Nigeria,

Burundi and Tanzania have higher percentage holdings of domestic debt by the Central Bank in sub- Saharan Africa(see table 4).

Table 4: Domestic Debt Holdings(Sub-Saharan Africa, 1980-2000 Averages) %

Country	Central Bank	Deposit Money Banks	Non-Bank Sector
Burundi	55	22	23
Cape Verde	30	48	22
Ethiopia	24	57	19
Gambia, The	0	52	48
Ghana	27	39	34
Kenya	11	39	50
Lesotho	1	80	19
Madagascar	-	-	-
Malawi	0	100	0
Mauritius	5	40	55
Nigeria	**66***	**30***	**4***
Rwanda	0	21	79
Seychelles	0	86	14
Sierra Leone	4	60	37
South Africa	-	-	-
Swaziland	0	66	34
Tanzania	44	42	14
Uganda	17	73	10
Zambia	0	77	22
Zimbabwe	19	35	47
African Average	**17**	**54**	**30**

Source: Christensen (2004)

One critical issue that arises is why the CBN has continued to dominate the investor base of domestic government debt in Nigeria. Several reasons have been advanced to explain these trend. According to Odozi(1996), the growing declines in the relative shares of bank and non-bank public holdings of government securities has been attributed to the capped interest rate regime in 1991-1995, and the deregulation of the foreign exchange market as from 1995 which motivated banks to remain sufficiently liquid to participate in AFEM intervention sessions.

Besides interest rates and the foreign exchange market, other reasons have been advanced for the continued dominance of the CBN in holding government securities(see Okounrounmu, 1992, Oke, 1992). These include: statutory requirement that the instruments be underwritten by the CBN, lack of institutional private organizations to underwrite the securities(ie before 1993)., the illiquidity and insolvency of a large number of banks, inadequate expertise in government securities trading, large size of government securities issues very far above the absorptive capacity of the organized money market.

Other factors included the tendency by the commercial and merchant banks in the early years to invest in government securities when there was high liquidity in the economy and promising investment options were few. Again the federal government reliance on the issue of treasury bills and certificates to finance its budget deficit tends to increase the holdings by the Central Bank which is obliged to absorb any unsubscribed portion of any issue.

Another factor has been the relative unattractiveness of the interest rates paid on government securities compared with interest rates on alternative money market instruments. The problem however became acute in the wake of the adoption of deregulatory policies since 1987. Moreover, some of the monetary policy measures in

the past, have tended to encourage the dis-investment in domestic debt instruments as the policy measures usually pinched the liquidity position of banks. For instance, the abolition of foreign guarantees or currency deposits as collateral for Naira loans. Another example, is the restriction on placement of deposits by the federal government ministries and parastatals in the banks. All these affected the liquidity position of banks, and the overall effect of these measures explain partly the continued domination of the holdings by the Central Bank over a long period of time.

Investor base by Instrument type

Again the composition of holders by instrument type is important for a detailed review of portfolio characteristics. Although the holders are on aggregate the same, the analysis by instrument type reveals the relative attractiveness of the individual portfolios.

For treasury bills, between 1960 and 1965, the non-bank public (other investors) constituted the largest subscribers to new issues and holding of treasury bills outstanding. However, between 1965 and 1967, there were rapid increases in CBN holdings partly due to the CBN persuasion of government to issue an increasing volume of bills as an impetus to the development of the money market even when it meant that the Bank had to take up the un-subscribed issues in order to be able to keep a portfolio of different maturities for its secondary market activities(see Oke , 1992). During the oil boom era, 1970 to 1980, CBN holdings fell drastically as government had no need to borrow. During these periods, commercial banks and the non-bank public held most of the outstanding bills(see appendix 3). As from 1981 to about 1998, the CBN held a substantial and increasing portion of the total outstanding bills. As from 1998, after the banking crises, which saw to the closure of about 28 banks, the holdings of commercial banks of treasury bills started to grow substantially.

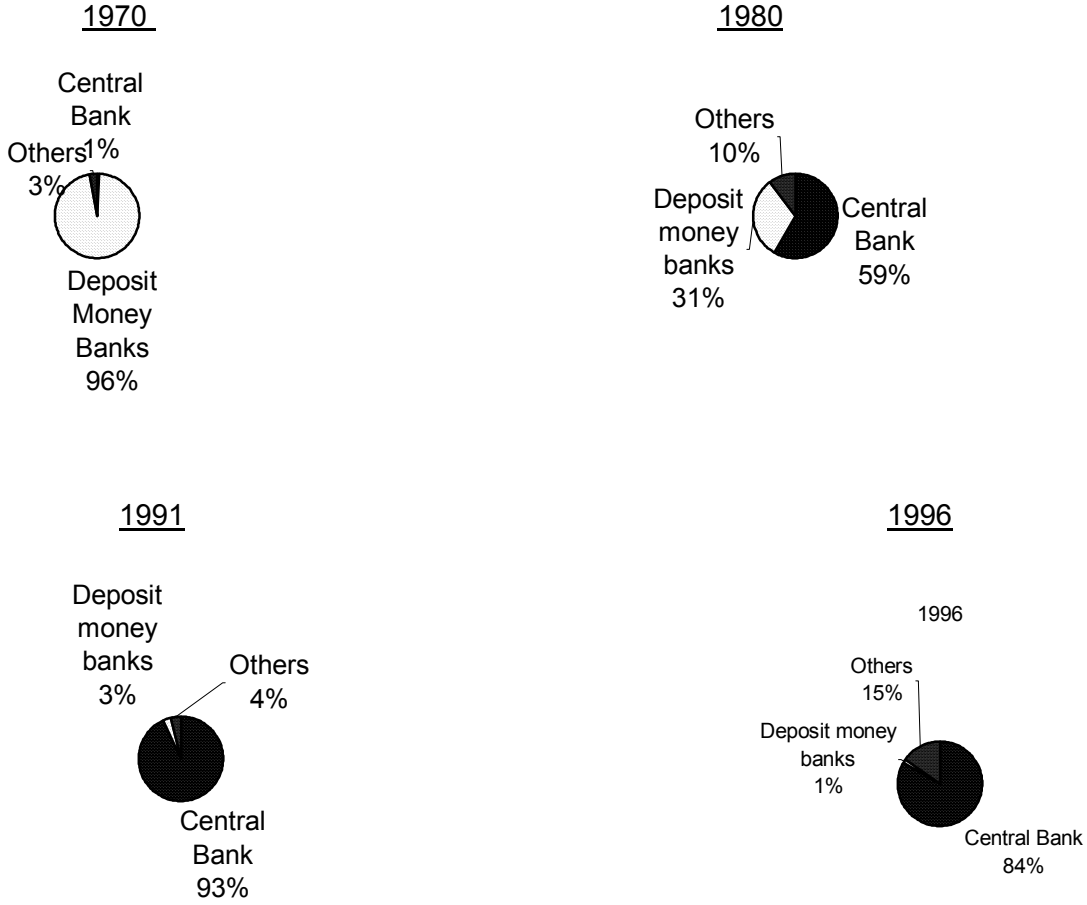
The 1998 banking crises generally affected the investor pattern of treasury bills. Specifically, in 1998, 26 banks were closed thereby reducing the number of operating banks from 115 in 1997 to 89. Basically the banking crises was traceable to the high level of non-performing loans in the system. Infact the ratio of non-performing loans to total deposits in the banking industry increased from 10.3 percent in 1989 to 30.4 percent in 1996.

In an effort to stem the tide and reduce the panic created by the crises, the Central Bank initiated a set of new policies. In 1999, there was an upward review of the liquidity and cash reserve ratios, mandatory sales of special Treasury Bills to banks, and a new requirement of treasury bills cover for foreign exchange purchases of banks at the autonomous foreign exchange market.

These policies, in addition to the liberalized treasury bills rate , as well as the public enlightenment by the CBN to popularize investment in treasury bills led to a flight to safety for bank assets. The proportion of deposit banks take up of new issues to increase largely in 1999. From a mere 18.3 percent holding of treasury bills in 1998, the holdings of deposit money banks jumped to 51.4 percent in 1999, while that of the Central Bank, declined drastically from 49.7 percent to 22 percent within the same period (see appendix A3).

Fig 5: Holdings of treasury bills, by type of investor

Fig: 6 Holdings of treasury certificates by type of investor.



For treasury certificates, between 1968 and 1977, merchant banks were the main subscribers and holders of treasury certificates. The holdings ranged from 70 percent to 97 percent of total outstanding. As from 1978 there was a shift in the absolute and relative holdings of treasury certificates. Between 1978 and 1996 when treasury certificates were discontinued, the CBN held the bulk of treasury certificates outstanding. The declines in deposit money banks holding during the period reflected their reactions to sporadic liquidity squeeze by the CBN, which led to the rediscounting of a large proportion of their holdings.

2.3 Maturity Structure

The maturity structure of government domestic debt can affect both costs and risks of using domestic debt instruments[2]. If the debt portfolio consists mainly of short-term debt, the government may face considerable risks(see Christensen, 2004: 6). The government therefore manages the maturity profile of the debt(ie the amount that matures or comes due) to limit the refinancing risk. A balanced maturity profile limits the need to refinance a large portion of the debt in a period of high interest rates. Figures 7 below, compare the average maturity of government domestic debt in Nigeria between 1993 and 2003, while figure 8 show the short-term debt as a percentage of total debt.

Figure 7: Average maturity of government domestic debt (1993 and 2003)

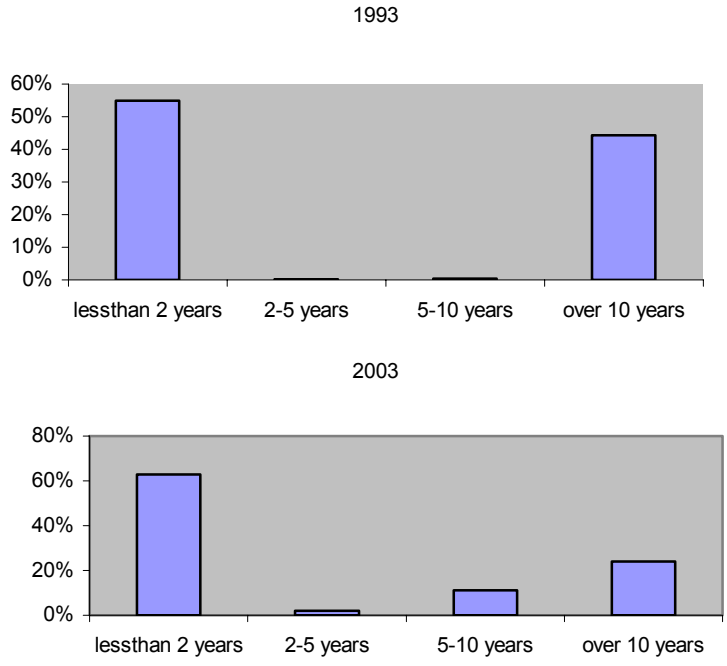
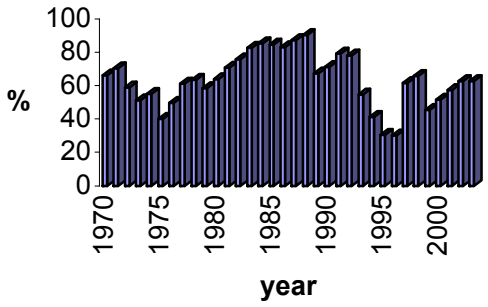


Figure 8: Short term debt (less than 2 years) as a percentage of total domestic debt



The proportion of short term government debt instruments (with not more than 2-year maturity) dominated the portfolio of the debt stock accounting for more than half of the debt instruments(see figure 8 above and appendix 4.). From around 1993, the dominance of short term debt instruments were significantly reduced as longer term treasury bonds were issued or as existing short dated debt instruments were converted to bonds, in an attempt to reduce debt service obligations(see Odozi, 1996). The share of short term debt instruments fell from an average of 80.5% between 1981 and 1991 to 51.3% between 1992and 1998, while the share of long term debt instruments of over 10 years maturity and above increased from 15.1 % to 48.5% in the same period. The share of the medium term debt instruments of 2-5 years maturity dropped from 1.3% between 1981 and 1991 to only 0.3 % between 1992 and 1995. However it increased slightly to 2.9% in 2001. The low share of medium term debt instruments reflected the absence of new issues of development stocks in the financial markets since 1987.

The dominance of short term paper greatly increases rollover and market risk, especially in countries with large outstanding domestic debt stocks. According to Christensen (2004), with interest rate flexibility which accompanied financial liberalization in Africa, many countries with large amounts of short-term debt became vulnerable to changes in market conditions.

In a bid to increase market participation in Nigeria, there have been attempts to shorten the maturity structure in the secondary market. The tenor of treasury bills prior to the financial liberalization policy in the late 1980s/ early 1990s was 91 days. But in order to enhance the competitiveness of these instruments in the money market, Treasury bills of shorter tenors, ranging from 25 to 91 days have been introduced for trading at the bidding sessions of the open market operations.(see figure 9 below.)

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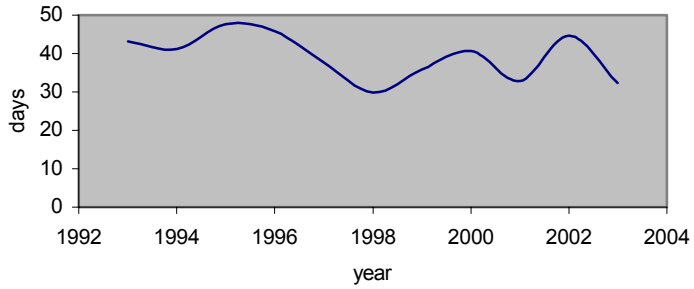
[2] Maturity is time left until final payment. Instruments with a maturity of over five years are called bonds. Those with a maturity of one to five years are called notes, while those with a maturity of less than a year are called bills or money market instruments(see Marrison, 2002:52)

Figure 9: Average tenor (days) Treasury bills at OMO weekly sessions



2.5 Implications of the current Domestic Debt Structure for Monetary Policy

The structural characteristics of government domestic debt discussed- including, composition, investor base and maturity structure (2.1- 2.3) have important implications for the conduct of monetary policy and for the development of the financial sector in general. Here we highlight some of the key structural characteristics and then discuss its wide implications.

First, the composition of the market has been mainly in favour of short-term treasury bills. A key question has been what are the implications of the higher ratio of short term to long term debt instruments for monetary and macroeconomic policy in Nigeria? Currently, the CBN could finance any deficit and refinance maturing debt easily with the frequent sales of large quantities of short-term treasury bills. But this simply concentrates government indebtedness to the most liquid sector of the market; short-maturing treasury bills. Issuing securities at longer maturities reduces to some extent the liquidity of the securities market. Large maturing debt is inherently less liquid than short-term debt.

At several times, the Central Bank of Nigeria has tried to control excess liquidity in the banking system either using stabilization securities to mop up the excess, or by changing liquidity ratio requirements. However this policy is always frustrated by the regular issuance of more short term treasury bills which immediately restores high liquidity in the system thereby impeding monetary policy conduct. Generally regular liquidity mop up exercises by t he Central Bank are hampered by the frequent sales of short term treasury bills.

Second, the investor base is still narrow, with the Central Bank holding still by 2003 up to 52 percent of total domestic debt, while the deposit money banks hold 36 percent, and the non-bank public only about 12 percent. Several concerns over the Central Banks excessive holding of government debt securities, point to its negative macroeconomic effect. As Hawtrey (1933) summarized earlier,

> " the acquisition of government securities by the Central Bank is regarded as opening the door to inflation"

For monetary policy to be effective, both institutional investors and the public should hold sufficient proportions of the debt instrument. Infact the Central Bank can expand or contract liquidity in the system and ultimately the money supply effectively only if banks

on the average hold a fairly large proportion of the instruments. Currently there appears to be a close relationship between the Central Bank of Nigeria's holding of government security and the monetary base(defined as the currency in circulation). Basically, the CBN's purchase of government securities constitutes the principal source of the country's currency and part of the banks reserve balances, hence the monetary base. The implication is that with large CBN's holding of treasury securities, liquidity usually exceed targeted levels for several years with base and broad money persistently breached.

Besides, purchases of government debt by the Central Bank is seen as tantamount to " lending to the crown", which is regarded as a dangerous path for Central Bank policy (Marshall, 2002). Furthermore, large CBN holdings discourages the use of private securities in Open Market Operations, a situation that retards financial market development, since CBN will only use the large government securities at its disposal for secondary trading.

3: RISK CHARACTERISTICS OF DOMESTIC GOVERNMENT DEBT PORTFOLIO IN NIGERIA.

Financial institutions, like banks often hold portfolios of commercial/ industrial loans, publicly traded bonds, equity securities, government debt instruments etc. These assets face a variety of correlated risks, but mainly ; default, liquidity and market risks.

For government debt instruments(especially Treasury Bills), the most common risk is the market risk, usually brought about by changes in the prices of the security. Historically, government securities especially short tenured bill have zero default risk. In addition, the availability of liquid secondary market for such security eliminate the possibility of liquidity risk. Thus for holders of government domestic debt instruments(especially treasury bills), the most important risk to manage is the Market Risk. For the issuer, which is the government , the common risk to mange is the Rollover or Refinancing Risk, which arises because of the short maturing nature of the security.

An extensive literature exist on the analysis of market risk, which usually affect the portfolio of marketable assets held by banks. One commonly used measure of the price risk of an investment in some financial asset is the standard deviation of the price of the asset, following the standard portfolio theory. But if one is interested particularly in the maximum down-side risk one is exposed to, then the so-called Value-at-Risk(VaR) is a more suitable instrument.(see Garcia, 2002).

3.1 Value at Risk(VaR)

Jorion (1997, 2001) defines value at risk as " the expected maximum portfolio loss over a target horizon with a given confidence interval". In the most general form, the basis for calculating VaR is the variance of the return on the portfolio.

$$\sigma_{PF}^2 = w' \sum w \quad \text{----- (1)}$$

Where w = vector of weights for the various securities in the portfolio, w′ = transposed vector of weights in the portfolio, while $\sum$ = variance –covariance matrix of R returns on securities in the portfolio.

Assuming banks hold a portfolio of domestic government debt securities, then the basic price equation of the portfolio can be written as follows:

$$Pr_{pf} = w_1 * Pr_{bond1} + w_2 * Pr_{bond2} + \text{-----} w_n * Pr_{bondn} \text{ ------(2)}$$

Where w, defined earlier as weights, is the share of the value of a component bond in the total portfolio value. The return on the portfolio is at time t, defined as:

$$Rpf_{t+1} = \sum_{t=1}^{n} w_i * R_{i,\,t+1} \quad \text{-----(2)}$$

Where the sum is taken over n securities in the portfolio, wi denotes the proportionate value of the holding of security I at the end of day t. The variance of the portfolio can be written as;

$$\sigma^2 pf_{t+1} = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i * w_j \sigma_{ij,\,t+1} = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i * w_j * \sigma_{i\,t+1} * P_{ij\,t+1} \quad \text{-----(3)}$$

Where $\sigma_{ij\,t+1}$ is the covariance and $P_{ij,\,t+1}$ is the correlation between security I and j on day t+1 and for $P_{ij,\,t+1}$ =1,

$$\sigma_{ij,\,t+1} = \sigma^2_{i\,t+1} \text{ for all i.}$$

and we can write,

The VaR of the portfolio is simply ;

$VaR_{pf,\,t+1} = \sigma_{pf,\,t+1} * F_p^{-1}$ ---------(4)

Where F_p^{-1} is he pth quantile of the rescaled portfolio returns.

The approaches to measure VaR can be divided into two groups: local and full valuation. The variance-covariance method is the best example of the first group. Consider a portfolio with a single asset with normally distributed returns, value w, and volatility σ; VaR is given by:

$$VaR = w[-\sigma \sqrt{dt}\ \alpha(1\text{-}c)] \text{ ---------- (6)}$$

Where dt reflects the time horizon and α (1-c) is the inverse of the cumulative distribution for the standardized normal distribution.

The main advantage of the variance-covariance method is simplicity. However given the common leptokurtic distribution (the existence of fat tails) of financial assets, the variance- covariance method tends to underestimate VaR(see Jorion, 1997, Noceeti, 2002, Allen, 2003).

Full valuation methods can overcome these problems. The best examples of this group are Historical Simulation and Monte Carlo simulation. With historical simulation VaR is measured simply by collecting data on historical returns and assuming that the future distribution of the assets will be the same as the distribution in the past. Because it uses actual data, historical simulation accounts for non-linearities and 'fat tails'.

In this study we shall restrict ourselves to the variance-covariance and historical simulation methods. For the variance- covariance methods, we compare the simple approach and the riskmetrics approach(see JP Morgan,1996).

Data, Procedure and Results.

Presently, investors in the government domestic debt market in Nigeria's actively hold two instruments; treasury bills and treasury bonds. Treasury bills are marketed in the money market. Treasury bonds on the other hand are non-marketed, but held solely by the Central Bank, but issued and sold to the public sometimes to complement intervention securities in managing the liquidity surfeit in the banking system. As such treasury bonds are not affected by market risks.

We therefore used the treasury bills transactions in the primary market. From the weekly primary market transaction, we developed the monthly data series from January 1999 to June 2004. We have thus chosen to begin the analysis from the post banking crises era, and the post- military era(ie as from 1999). These years covered the periods when there were several institutional changes in the banking sector that had direct impact on competition and market growth.

It is also argued that in the estimation of the VaR model, the sample data must be long enough to cover maximum possible variation in data. That is, if one estimates a model based on a very 'calm' period, it can never predict well during volatile periods. But to guard against such biases, we used data points approximately covering a period of five and half years that include both volatile and tranquil periods. All the data are obtained from the issues office of the Central Bank of Nigeria.

The standard VaR methodology assumes that the returns are multinormally distributed with zero means and standard deviations and covariance's to be estimated from the data. Thus as a first step in estimating the VaR models, we examine the time series properties of mean and distribution of portfolio return of Treasury bills. The results(not reported here) indicate that the returns are fairly normal.

In table 7, we report our estimated monthly VaR. All calculations are restricted to the left tail(one tailed) of return distribution. All the VaR estimates correspond to the probability level 0.01(equivalently correspond to the confidence level, 0.99) . We report the absolute VaR figures(ie VaR expressed in Naira terms), computed by multiplying the portfolio values(from our raw data) with the estimated relative VaR. We compare the estimates of VaR for Treasury bills across the two methods, variance-covariance(normal and riskmetrics) and historical simulation for the 1 month horizon.

Table 7 VaR- Treasury Bills- (Millions of Naira)- January 1999-June 2004.

Date	Variance-Covariance		Historical Simulation
	Simple	RiskMetrics(λ= 0.94)	
Jan 1999	2082.84	2098.64	2023.46
Feb 1999	2464.32	2614.39	2202.31
Mar 1999	3219.04	3813.27	2442.66
Apr 1999	3234.02	3977.11	2868.26
May 1999	3212.04	4013.28	2966.54
Jun. 1999	3211.06	4567.49	3011.27
Jul 1999	3341.59	4663.28	2988.42
Aug. 1999	4332.06	5014.61	3140.61
Sep. 1999	4214.03	5329.34	3722.31
Oct. 1999	3929.66	4211.28	3554.31
Nov. 1999	4234.43	5027.14	3842.01
Dec.1999	4321.49	5289.47	3939.27
Jan. 2000	4236.27	5149.23	4014.63
Feb. 2000	5412.04	5011.31	4213.38
March 2000	6011.24	6567.21	4834.27
April 2000	6211.32	6418.57	5022.26
May 2000	5104.13	6213.27	4298.27
Jun 2000	4932.42	6314.16	4214.32
Jul 2000	4767.18	6412.49	4442.27
Aug 2000	5213.49	6112.48	5011.22
Sep 2000	6231.49	6388.24	5233.67

Oct 2000	6467.26	6898.16	5237.49
Nov 2000	6321.49	7011.26	5866.44
Dec. 2000	6032.33	7294.06	6246.26
Jan 2001	11476.87	11113.41	10044.21
Feb 2001	14512.39	14215.32	13432.70
Mar 2001	11212.41	12311.04	10123.31
April2001	12211.41	12431.41	8117.21
May 2001	18101.43	10021.75	16101.23
Jun 2001	14110.23	16056.35	13210.45
Jul 2001	14121.43	16994.66	13114.63
Aug 2001	18401.21	19413.36	16104.32
Sep 2001	17121.04	10876.47	16012.63
Oct 2001	13011.31	14970.90	15411.51
Nov 2001	18412.34	18114.32	17531.54
Dec 2001	19214.44	20211.11	180.4.14
Jan 2002	12110.33	14354.27	16796.14
Feb 2002	10122.04	17611.11	6534.31
Mar 2002	7034.64	7961.25	6110.36
Apr 2002	7737.26	6117.41	8361.04
May 2002	6751.25	7035.13	7421.14
Jun 2002	5161.32	6078.74	7508.45
Jul 2002	6152.32	7818.37	8102.15
Aug 2002	8844.36	7813.26	8372.65
Sep 2002	12191.27	14672.57	10211.34
Oct 2002	14305.91	16726.41	14043.81
Nov 2002	7496.45	10021.67	6113.63
Dec 2002	13206.24	14934.67	12947.41
Jan 2003	12367.15	14041.39	10210.16
Feb 2003	11407.76	12114.07	9104.23
Mar 2003	12424.37	14859.04	8211.16
April2003	12214.53	14536.47	10102.53
May 2003	10532.10	12107.69	8214.69
Jun 2003	16470.41	18927.41	9569.31
Jul 2003	14997.59	14146.33	8171.01
Aug 2003	10717.61	12049.79	8215.11
Sep 2003	12017.36	14867.59	9247.39
Oct 2003	16963.56	18114.68	14532.66
Nov 2003	11043.57	12231.77	9113.44
Dec 2003	12631.41	15214.65	11784.04
Jan 2004	11261.21	17776.59	10311.27
Feb 2004	10231.37	14658.21	12789.83
Mar 2004	19067.34	15789.14	16149.41
Apr2004	16120.67	14981.57	9179.78
May 2004	18241.12	13211.47	11118.63
Jun 2004	17345.79	18046.71	12536.59

The VaR numbers appears to fairly portray the events in the Nigerian money market. Until the end of December 2000, the VaR measure (for all three methods) is relatively constant. A noticeable peak was at the beginning of 2001, when the VaR present steep changes. The portfolio values also present steep changes during this periods reflecting some underlying volatility .

For example look at the beginning of 1999, when primary issues of treasury bills worth 140 billion Naira was floated to refinance federal government ways and means advances. With excess funds in the banking system it was not suprising that financial institutions increased their holdings of treasury bills during the year. When that happened, interest rates dropped, and this showed up in the minimal volatility at that time. In the early part of 2001, government announced new directives requiring discount houses to hold a minimum of 60 percent of their investment in treasury bills. The Central Bank through several policy efforts at this time tried to establish treasury bills as an attractive investment instrument. The efforts paid off as interest rates for treasury bills as well as other rates shot up, but kept fluctuating at that time. This increased the volatility of portfolio value.

It is seen that beginning from January 2002, there was a reversion in VaR numbers to the levels that prevailed up to December 2000. So what happened in 2001,

and why was the VaR numbers so high in 2001, and only to decline in 2002? A part explanation of what happened in 2001 was the high and fluctuating interest rate and exchange rate regimes that hit the Nigerian economy at that time.

Beginning from 2001, exchange rates depreciated rapidly and also interest rate increased. First, there was a fall in foreign exchange inflow, which coupled with the increased demand for foreign exchange, induced the depreciation of the Naira in the foreign exchange market. In order to stem the depreciation of the Naira, the Dutch Auction System (DAS) of foreign exchange management was re-introduced in early 2002. A natural question to ask at this pint is : can exchange rate depreciation affect the VaR measure of a domestic currency denominated asset. If exchange rate depreciation is a main factor for the increase in the VaR measure; does a high VaR cause more depreciation, or is it the other way around?

Furthermore interest rate variations were so high in 2001, even for short maturities such as treasury bills. However in 2002, interest rates appeared to have lowered, which was attributable to Central Bank's downward review of Minimum Rediscount Rate(MRR) and the moral suasion employed by the CBN to encourage banks to bring down their lending rates in order to boost investment. This thus lowered the volatility of interest rates in 2002.

In summary, the VaR increased greatly between 1999 and 2003, almost more than fivefold. In the periods when volatilities are falling, the VaR appears to respond more clearly to the changes in total value of the debt. That appears to be what happened between March 2002 and August 2002. Figure 13 shows the computed VaR from table 7. It appears that the longer the period, the higher the VaR. Figure 14 shows the VaR – total treasury bill value for the corresponding years. The VaR jumped over three fold from January 2001. Although there were occasional declines between 2002 and June 2004, the levels never returned to the 1999-2000 levels. As from 2001, not only the debt size grew substantially, but the VaR more than doubled, thereby increasing the risk borne by the holders.

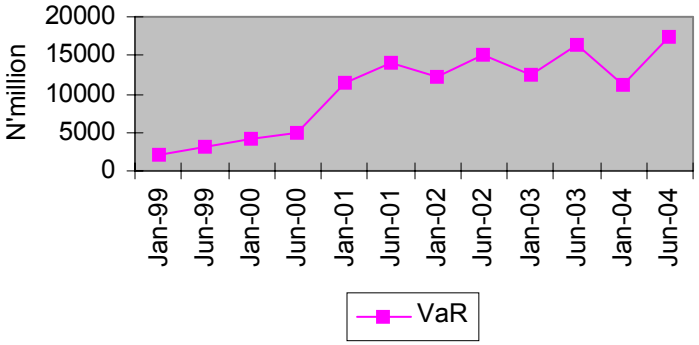
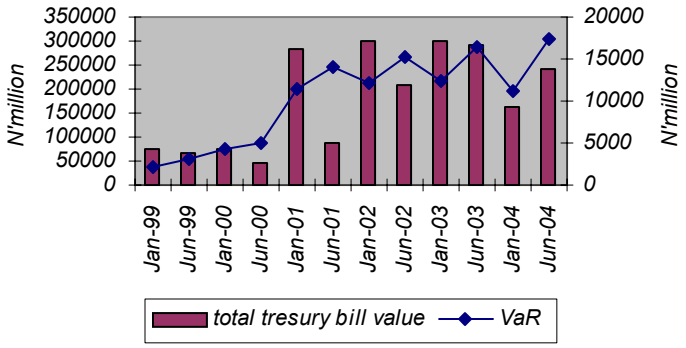


Figure 13 : VaR(simple) for treasury bills,

Figure 14; VaR- total treasury bill value



Value at Risk(VaR) and Domestic Bank Stability.

Blejer and Schumacher(1999) were the first to suggest that Value at Risk(VaR) could be used to assess the solvency of a Central Bank, and in doing so, it could be a good predictor of financial crises. Ever since then, several papers have studied the accuracy of bank VaRs in predicting bank stability. (See Berkowitz and O'Brien, 2002; Jorion, 2002; Hirtle, 2003; O'Brien and Berkowitz(2004).

We can assume that the level of bank fragility increases, with increases in the ratio of bank value at risk to portfolio value;

$$\pi_t = f\left(\frac{\mathrm{VaR_t}}{\mathrm{P_t}}\right) \quad \text{----------}(7)$$

Where π denotes the level of bank fragility (or conversely of profitability) at time t and P_t is the value of the banks total portfolio at time t. For a high degree of confidence, VaR indicates the expected portfolio loss in very few occurrences. Since Bank operators try to profit from government debt instruments, by putting at risk a large amount of resources to purchase the securities, it is also reasonable to assume that they care not only about these extreme cases(of VaR) loss , but also about other characteristics of the distribution of the portfolio returns, such as yields.

Thus the lower the expected return on the portfolio and the higher the expected number of occurrences on the left side of the distribution, represented by the mean and negative skewness respectively, the higher the level of fragility.;

$$\pi_t = f\left(\frac{\mathrm{VaR_t}}{\mathrm{P_t}}, \mathrm{mean}\,(\partial \mathrm{p}), \mathrm{skewness}(\partial p)\right) \quad \text{----------}(8)$$

Where (VaR/P) > 0 and mean, skewness< 0. We can therefore analyse bank stability as directly related to bank performance and as being influenced by portfolio market risk, and other factors that can affect the distribution of portfolio returns. Using this framework, we can test for the sensitivity of bank trading revenue to changes in the banks VaR.

Specifically, we examine the monthly trading revenue reported by a sample of banks, and ask whether variations in the amounts reflect the extent of value at risk .That is how highly correlated are variations in the size of market risk exposure of banks with variations in the size of the trading revenues. If the two variables are not highly

correlated, we can take this as some initial evidence that the changes in value at risk are not reflected in trading revenue size and therefore do not pose serous risks for banking stability. This same approach has been adopted in some recent literature in assessing the accuracy of VaR in analysing bank performance.

Jorion (2002), Hirtle(2003) using a set of quarterly data argue that bank VaRs have good forecast power for trading revenue variability. Berkowitz and O'Brien(2002) examine performance of value at risk models for a sample of large US bank holding companies using confidential supervisory data that permit comparison of daily value-at-risk estimates with next-day trading results. They find substantial variation in the performance of value at risk in predicting trading results for the different companies.

Bank Data and Descriptive Statistics

Our analysis here is based on new data collected from 13 banks that rendered accurate monthly data on our variables of interest to the Central Bank. Table 8 illustrates the current exposure of the sample banks to government domestic debt in relation to their total assets. We classified the 13 banks by size based on total assets.

Table 8: Bank exposure to government debt: **Micro Data ***

Bank Type	No of Banks	Government debt/asset		Government debt/equity	
		Mean (%)	Standard deviation (%)	Mean (%)	Standard deviation (%)
Large Banks	3	26.4	5.6	241.8	1237.8
Mid-sized	4	34.6	3.8	334.1	576.2
Small	6	61.8	7.8	432.5	1104.3

* : Treasury Bills only.

The micro data from the 13 banks, show that on average banks hold close to 40 % of their assets in the form of treasury bills. But beneath the surface, there are important differences between banks. The small banks amongst them hold half of the combined assets in treasury bills for all the banks. This high dispersion of government debt to assets ratios among banks may have consequences for different bank types.

In table 9 below, we show the individual banks data on trading revenue obtained directly from their submitted returns, and the computed VaR based on returns submitted. We use the monthly trading revenue and VaR data for the 13 banks for the observation period, January 2001 to June 2004. As the table shows, individual banks VaR appears to be conservative. However the VaR is based on treasury bills held by banks alone, while the trading revenue consists of both net interest and non-interest income.

The reported coefficient of variation (ie the ratio of the standard deviation and the mean) of the VaR shows that for majority of the banks, the variability of VaR is relatively small compared to its mean. Only banks, 1, 2 and 8 have very large coefficients of variation, compared to other banks in the sample.

Table 9 : Descriptive Statistics on Bank Trading Revenue and VaR

Bank	Trading Revenue		VaR (relative)	
	Mean	Kurtosis	Mean	Coefficient of Variation
1	2.11	12.61	2.03	0.83
2	1.06	7.78	2.15	0.72
3	0.99	6.48	40.5	0.21
4	0.75	5.79	4.29	0.20
5	0.72	5.64	3.89	0.18
6	0.71	5.28	4.11	0.34
7	0.54	3.71	3.74	0.24
8	0.41	3.35	3.03	0.84
9	0.39	3.23	3.85	0.22
10	0.40	3.51	2.98	0.31
11	0.54	4.14	2.75	0.19
12	0.56	4.03	2.65	0.16
13	0.62	4.50	2.80	0.23

Source: Computed from Individual Bank monthly returns

We begin our analysis by regressing the monthly trading revenues on the monthly VaR estimates(obtained through the variance-covariance method). This specification can be interpreted as capturing the average degree of correlation between the market risk factor and the trading revenue size for individual banks in the sample overtime. Our intention here is to test if the individual bank VaR have power to forecast trading revenue volatility. As an indicator of forecast power, we check for the correlation between computed monthly bank VaR and the absolute value of next month trading revenue for the banks, with absolute value being used to proxy volatility. The basic question we seek to answer is, how highly correlated are variations in market risk measure to variations in trading revenue size? If the two variables are nor highly correlated, we may take this as some evidence that market risk size are not reflected in bank revenue size.

Two other variables are included as explanatory variables for bank trading revenue; interest rates(economy specific), and operating expenses(bank specific). Both variables affect bank revenue size. The model can thus be stated as:

$$R_{t+1} = b_0 + \mathrm{b}_1 VaR_t + \mathrm{b}_2 I_t + \mathrm{b}_3 OE_t \quad (9)$$

Where R is the trading revenue, VaR is the computed value at risk. I is the interest rates, and OE is the bank operating expenses.

We run these regressions individually for the 13 sample banks for our sample period. Three versions of the model are run. First, we run a simple model, where the trading revenues are regressed on the relative VaR . Second we add as explanatory variables, the other two variables, earlier mentioned, which can affect trading revenue size. Third, we divide trading revenue into two components; non-interest revenue and interest revenue, and then regress the interest revenue component on the VaR estimates. Suprisingly, the impact of these different specifications is very little in terms of the signs and absolute size of the coefficients, so we report only the second variant specifications.

Table 10: Trading Revenue- VaR regression results

	Variables					
Bank	b_0	b_1	b_2	B_3	R^2	F-stat
1	0.619 (1.38)	0.054 (0.751)	-0.109 (-1.68)	-0.287 (-0.143)	0.246	9.74
2	0.428 (1.09)	0.029 (0.574)	-0.137 (-0.672)	-0.171 (-1.313)	0.237	12.64
3	0.347 (0.382)	0.143 (0.984)	-0.195 (-1.86)	0.031 (0.633)	0.121	8.36
4	0.111 (1.28)	0.251 (1.15)	0.267 (1.35)	-0.012 (-0.227)	0.110	7.89
5	0.531 (0.726)	0.648 (0.343)	-0.231 (0.456)	0.021 (0.350)	0.107	10.64
6	0.392 (1.781)	0.511 (0.632)	0.424 (0.191)	-0.040 (-0.498)	0.053	12.32
7	0.285 (0.851)	0.319 (0.156)	-0.365 (-0.344)	-0.091 (-0.129)	0.071	9.37
8	0.219 (1.06)	0.453 (0.768)	-0.493 (-1.13)	0.037 (0.495)	0.090	4.36
9	0.376 (0.714)	0.336 (0.134)	-0.592 (-0.410)	0.043 (0.843)	0.067	3.73
10	0.683 (0.773)	0.595 (0.854)	0.741 (0.566)	-0.067 (0.769)	0.074	6.24
11	0.146 (0.662)	0.497 (1.401)	-0.131 (-0.418)	-0.263 (0.410)	0.071	5.21
12	0.345 (0.391)	0.327 (0.418)	-0.045 (-0.957)	0.187 (0.646)	0.077	4.23
13	0.755 (1.33)	0.385 (0.202)	-0.245 (-0.179)	-0.231 (-1.160)	0.068	5.23

bo, b1, b2, b3 represent VaR, Interest rate, and Operating expenses coefficients respectively. t-stat in parenthesis.

Turning to the second column of table 10, we can see that there is a positive correlation between the VaR estimates and the size of the trading revenue. The regression coefficients are all positive. The size of the VaR coefficients on the first three banks(1,2,3) representing the large sized banks amongst the sample appears smaller than the others. This may also suggest that the effect of VaR on bank trading revenue is smaller in large banks . However, only 3 large banks are included in the sample.

For the three versions of the model that we run, each specification changes the R^2, but the coefficients on the variable are not different in terms of signs. In all the specifications, the VaR variable is positive, but generally small. This conclusion may be taken as initial evidence that the market risk exposure may be reflected in the trading account size. However since the for many banks, the correlation is still weak, there is yet no convincing evidence to show that changes in the bank VaR produce very serious changes in bank trading revenue volatility.

3.2 Rollover Risk

In this section, we compute the rollover risk of the government debt instruments. Computing the rollover risk will help us compare increases in the risk borne by the government (debt issuers) and the risk borne by the banks(debt holders).

The rollover risk is the risk that the debt manager may be placed in a corner when she needs to rollover a large part of the debt, thereby having to offer extremely high yields(Garcia, 2002). The issuance of short term government debt instruments(like treasury bills), increases rollover risk, and may be a major source of systemic risk.

The rollover risk depends on how well spread through time the debt maturities are. The more spread apart they are, the lower the risk. A proxy of how well spread the securities maturities are is the average maturity of the security.

Here we compute the magnitude(size) of the debt rollover for the years, 1995 and 2003 following the method as in Garba, 1996. We compare the rollover size of treasury bills and treasury certificates, representing short term and longer term debt securities(91 day and 1-2 years maturities respectively). For 2003, we compute the rollover size for treasury bills only since treasury certificates were discontinued after 1995. After computing the rollover size, then we proceed to compute the rollover risk.

Measuring rollover size

(a) Treasury Bills

Table 11 shows the monthly issues of treasury bills(imt) and the stock of treasury bills at the end of the month(mt) for the periods, 1995 and 2003. Treasury bills mature on the 91st day after issue. Thus treasury bills issued in month t(imt) mature in month t+3. If we represent treasury bills maturing at month t by (dmt), this yields a function for treasury bills maturing at month t, and this function can be written as:

$$dmt = imt-3 \quad \text{--------} \quad (9)$$

The new monthly issues(Δmt) ie, the net change in stock is given by;

$$\Delta mt = imt - dmt \quad \text{-------} \quad (10)$$

Equation 9 implies that treasury bills that mature at any given month are issued three months before, while equation 10 implies that net change in stock is the difference between new issues and mature stock. We can now use table 11 to calculate the rollover.

The monthly stock(mt) and the total monthly issues(imt) are shown in columns one and two. We compute the mature stocks for each month(dmt) and the monthly change in stock or new issues(Δmt) using equations 9and 10.

Table 11 shows the debt stock outstanding at the end of month m of year t,(mt) is the sum of the issues in that month(imt) and those of two previous months(imt-1 and imt-2). Thus the stock of treasury bills outstanding at any point must not include that of a fourth month if default is to be avoided. This implies that:

$$mt = imt+(imt-1) + (imt-2) \quad \text{---------} \quad (11)$$

Given that the issues imt-2 mature at mt+1, the policy of rollover requires the Central Bank to issue treasury bills of at least imt-2 and use the proceeds to repay it. Since the Central Bank underwrites all issues, debt default is avoided and maturing treasury bills are promptly settled. If the bank issues exactly imt-2, the debt stock remains the same since;

$$mt+1 = imt+1 +imt +(imt-1) \quad \text{-------} \quad (12)$$

and

$$imt+1 = imt-2 \quad \text{------} \quad (13)$$

Table 11 shows that apart from October in 2003, for all other months for the two sample years, all monthly issues were for the purposes of debt rollover This is true for all

the periods in which the net change in debt stock outstanding was zero(0.00). Columns 2 and 3 shows the monthly issues and mature stock repaid respectively.
From equations 11 and 12,
$\Delta mt = mt+1 - mt$ or $imt+1 - imt-2$ ---------- (14)
$\Delta mt=0$ implies that $mt+1 = mt$ or $imt+1 = imt-2$ -------- (15)
$\Delta mt > 0$ implies that $mt+1 > mt$ or $imt+1 > imt-2$ ---------- (16)
Two conditions are consistent with full debt rollover. First if net change in debt stock or new issues is zero, and second if net change in new issues is positive.

Table 11 :Treasury Bills: Rollover Size

1995: Month	Outstanding stock	Total New issues	Matured stock repaid	Change in stock*
1995:01	103326.50	32000.00	32000.00	0.00
1995:02	103326.50	32000.0	32000.0	0.00
1995:03	103326.50	39326.50	39326.50	0.00
1995:04	103326.50	32000.00	32000.00	0.00
1995:05	103326.50	32000.0	32000.0	0.00
1995:06	103326.50	39326.5	39326.5	0.00
1995:07	103326.50	32000.0	32000.0	0.00
1995:08	103326.50	40000.0	40000.0	0.00
1995:09	103326.50	31326.50	31326.50	0.00
1995:10	103326.50	32000.0	32000.0	0.00
1995:11	103326.50	40000.0	40000.0	0.00
1995:12	103326.50	31326.5	31326.5	0.00

Note= * 0.00 means full rollover

Table 12: Treasury Bills: Rollover Size

2003: Month	Outstanding stock	Total New issues	Matured stock repaid	Change in stock*
2003:01	825100.0	64246.00	64246.00	0.00
2003:02	825100.0	64246.00	64246.00	0.00
2003:03	825100.0	64246.00	64246.00	0.00
2003:04	825100.0	70010.32	70010.32	0.00
2003:05	825100.0	68240.00	68240.00	0.00
2003:06	825100.0	70010.32	70010.32	0.00
2003:07	825100.0	70010.32	70010.32	0.00
2003:08	825100.0	70010.32	70010.32	0.00
2003:09	825100.0	70010.32	70010.32	0.00
2003:10	825100.0	64000.00	67000.0	-3000
2003:11	825100.0	78000.00	78000.0	0.00
2003:12	825100.0	80000.00	80000.0	0.00

Note= * 0.00 means full rollover

(b) Treasury Certificates

Table 13 shows monthly stock of treasury certificates (stc) , monthly issues(itc) and change in stock(Δtc) in columns, 1, 2 and 3 respectively. Unlike in the case of treasury bills, the maturity of treasury certificates cannot be precisely determined since issues have a maturity range of between 12 months and 24 months. The direction of new issues relative to total issues could be used to show the incidence of debt rollover. We can specify the monthly treasury certificate stock as :

stc = stcl + itc – residual ----------(16)

Where stcl = stock of treasury certificates in the previous month, the residual represents the debt- repayment policies, which is unknown because we do not have data on monthly maturities of treasury certificates. The rearrangement of equation 17 yields;
Δtc + residual = itc -------- (18)
Equation 18 shows that total issues(itc) is the sum of residual and new issues or change in stock(Δtc)= 0 and residual = itc, then all monthly issues are for the purpose of debt rollover. From table 13, it is shown that the periods November and December satisfy this condition. If $\Delta tc > 0$ and residual $<$ itc, monthly issues would exceed what is required to rollover treasury certificates due for repayments. Finally if $\Delta tc < 0$, residual $>$itc. Basically, a negative change in new issues implies that part of all the treasury certificates due for repayment in that month are being repaid or converted to other types of securities.

Table 13 Treasury Certificates: Rollover Size

1995: Month	Outstanding stock	Total New issues	Matured stock repaid(residual)	Change in stock*
1995:01	37342.70	150.0	150.0	0.00
1995:02	37342.70	0.00	0.00	0.00
1995:03	37342.70	748.50	748.50	0.00
1995:04	37342.70	200.0	200.0	0.00
1995:05	37342.70	0.00	0.00	0.00
1995:06	37342.70	0.00	0.00	0.00
1995:07	37342.70	0.00	0.00	0.00
1995:08	37342.70	3310.50	3310.50	0.00
1995:09	37342.70	545.00	545.00	0.00
1995:10	37342.70	1868.60	1868.60	0.00
1995:11	36752.90	920.60	1510.40	-589.80
1995:12	23596.30	0.00	13156.60	-13156.60

Note= * 0.00 means full rollover

Measuring the Rollover Risk

One possibility for measuring the rollover risk is to model the rates of return distribution of public bonds such that its variance varies according to the average maturity of the debt stock. The higher the debt average maturity, the lower the rollover risk, and the lower the variance of bonds returns at the placement auctions. This model is called the Hetroskedasticity Conditional on Debt Maturity(HCDM).

We can then model the conditional hetroskedasticity, by adding to the variance a quadratic term that accounts for the debt maturity. This quadratic term is decreasing on debt maturity, being zero when the maturity is the highest possible. For a two security case[example, treasury bills, Rn(short term) and treasury certificates, Rf(longer term)], the negative of the expected cost and the modified variance are:

$$-\ Expected\ \cos t = -\left[\alpha\, E(R_n) + (1-\alpha) E(R_f)\right] \quad \text{----------(19)}$$

$$Modified\ Variance = \left\{ \begin{array}{l} \left\lfloor \alpha^2 \sigma^2 (R_n) + (1-\alpha)^2 \sigma^2 (R_f) + 2\rho\, \sigma(R_n)\, \sigma(R_f)\, \alpha(1-\alpha) \right\rfloor + \\ \eta\left[(\alpha M_{Rn} + (1-\alpha) M_{Rf} - M_{Rf})^2 \right] \end{array} \right\} \text{--(20)}$$

Where, Rt = treasury bills return Rf= treasury certificate return α= portfolio weight on the Treasury bills (1-α)= portfolio weight on the treasury certificates Mrt =treasury bills maturity Mrf = treasury certificates maturity η = rollover risk weight E(.) = returns expected value σ(.) = returns standard deviation ρ = returns correlation coefficient.

The parameter η is the weight that incorporates to the variance the effect of the rollover risk. As η changes, the rollover risk as measured by the modified standard deviation also changes, for all portfolios (short term and long term). (see Garcia, 2002).

In figure 15 below, we show the rollover risk premium(calculated modified variance) for a single portfolio(treasury bills) for all the months in 2003 while in figure 16, we plot the rollover risk premium against the value at risk. It shows that the rollover risk premium increased sharply within the year as compared to the value at risk.

Figure 15: Rollover risk premium (January –December, 2003)

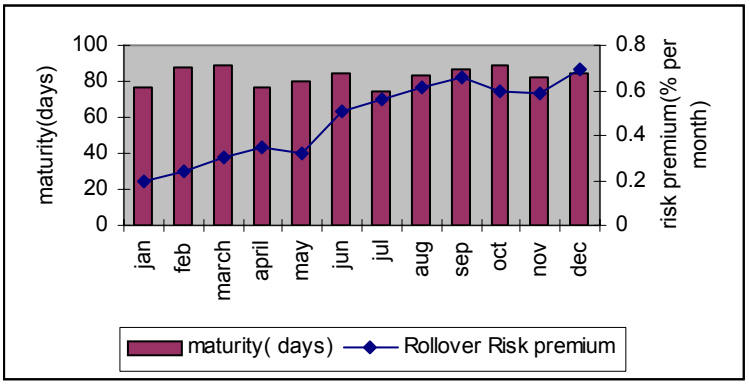
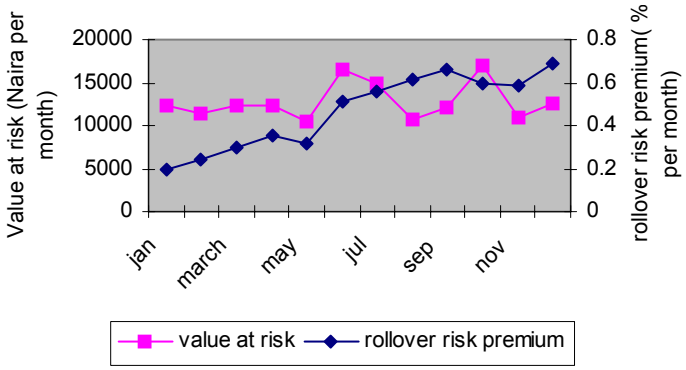


Figure 16: Rollover risk Premium and VaR (January to December, 2003)



4: IMPLICATIONS OF GOVERNMENT DOMESTIC DEBT RISK CHARACTERISTICS FOR MONETARY POLICY CONDUCT IN NIGERIA

In this section, we analyse few issues pertaining to the implications of the computed risk characteristics for the conduct of monetary policy. Generally an increase in the risk premium of domestic debt(especially treasury bills) can have three main effects. First, it can reduce the potential demand for the instrument at both the primary and secondary market, since several holders will be unwilling to hold such securities at such levels. Second, increases in the domestic debt risk can affect the solvency of the domestic banks. Third, increases in the market risk can affect the sterilization of bank excess reserves.

4.1 Risk , Demand for Debt. and Monetary Policy

The risk profile of government debt may have two direct consequences: First, holders of the debt instruments may refuse to hold these assets and instead shift to foreign currency denominated assets or decide to hold excess liquidity. Therefore when old debt matures, they may prefer not to purchase new securities. Figure 17 and 18 below compares the monthly demand for treasury bills in both the primary market and open market operation with the VaR estimates in 2003.

Figure 17: Demand for Treasury Bills in the Primary Market and computed VaR(2003)

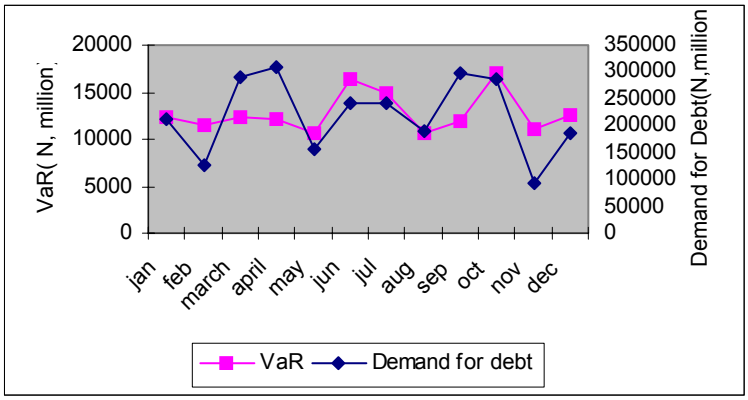
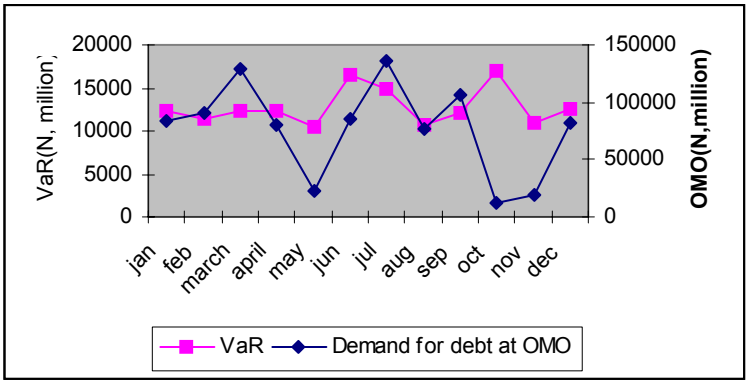


Figure 18 : Demand for Treasury Bills at OMO and computed VaR (2003)



The demand for treasury bills remains quite large at the primary market despite the increases in computed absolute VaR. The demand for treasury bills at the OMO appears to respond to movements in computed VaR. Two likely reasons may be responsible for this. First, the demand for debt at the primary market is the combined demand by the Central Bank, the deposit money banks and the non-bank public. The Central Bank is by law required to absorb the excess not taken up by the others in the market. Second, domestic residents hold majority of the debt, and as such may not respond quickly to VaR changes in the primary market auctions. If the demand for treasury bills continue to shrink especially at the OMO as noticed in the period, August to December 2003, the question becomes how will the Central Bank conduct the needed transactions.

In the presence of occasional declines in the demand for treasury bills, the CBN now rely on captive demanders of treasury bills such as discount houses that are by law required to keep a minimum of 60% of their deposit liabilities in treasury bills. There have been efforts by the Central Bank to stimulate the demand for these bills. In 199, it introduced a special treasury bill designed as more attractive investment instrument. This was however discontinued in 2000. But again in 2001, the CBN began issuing its own security with a 180 day and 360 day maturity. Because of the attractive interest rate(compared to treasury bills) the demand for the CBN certificates rose astronomically, and the initial issue was oversubscribed. However as the differential between the CBN certificates and Treasury bill rates narrowed, the market lost interest in CBN certificates and by April 2002, it was discontinued.

If the demand for treasury bills continues to fluctuate especially at the secondary market, then the CBN may have to consider, changing its procedures of conducting OMO solely in treasury bills. In particular, the CBN may have to consider purchasing securities offered by non-governmental agents. Here again, using securities that are privately owned would expose the system to more credit risk than it faces today.

In figure 19, we plot the treasury bills issues for 2003 and the rollover risk premium. Here again we seek to gauge how the rollover risk premium affects the supply of treasury bills by government.

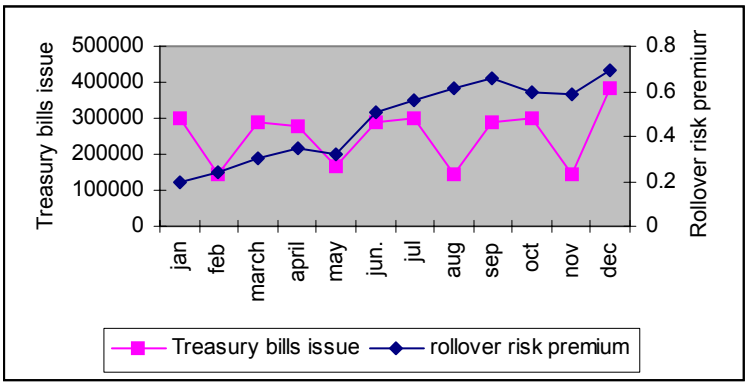


Figure 19: Treasury bills issues and Rollover risk premium

Although no clear co-movement pattern is detected in the issues of treasury bills, a substantial decline in the volume of new treasury bills issues would of course have repercussions for both the government and the financial system. Because treasury bills are free of default risk, and are highly liquid relative to other assets, they are still the

most preferred savings investment. However if the rollover risk premium continuos to grow, the government may reduce the yield rates so as to accommodate the rollover risk premium. This will further reduce demand and again affect the conduct of monetary policy conduct

4.2 Risk, Reserve Requirements and Monetary Policy

The Central Bank of Nigeria over the years have used reserve requirements as a tool for monetary management. Each depository bank is mandated to maintain with the Central Bank, a minimum amount of cash deposits expressed as a ratio of its total deposit liabilities. Basically the purpose of the reserve requirements is to complement OMO in controlling liquidity in the banking system.

Higher reserve requirements serve not only as deterrence against excessive credit expansion, but also a convenient and cheap way of rolling over the debt, since part of the reserve requirements are usually deposited in government treasury bills. Given that bank excess reserves are sterilized, increases in market risk of government treasury bills will discourage banks from disclosing the correct size of excess reserves for fear of depositing them as treasury bills.

The Central Bank have tried different approaches to entice banks to disclose their real size of their excess reserves position, and to use it in purchasing treasury bills at the auctions. In 1999, the CBN introduced the policy of paying banks a token interest on reserves in excess of 8 percent so as to encourage banks to render accurate information on their level of excess reserves. However, there remains a possibility that banks will keep their true level of excess reserves undisclosed rather than being forced to purchase treasury bills at increasing market risk. If this happens, the Central Bank will have to seek for alternative ways of mopping up the excess reserves of the banking sector.

Besides, sterilization of bank excess reserves using short-term treasury bills could place heavy burden of debt servicing cost on the government. A good alternative may be to issue longer-term government security. However, with the long-term market still weak, the switch may yet be difficult.

4.3 Domestic Debt Risk and Banking System Solvency

Revealed preference shows that banks in Nigeria still prefer to hold a significant percentage of their assets in the form of domestic government debt. The real fact as noted by Alison(2001), is that banks that are not adequately capitalized and/ or have levels of bad debt usually rely on income and profits from treasury bills operation to keep themselves solvent. Thus any significant reduction in interest rates and/ or treasury bill dealing could affect solvency.

Typically, after the 1998 banking sector problems in Nigeria, treasury bills became the most important interest earning asset for many banks, given the fact their non-performing loans as a percentage of total deposits had increased from 10.3 % in 1998 to 30.4 % in 1996. Today several banks hold significant amount of treasury bills in excess of what they are required to hold by the Central Bank, essentially for the purposes of income generation.

The question now is then: How will further increases in VaR of treasury bills affect the solvency of the banking system? While treasury bills will remain free of default risk, their increased market risk will definitely decrease their usefulness as risk free benchmarks.

Given the current vulnerability of the banking sector to default risk(as evidenced during the 1998 banking problems), a rise in government debt market risk will endanger the liquidity and solvency of the banks. This will ultimately affect monetary policy given the role of banks in the economy and the fact that the ultimate effect of monetary policy is still largely dependent on the banking system.

Summary of Findings, and Conclusion

In this study, we have analyzed several aspects pertaining to domestic government debt in Nigeria. In section 1, we analyze the evolution of domestic government debt instruments in Nigeria, and discuss the causes of the extremely large and fast growth of the domestic government debt over the past two decades. One thing is clear, domestic government debt in Nigeria has been generated mainly for budget deficit financing. Foreign capital inflows have been minimal in Nigeria, and as such, sterilization of such inflows through domestic debt issuance has not really been applied.

Section 2 analyses the structure of domestic debt in Nigeria in terms of composition, ownership and maturity structure. Domestic debt currently consists mainly of treasury bills with short maturity dates. The investor base is still narrow with the Central Bank dominating the ownership of the total debt stock. The implications of these structural characteristics for market and refinancing risk is also analyzed. Decisions about composition and maturity structure could lead to tradeoffs between market risk and refinancing risk.

Section 3 implements risk measures for domestic debt instruments.- value at risk and rollover risk. First we compute the VaR for only treasury bills since it is about the only currently marketable government security. The VaR measures the worst plausible loss of a portfolio present value. The results show that the risk was moderate from 1999 up to 2000, but shot up as from early 2001 when volatility grew a lot. It decreased steadily as from early 2002, but shot up again as from the middle 2003. Several shocks such as the uncertainty after the 2003 elections may have contributed in increasing volatility and risk as measured through the VaR by the middle of 2003.

The debt rollover magnitude is also computed here. For several months, the debt has been in the form of rollover, with no new issues being made. The rollover risk is also measured in the context of the widely known mean-variance analysis. Presently the debt structure is fairly risky from their market risk perspective.

Finally, section 4 considers several issues pertaining to he implication of the increasing debt risk level for monetary policy conduct. Considering that the instruments of monetary policy are mainly, open market operation, discount windows, both of which involve the sale/ purchase of government instruments(treasury bill) and reserve requirements,(which also sometimes involve the sale of treasury bills), then increases in the risk levels of treasury bill can therefore affect monetary policy. We analyse this effect in two ways-: the effect of the risk premium on the demand for debt instruments, and the effect of the risk premium on banking system solvency. Demand for debt especially at the OMO sessions appear to have responded to the rising VaR values

In conclusion, the main message is that the domestic government debt in Nigeria has continued to suffer from confidence crises as market participants have consistently shown greater unwillingness to hold longer maturities. The government has therefore only been able to issue more of short term debt instruments. In recent times as the macroeconomic conditions become fairly stable, the market has sought for longer-term debt securities. The 2003 first FGN bonds typically butlers this fact.

In general, domestic macroeconomic conditions must however improve and become more stable so as to encourage market participants to hold longer maturing debt instruments of government. Again improved foreign access to holdings of domestic government debt might help in improving the demand for longer maturing debt. However foreign investors would also become more attracted if macroeconomic conditions are stable and credibility and consistency in government is assured.

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Appendix (A.1) **Government Debt Outstanding**

Year	Domestic Debt (N, billion)	External Debt (N, billion)	Total Debt (N, billion)	Domestic Debt as a % of total debt	External Debt as a % of total debt	Domestic debt as a % of GDP	External debt as a % of GDP	Total Debt as a % of GDP
1960	0.02	0.09	0.11	19.9	80.1	1.0	3.9	4.9
1961	0.06	0.12	0.18	33.7	66.3	2.5	4.9	7.4
1962	0.08	0.14	0.23	36.7	63.3	3.4	5.9	9.4
1963	0.13	-	-	-	-	-	-	-
1964	0.17	0.14	0.31	55.2	44.8	5.5	4.5	10.0
1965	0.21	0.14	0.35	60.4	39.6	6.4	4.2	10.7
1966	0.28	0.15	0.44	65.5	34.5	8.0	4.2	12.2
1967	0.36	0.17	0.53	67.7	32.3	12.3	5.9	18.2
1968	0.49	0.17	0.66	74.3	25.7	17.1	5.9	23.1
1969	0.74	0.17	0.91	80.9	19.1	19.3	4.6	23.9
1970	1.11	0.18	1.29	86.4	13.6	19.8	3.1	24.7
1971	1.25	0.18	1.42	87.5	12.5	19.0	2.7	21.7
1972	1.00	0.27	1.27	79.0	21.0	13.9	3.7	17.6
1973	1.06	0.28	1.34	79.3	20.7	9.7	2.5	12.2
1974	1.27	0.32	1.59	79.7	20.3	6.9	1.8	8.7
1975	1.68	0.35	20.3	82.8	17.2	7.8	1.6	9.7
1976	2.63	0.37	3.00	87.5	12.5	9.6	1.4	11.3
1977	4.64	0.37	5.00	92.7	7.3	14.2	1.1	15.9
1978	5.98	1.25	7.24	82.7	17.3	16.6	3.5	20.9
1979	7.23	0.61	8.84	81.8	18.2	16.8	3.7	21.1
1980	8.23	1.87	10.10	81.5	18.5	16.2	3.7	20.3
1981	11.20	2.33	13.53	82.8	17.2	22.1	4.6	26.8
1982	15.01	8.82	28.83	63.0	37.0	29.0	17.1	46.2
1983	22.22	10.58	32.80	67.8	32.2	38.9	18.5	57.8
1984	25.68	14.81	40.48	63.4	36.6	40.4	23.3	64.3
1985	27.95	17.30	45.25	61.8	38.2	38.6	23.9	63.4
1986	28.44	41.45	69.89	40.7	59.3	38.9	56.7	96.9
1987	36.79	100.79	137.58	26.7	73.3	33.8	92.6	128.7
1988	47.03	133.96	180.99	26.0	74.0	32.4	92.2	126.8
1989	57.05	240.39	287.44	16.4	83.6	20.9	106.9	129.2
1990	84.12	298.61	382.74	22.0	78.0	32.3	114.6	148.4
1991	116.20	328.05	444.25	26.2	73.8	35.9	101.2	138.7
1992	161.90	544.26	706.16	22.9	77.1	29.4	99.0	129.7
1993	261.09	633.14	894.24	29.2	70.8	37.5	90.8	129.3
1994	341.27	648.81	990.08	34.5	65.5	37.3	70.9	108.7
1995	341.08	716.82	1057.95	32.2	67.8	17.2	36.2	54.0
1996	343.67	617.32	960.99	35.8	64.2	12.2	21.9	35.1
1997	359.03	595.32	954.96	37.6	62.4	12.2	20.3	33.7
1998	523.49	633.02	1156.51	45.9	54.1	18.9	22.3	41.8
1999	794.81	2577.38	3372.19	23.6	76.4	21.2	30.7	104.5
2000	898.25	3097.38	3995.64	22.5	75.5	23.4	36.8	82.5
2001	1016.97	3176.29	4193.27	24.2	75.8	26.5	41.1	76.4
2002	1161.00	3932.88	5098.88	22.8	77.1	28.4	42.1	89.0
2003	1329.70	4478.32	5808.02	23.9	77.1	27.5	39.8	76.2

Source: CBN Annual Report(various issues), CBN Statistical Bulletin (various issues), DMO Data Bank

Appendix(A.2) : **Composition of Nigeria's domestic government debt outstanding (N, million)**

Year	Treasury Bills	% share of total	Treasury Certificates	% share of total	Treasury Bonds	% share of total	Development stocks	% share of total	Others	% share of total
1960	18.2	77.4	-	-	-	-	5.3	22.6	-	-
1961	34.0	57.3	-	-	-	-	25.3	42.7	-	-
1962	48.0	55.4	-	-	-	-	38.7	44.6	-	-
1963	60.0	46.7	-	-	-	-	68.4	53.3	-	-
1964	68.0	39.0	-	-	-	-	106.4	61.0	-	-
1965	80.0	37.0	-	-	-	-	136.2	63.0	-	-
1966	128.0	44.4	-	-	-	-	160.1	55.6	-	-
1967	168.0	46.1	-	-	-	-	196.2	53.9	-	-
1968	240.0	48.8	20.0	4.1	-	-	232.1	47.2	-	-
1969	340.0	45.8	142.0	19.1	-	-	261.0	35.1	-	-
1970	556.0	50.0	236.0	21.2	-	-	299.0	26.9	20.9	1.9
1971	616.0	49.5	256.0	20.6	-	-	355.0	28.5	18.7	1.5
1972	368.6	36.8	207.9	20.8	-	-	410.8	41.1	13.4	1.3
1973	401.9	37.9	262.4	24.7	-	-	392.9	37.0	4.0	0.4
1974	616.0	48.6	268.6	21.2	-	-	377.8	29.8	4.2	0.3
1975	616.0	36.7	219.0	13.0		-	840.5	50.1	3.4	0.2
1976	616.0	23.4	652.0	24.8	-	-	1358.9	51.7	3.1	0.1
1977	691.0	14.9	900.0	19.4	-	-	1815.7	39.2	1229.3	26.5
1978	816.0	13.6	1800.0	30.1	-	-	2197.7	36.7	1169.4	19.5
1979	2119.0	29.3	2310.0	31.9	-	-	2785.0	38.5	17.2	0.2
1980	2119.0	25.7	3027.6	36.8	-	-	3069.0	37.3	15.9	0.2
1981	5782.0	51.6	2057.6	18.4	-	-	3353.0	29.9	2.9	0.0
1982	9782.0	65.2	1668.6	11.1	-	-	3557.0	23.7	2.9	0.0
1983	13476.0	60.6	4894.4	22.0	-	-	3851.0	17.3	2.9	0.0
1984	15476.0	60.3	6413.1	25.0	-	-	3783.0	14.7	2.9	0.0
1985	16976.0	60.7	6654.1	23.8	-	-	4319.0	15.5	2.9	0.0
1986	16976.0	59.7	6654.7	23.4	-	-	4808.0	16.9	1.5	0.0
1987	25226.0	68.6	6654.1	18.1	-	-	4909.0	13.3	1.5	0.0
1988	35476.0	75.4	6794.6	14.4	-	-	4759.0	10.1	1.5	0.0
1989	24126.0	51.3	6944.6	14.8	11350.0	24.1	4629.0	9.8	1.5	0.0
1990	25476.0	30.3	34214.6	40.7	20000.0	23.8	4402.5	5.2	31.5	0.0
1991	57763.1	49.7	34214.4	29.4	20000.0	17.2	4221.0	3.6	1.5	0.0
1992	103326.5	63.8	35241.4	21.7	19006.5	11.7	3961.0	2.4	364.8	0.4
1993	103326.5	39.6	36584.7	14.0	117139.7	44.8	3731.7	1.4	311.4	0.2
1994	103326.5	30.2	37324.7	10.9	115341.7	57.9	3350.0	1.0	0.00	-
1995	103326.5	25.2	23324.7	5.8	118681.7	68.2	3170.0	0.8	0.00	-
1996	103326.5	30.0	0.00	-	237387.6	69.0	2960.0	0.8	0.00	-
1997	221801.5	61.8	0.00	-	134387.6	37.4	2840.0	0.8	0.00	-
1998	221801.5	41.3	0.00	-	179620.1	33.4	2680.0	0.5	0.00	-
1999	361758.4	48.1	0.00	-	430608.2		2440.0		133398	24.8
2000	465535.7	51.8	0.00	-	430608.2	47.9	2110.0	0.3	0.00	-
2001	584535.8	57.4	0.00	-	430608.2	42.3	1830.0	0.3	0.00	-
2002	733763.0	62.9	0.00	-	430608.2	36.9	1630.0	0.2	0.00	-
2003	825100.0	62.0	0.00	-	430608.2	32.3	1470.0	0.3	0.00	-

Source: CBN Annual Report (various issues), CBN Statistical Bulletin (various issues), DMO Data Bank

Appendix (A3) : Investor base by type of instrument (Treasury Bills) - N'million

Year	Central Bank		Commercial Banks		Merchant Banks		Others		Total
	Holdings	% share of total	Holdings	% share of total	Holdings	% share of total	Holdings	% share of total	
1960	2.7	15.0	3.7	20.6	-	-	11.6	64.4	18.0
1961	13.3	39.1	6.0	17.6	-	-	14.7	43.2	34.0
1962	9.4	19.6	13.5	28.1	-	-	25.1	52.3	48.0
1963	31.4	52.3	9.3	15.5	-	-	19.3	32.2	60.0
1964	13.2	19.4	20.4	30.0	-	-	34.4	50.6	68.0
1965	24.9	31.1	19.4	24.3	-	-	35.7	44.6	8.0
1966	58.0	45.3	29.2	22.8	-	-	40.8	31.9	128.0
1967	64.8	38.6	34.4	20.5	-	-	38.8	23.4	168.0
1968	8.6	3.6	204.5	85.2	-	-	26.9	11.2	240.0
1969	23.5	6.9	207.7	61.1	-	-	108.8	32.0	340.0
1970	100.2	18.0	276.8	49.8	28.2	5.1	150.7	27.1	556.0
1971	179.6	29.2	101.9	16.5	24.3	3.9	340.4	55.3	616.0
1972	36.6	5.9	174.3	28.3	34.2	5.6	370.9	60.2	616.0
1973	86.4	14.0	150.5	24.4	40.7	6.6	338.4	54.9	616.0
1974	18.9	3.1	493.6	80.1	-	0.0	103.5	16.8	616.0
1975	1.2	0.2	512.7	83.2	-	0.0	102.0	16.6	616.0
1976	3.1	0.5	466.9	75.8	7.4	1.2	138.4	22.5	616.0
1977	161.0	23.3	295.9	42.8	26.9	3.9	207.2	30.0	691.0
1978	27.3	3.3	512.4	62.8	7.8	1.0	268.5	32.9	816.0
1979	0.2	0.0	1307.0	61.7	45.9	2.2	764.9	36.1	2119.0
1980	-	0.0	1600.5	75.5	40.6	1.9	477.9	22.6	2119.0
1981	3404.9	58.9	917.5	15.9	51.1	0.9	1408.5	24.4	5782.0
1982	5463.7	55.9	2189.8	22.4	171.7	1.8	1956.8	20.0	9782.0
1983	6018.1	44.7	4361.7	32.4	374.5	2.8	2721.7	20.2	13476.0
1984	4860.0	31.4	7296.6	47.1	876.5	5.7	2442.3	15.8	15476.0
1985	6184.1	36.4	7990.9	47.1	1027.1	6.1	1773.9	10.4	16976.0
1986	11585.0	68.2	3062.0	18.0	98.0	0.6	2239.0	13.1	25226.0
1987	14215.3	56.4	5250.5	20.8	260.6	1.0	5489.6	21.8	35476.0
1988	11560.3	32.6	5273.9	14.9	159.1	0.4	7482.7	21.1	24126.0
1989	11164.0	46.3	2535.2	10.5	84.6	0.4	10341.5	42.9	25476.0
1990	3403.9	13.4	7665.8	30.1	346.1	1.4	14060.2	55.2	24126.0
1991	34756.0	60.2	6254.2	10.8	673.0	1.2	15045.1	26.0	57763.1
1992	81143.0	78.5	5181.0	5.0	1084.8	1.0	15988.7	15.5	103317.5
1993	47386.5	45.9	28831.7	27.7	9393.8	9.1	17694.5	17.1	103326.5
1994	30184.2	29.2	8637.4	8.4	28286.3	27.4	36218.1	35.1	103326.5
1995	41984.1	40.6	17712.1	17.1	2105.3	2.0	41522.9	40.2	103326.5
1996	9490.1	7.2	46770.8	45.2	8947.7	8.6	38115.0	36.8	103326.5
1997	141676.0	63.8	38051.9	17.1	6384.3	2.8	35685.6	16.0	221800.5
1998	132513.4	49.7	40787.7	18.3	8165.3	3.6	40335.1	18.1	221801.5
1999	79860.5	22.0	186142.7	51.4	12723.3	3.5	43798.0	12.1	361758.4
2000	87355.5	18.7	275773.6	59.2	12439.3	2.6	89961.4	19.3	465535.8
2001	325328.5	55.6	199261.5	34.0	-	-	59945.4	10.2	584535.8
2002	147821.0	20.1	460229.0	62.7	-	-	125712.0	17.1	733762.0
2003	255661.6	30.9	430836.9	52.2	-	-	138553.0	16.8	825054.0

Source: CBN Annual Report(various issues), CBN Statistical Bulletin (various issues), DMO Data Bank

Appendix (A4) : Investor base by type of instrument (Treasury Certificates) - N'million

Year	Central Bank		Commercial Banks		Merchant Banks		Others		Total
	Holdings	% share of total	Holdings	% share of total	Holdings	% share of total	Holdings	% share of total	
1960									
1961									
1962									
1963									
1964									
1965									
1966									
1967									
1968					19.4	97.0	1.2	6.0	20.0
1969			2.2	1.5	138.9	97.8	0.9	0.6	142.0
1970	2.2	0.9	3.9	1.7	223.4	94.7	6.3	2.7	236.0
1971	0.0	0.0	2.8	1.1	188.9	73.8	60.0	23.4	256.0
1972	0.5	0.2	4.1	1.4	202.0	70.6	79.2	27.7	286.0
1973	19.3	6.7	6.8	2.4	231.5	80.9	28.1	9.8	286.0
1974	0.6	0.2	3.3	1.2	261.7	91.5	20.4	7.1	286.0
1975	2.7	1.2	1.4	0.6	214.1	93.9	9.4	4.1	228.0
1976	4.7	0.7	6.9	1.1	587.7	90.1	32.6	8.1	652.0
1977	79.6	8.8	4.7	0.5	808.6	89.8	6.9	0.8	900.0
1978	1177.0	65.4	6.3	0.4	440.6	24.5	176.1	9.8	1800.0
1979	1072.8	46.4	13.5	0.6	837.0	36.2	386.7	16.7	2310.0
1980	1590.9	58.3	18.0	0.7	834.3	30.6	284.4	10.4	2727.0
1981	1112.6	48.2	18.3	0.8	850.4	36.9	320.3	13.9	2307.0
1982	900.3	54.0	2.9	0.2	625.8	37.5	136.6	8.2	1668.6
1983	3560.7	72.8	11.0	0.2	798.7	16.3	544.0	11.1	4894.4
1984	4304.2	67.1	17.5	0.3	1429.5	22.3	661.9	10.3	6413.1
1985	3724.4	44.6	105.0	1.3	2264.0	27.1	3260.7	27.3	8354.1
1986	4518.3	67.9	50.2	0.8	1360.8	20.4	725.5	10.9	6654.1
1987	3431.1	51.6	24.8	0.4	2322.2	34.9	875.5	13.2	6654.1
1988	3670.4	54.0	8.8	0.1	2035.7	30.0	1079.7	15.9	6794.6
1989	4483.5	64.6	0.0	0.0	1095.9	15.8	1365.2	19.7	6944.6
1990	31847.3	93.1	5.0	0.0	1036.5	3.0	1326.0	3.9	34214.6
1991	32813.3	95.9	0.0	0.0	559.3	1.6	842.0	2.5	34214.6
1992	22896.6	66.9	324.6	0.9	0.0	0.0	10993.4	32.1	34214.6
1993	35307.7	96.5	673.7	1.8	51.3	0.1	551.6	1.5	36584.3
1994	22365.9	59.9	614.3	1.6	0.0	0.0	14362.5	38.5	37342.7
1995	30079.0	76.6	280.8	1.2	0.0	0.0	5257.9	38.5	35681.1
1996	31142.9	83.3	415.6	1.1	9.4	0.1	5774.8	15.4	37342.7
1997									
1998									
1999									
2000									
2001									
2002									
2003									

Source: CBN Annual Report(various issues), CBN Statistical Bulletin (various issues), DMO Data Bank

Note: Treasury certificates were discontinued as from 1996, when the outstanding treasury certificates were converted into treasury bonds with effect from 11th, March, 1996.

Appendix (A.5) : Maturity Structure of Domestic Government Debt 1970-2003

(in billion Naira)						(in percentages)				
Year	**Less than 2 years**	**2-5 Years**	**5-10 years**	**Over 10 Years**	**Total**	**Less than 2 years**	**2-5 years**	**5-10 years**	**Over 10 years**	**Total**
1970	0.62	0.02	0.05	0.25	0.94	6.3	1.7	5.5	26.4	100
1971	0.89	0.01	0.06	0.29	1.25	70.7	1.1	4.9	23.3	100
1972	0.59	0.03	0.05	0.33	1.00	58.9	2.8	5.1	33.3	100
1973	0.55	0.05	0.04	0.43	1.06	51.5	4.9	3.5	40.1	100
1974	0.70	0.05	0.06	0.46	1.27	55.1	3.8	4.9	36.2	100
1975	0.68	0.05	0.14	0.82	1.68	40.3	2.8	8.3	48.5	100
1976	1.31	0.04	0.24	1.11	2.63	49.7	1.7	6.2	42.4	100
1977	2.85	0.20	0.34	1.24	4.64	61.4	4.4	7.3	26.8	100
1978	3.81	0.12	0.25	1.80	5.98	63.7	2.0	4.2	30.1	100
1979	3.92	0.17	0.31	2.27	6.68	58.7	2.6	4.7	34.0	100
1980	5.26	0.14	0.51	2.33	8.23	63.9	1.7	6.2	28.3	100
1981	7.94	0.14	0.56	2.56	11.20	70.9	1.2	5.0	22.9	100
1982	11.29	0.24	0.71	2.60	14.85	76.1	1.6	4.8	17.5	100
1983	18.44	0.25	0.87	2.66	22.22	83.0	1.1	3.9	12.0	100
1984	21.95	0.34	0.85	2.53	25.68	85.5	1.3	3.3	9.9	100
1985	23.74	0.36	1.00	2.85	27.95	84.9	1.3	3.6	10.2	100
1986	23.64	0.68	1.26	2.86	27.44	83.1	2.4	4.4	10.1	100
1987	32.16	0.67	1.06	2.90	36.79	87.4	1.8	2.9	7.9	100
1988	42.68	0.62	1.00	2.73	47.03	90.7	1.3	2.1	5.8	100
1989	31.76	0.79	0.91	13.79	47.05	67.5	1.7	1.9	29.3	100
1990	60.13	0.79	1.06	22.11	84.09	71.5	0.9	1.3	26.3	100
1991	92.47	0.77	1.13	21.83	116.20	79.6	0.7	1.0	18.8	100
1992	126.76	0.51	1.21	33.42	161.90	78.3	0.3	0.7	20.6	100
1993	149.12	0.61	1.05	120.31	271.09	55.0	0.2	0.4	44.4	100
1994	141.06	1.13	1.83	115.34	341.27	41.3	0.3	0.5	33.8	100
1995	103.61	0.85	1.21	143.11	341.08	30.4	0.2	0.4	42.0	100
1996	103.60	0.85	18.12	221.10	343.67	30.1	0.2	5.3	64.3	100
1997	221.80	0.85	18.12	118.25	359.03	61.8	0.2	5.0	32.9	100
1998	355.43	1.19	18.12	162.75	537.49	66.1	0.2	3.4	30.3	100
1999	361.76	1.19	18.12	413.74	794.81	45.5	0.1	2.3	52.1	100
2000	465.54	11.94	42.61	378.16	898.25	51.8	1.3	4.7	42.1	100
2001	584.90	29.30	251.79	150.99	1016.98	57.5	2.9	24.8	14.8	100
2002	728.80	23.49	70.47	341.80	1161.0	62.9	6.0	6.0	29.1	100
2003	836.80	26.64	147.89	321.12	1329.7	62.8	2.0	11.1	24.1	100

Source: CBN Annual Report(various issues), CBN Statistical Bulletin (various issues), DMO Data Bank