

INTEREST RATES BEHAVIOUR UNDER A PROGRAMME OF FINANCIAL REFORM: THE NIGERIAN CASE

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This paper is an attempt to investigate the determinants of interest rates in Nigeria since the introduction of the deregulatory measures in 1987. Both the external and domestic factors were taken into account since Nigeria cannot be regarded as a closed economy. The major finding of the paper is that the most important factor affecting nominal lending rate in Nigeria is the persistent exchange rate depreciation. The identified channel of causation is the demand for money, especially for transactions purposes, which increases as the exchange rate depreciates, putting pressure on domestic liquidity. Institutional factors also explain a significant proportion of the variations in interest rates. The Fisher effect does not appear to be a major factor in interest rate determination as the expected inflation rate variable was not statistically significant.

The basic functions of interest rates in an economy in which individual economic agent takes decisions as to whether they should borrow, invest, save and /or consume are summarized in International Monetary Fund, (1983) under three broad aspects. First, interest rates, as return on financial assets serve as incentive to savers, making them defer present consumption to a future date. The relevant interest rates in this case are the deposit rates corrected for price inflation (or more precisely expected inflation rate). In this connection, interest rates affect the availability of saving; and to the extent that deposit rate vary depending on the maturity of the financial assets, they also influence the allocation of current saving among the assets. Second, interest rates, being a component of cost of capital, affect the demand for and allocation of loanable funds. The applicable rate of interest in this case is the bank lending rate, the changes which affect the cost of capital which influences investors' willingness to invest in machine and equipment (real investment). In this way, the level of interest (lending) rate could influence growth in financial instrument, output and employment. Third, the domestic interest rate, in conjunction with the rate of return on foreign financial assets, expected change in exchange rate, and expected inflation rate determine the allocation of accumulated savings among domestic financial assets, foreign assets, and goods that are hedged against inflation. The speculative movement of funds into/out of domestic/foreign assets depends on the relative levels of interest rates and whichever is appropriate among exchange rate, inflation rate and foreign interest rates.

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These broad roles of interest rates emphasize their significance in the structure of basic prices and indicate the need for study about their determinants under a flexible regime. Before the deregulation the level and structure of interest rates in Nigeria were fixed and administratively determined as were exchange rate and wages. The most important considerations which dominated interest rate policy at that time were the impact of interest rate changes on government expenditure and the need to promote investment and growth in the private sector. In order to keep the interest payment on public sector borrowing as low as possible, interest rates on government debt instruments were then fixed at low levels. Also, under a system of direct imposition of credit ceiling on banks and in the bid to channel domestic credit to prioritized sector discriminatory lending rates were fixed for loans and advances granted by banks to different sectors reflecting the authorities' preferences. Of course, the *attendant problems*, which became unmanageable because of the deliberate policy to keep the rates below market determined rates contributed largely to the factors that made deregulation a compelling strategy to adopt.

Since the deregulation, interest rates have been rising almost uninterruptedly especially in recent years. The major objectives of this paper is to investigate the factors responsible for the behaviour of the rates since the adoption of market determination of interest rates. The paper is divided into four parts. Part I highlights the important policy reforms introduced while Part II discusses the theoretical issues in the behaviour of interest rates in an economy. Part III contains the results of the estimation of the model used for assessing the impact of the determinants on interest rates. Part IV also discusses the unquantifiable other factors affecting interest rates. Part V of the paper contains the summary and conclusion.

PART I MEASURES FOR FINANCIAL SECTOR REFORM

The measures for the reform of the financial sector were adopted within an overall context of comprehensive Structural Adjustment Programmes (SAP) comprising stabilization measures and other measures designed to institute market systems for efficient resource allocation. This implies the elimination or reduction of the excessive controls which had been in vogue in the preceding two decades to levels that could sustain growth and development. Financial and trade liberalization were the cornerstones of the SAP. The financial sector reforms were designed to provide a more flexible policy framework for the management of the emerging adverse international economic developments such as the drastic decline in the price of crude oil and other minerals and primary commodity exports, and the growing protectionism as well as the impact of rising interest rates on the country's external debt burden. The reform was expected to promote financial savings, reduce the distortions in investment

decisions; and induce more effective intermediation between savers and investors. Generally, the financial sector reform could be conveniently classified into three categories: reform for the improvement of financial structure; reform designed to improve monetary management; and reforms to aid capital movements and the foreign exchange market.

Reform of the Financial Structure

The structural changes in the financial sector were designed to foster competition, strengthen the supervisory role of the regulatory authority, and streamline public sector relationship with the financial sector. With a view to increasing competition in the financial sector, the country licensed more new banks than at any period before. New banking institutions and other types of financial intermediaries have sprung up to provide various types of services in the banking, mortgage, brokerage and investment finance areas. Between 1986 and 1991, a total of 79 new banks with 824 bank branches opened for business. In the previous years (1980–1985), only 14 new banks with 644 branches opened for business. At the end of 1991, the total number of banks was 119 compared with 40 at the end of 1988 while the number of bank branches increased from 1,323 in 1985 to 2, 107 at end-1991. The economy also witnessed the establishment of financial trust banks and mortgage institutions within the last 3 years. As a protective measure against inadequate capital base for all banks, the Nigerian government has raised the minimum paid-capital of commercial and merchant banks to ₦50 and ₦40 million, respectively. Efforts are also made to recapitalize the insolvent banks and solve the problem of non-performing assets in order to restore confidence in the banking system. The shareholders have injected more capital to officially stipulated levels while banks are committed to gradually write off the non-performing assets in their portfolio. Also, in order to ensure safe and sound banking, the country has put in place prudential guidelines and strengthened banking supervision to minimize occurrence of non-performing assets. Important elements of the prudential guidelines consist of the bringing of capital adequacy ratio to conform to international standard, and provisioning for non-performing assets. Further efforts made to instill confidence in the banking system include the establishment of the Nigerian Deposit Insurance Corporation (NDIC) to insure bank deposits. With a view to streamlining the relationship of governments with the banking institutions the country has licensed discount houses which will tackle the problem of providing primary financing for government debt instruments and developing secondary market in treasury securities.

Another effort in the area of institutional strengthening was the re-enactment of the banking laws and the Act establishing the Central Bank to permit effective surveillance of the entire financial sector. In 1991 government promulgated two important Decrees affecting the banking industry in Nigeria. The Central Bank of Nigeria (CBN) Decree No. 24, and the Banks and Other Financial Institutions Decree

(BOFID) No. 25 which abrogated the CBN Act, 1958 (as amended) and the Banking Decree, 1969 (as amended), respectively. The new CBN Decree significantly enlarges the powers of the CBN with regard to the maintenance of monetary stability and evolving sound financial structure. In an attempt to stem the source of persistent excess liquidity, the Decree substantially reduces the size of advances that the CBN may grant to the Federal Government in any one year. The Decree also contains provisions to facilitate the use of market-based instruments of monetary control. In addition, the Bank's powers to obtain data and other information from economic agents in the country and appropriate directives to financial institutions are strengthened and expanded in scope to plug the observed leakages in monetary management. The BOFID seeks to introduce changes in regulations that can promote the development of the financial sector in a deregulated environment. Essentially, the Decree contains the following important elements; the centralization of the functions of bank licensing, regulation and supervision in the CBN; allowance for changes to be made to the law without recourse to a new legislation; and strengthening the regulatory powers of the CBN regarding keeping of proper books of accounts by financial institutions, the control of distressed banks and winding-up of failed institutions and bringing under regulation all financial sector operators formally within the informal sector but whose activities influence the economy significantly.

Monetary Policy Reform

The monetary policy reform measures have been designed to stabilize the economy in the short-run and to induce the emergence of market-oriented financial sector for effective mobilization of savings and efficient resource allocation. Initial steps adopted included the rationalization of credit controls. The sector-specific credit distribution targets have been streamlined with a view to giving banks greater discretion in the sectoral allocation of credit. The former 18 sector classification was reduced to only two sector categorization requiring 50 per cent of credit to be channelled to agriculture and manufacturing and the remaining 50 per cent to go to other sector. Regulatory measures pertaining to liquidity and reserve requirements, which used to discriminate between commercial and merchant banks were unified to give similar treatment to banks in general. Also of importance is the mopping up of excess liquidity through the issuance of stabilization securities. Because of the current difficulties to use open market operations effectively, the country has adopted the issuance of stabilization securities which are mandatorily issued to banks to mop up excess liquidity. Other instruments of monetary control comprise cash reserve requirements computed as a proportion of total deposit liabilities (demand, saving and time deposits).

The monetary measures also included interest rates deregulation which was achieved in stages. The initial gradual upward reviews in bank lending rates were followed by changes in the minimum rediscount rate (MRR). Those were followed

by full deregulation of bank deposit and lending rates. Another policy element in the determination of the rate was the fixing of the spread between the saving deposit rates and prime lending rate (PLR) as well as the margin between the PLR and the maximum lending rate. Interbank rate was also to bear a relationship to the PLR. Finally, the auction-based system for issuing treasury bills and certificates was introduced with the objective of improving the efficiency of public debt management and the conduct of monetary policy; enhancement of investor interest and participation in the holding of government debt instruments; promoting greater reliance on market forces in the determination of yields on the instruments; and encouraging the development of the secondary market for government short-term debt instruments.

These measures indicate active and gradual movement away from the past regime of stringent controls that created unsuitable environment for growth and development.

Trade and Exchange Liberalization

A major element of the structural adjustment measures which has produced profound effects on the operations of the banking institutions and the economy in general was the adoption of trade and exchange liberalization involving the establishment of a foreign exchange market, the elimination of exchange controls, quota restrictions on imports and import licensing. The country also rationalized the lists of banned imported goods and revised downward its schedule of import duties.

After a series of modification over the six year period the foreign exchange market now comprises the banks and the Central Bank which buys and sells foreign exchange at market determined exchange rate. Private users of foreign exchange go to their banks to buy or sell foreign exchange at exchange rates agreeable to them. However, banks still have to report their foreign exchange dealings to the Central Bank for the purpose of monitoring and ensuring that abuses are reduced to a minimum. Coexisting with the official foreign exchange market is a parallel market and a system of *bureaux de change*. Significant foreign exchange transactions are reported to have passed through these segments of the FEM. In the case of capital transactions such as profit, dividend or capital transfers official authorization is only required at the initial stage. Once approved, transfers could be effected through banks.

PART II THEORETICAL ISSUES IN THE DETERMINATION OF INTEREST RATES

In the general equilibrium framework, interest rate enters as a determinant of the demand (and possibly supply) for money balances. Any discussion of factors affect-

ing interest rates cannot be adequate without reference to the stance of the monetary policy pursued as this will indicate the state of excess supply or excess demand for money prevailing in the economy during the period. In other words, the state of excess money supply indicates the extent of pressure on the level of interest rates generally. For instance, for a change in money stock to be held in such a way that the demand for money balances equates its supply, some variables in the demand (and or supply as well) for money must also change so as to achieve required equilibrium. This implies that changes in interest rates may sometimes occur through the need to equilibrate the demand with the supply of money. However, this should not be taken as the only avenue through which interest rate changes in an economy. Changes in interest rates may occur through changes in other factors in the demand for money which will in turn affect market conditions. We shall consider these factors.

A simplified form of the money demand function is given by:

$$m_t^d = f(y_t, i_t, p_t^*) \dots\dots\dots (1)$$

where $m_{t,d} = (M^d/p)_t =$ demand for real money balances

$p =$ price index

$y^t =$ real income

$i_t =$ vector of interest rates

$p_{*t} = 1/p dp_* / dt =$ expected inflation rate

This form is considered adequate for our purpose. In Gibson (1970) this form of demand for money was used although expressed in nominal money balances.

From equation (1) and what had been said earlier, we identify three effects in the interest rate determination in a closed economy. First, the Fisher (inflation expectation) effect; second, the liquidity effect; and third, the income effect. In what follows we shall elaborate on each of these effects, take account of the openness of the Nigerian economy, and attempt to consolidate them in a theoretical model that will be estimated later in the paper.

The Fisher (inflation expectation) Effect

Essentially, the Fisher effect considers the behaviour of money lenders during an inflationary situation which would cause economic agents to form expectations of sustained increase in prices. Lenders, in order to compensate for the loss in real value of their money arising from the inflation, tend to increase the real rate of interest by their own expected rate of price inflation. Of course, during such a situation, because borrowers are sure that the goods purchased through the loan will also appreciate by a factor of their own expected inflation, they are willing to borrow. When the expectations of the borrower and the lender are at least the same it is possible for loan transactions to be concluded under this situation of persistent inflation.

The Fisher effect can be stated as:

$$i_t = r_t + p_t^* + r p_t^* \quad \dots\dots\dots (2)$$

where

- r_t = real rate of interest
- $r p_t^*$ = the appreciation in interest payment arising from the inflationary expectation. It could be neglected because of its small magnitude.

The deregulatory measures took the form of progressive reduction of subsidies such as the gradual removal of subsidies on the prices of petroleum products, agricultural inputs, and such major locally produced inputs like electricity and communication services. The measures were introduced simultaneously in all sectors of the economy. Through the impact of the changes in the prices of the affected goods on the costs of production of users of the products and services the domestic price level rose persistently. For the Fisher effect to be activated the inflationary development does not have to originate from the monetary phenomenon. What is required for Fisher effect to be set in motion is sustenance of inflation. The gradual deregulation of prices in all sectors was so frequent that it became a subject of speculation and expectation by economic agents. Moreover, the gradual deregulation of the foreign exchange market together with the frequent modification in the method of auction in the market as well as switches in policy regarding foreign exchange management was accompanied by persistent depreciation of the exchange rate in all segments of the market with ultimate impact on inflation. The sustained depreciation of the exchange rate actually led to speculative activities on the foreign exchange market so that expectations about future depreciation and inflation affected pricing decisions of economic agents. Inflationary expectation was also strengthened by excessive monetary and credit growths during the period. For example, the narrow money (M1) and aggregate domestic credit substantially exceeded the optimal targets stipulated by the Central Bank during the period of the reform. In 1988 and 1989, M1 grew by 43.6, and 21.5 per cent, respectively, exceeding stipulated target by 28.6, and 6.8 percentage points. Similar situation persisted in 1990 and 1991 when M1 also grew by 44.9 and 32.6 per cent and surpassed optimal targets by 31.9 and 18.0 percentage points, respectively.

The Liquidity Effect

The real rate, r_t can be expressed in terms of the excess supply of money which is the factor that determines the pressure on interest rates in the money market. Excess supply of money changes, depending on the supply and demand factors. A positive value of excess supply causes interest rate to fall in the first instance as wealth owners bid up the prices of assets and lowers their yields. There could be an impact also on the prices of goods which are raised by the associated increase in demand. The goods

could be locally produced and/or imported. Thus, the exchange rate of the national currency tends to depreciate as a result of the higher level of liquidity. If the excess money supply is maintained, the accompanying price increases tend to make economic agents form expectations that inflation and depreciation will persist and reflect these in the determination of prices and interest rates. In other words, the Fisher effect, which is a separate factor from the liquidity effect, will be set in motion as a secondary effect of the sustained state of excess money supply. This is well discussed in Friedman, (1968). Considering the liquidity effect, we adopt the specification in Edwards and Khan, (1985) and write

$$r_t = \alpha - \lambda EMS_t + w_t \quad (\lambda > 0) \quad \dots\dots\dots (3)$$

where

- α = a constant and represents the long-run real interest rate
- EMS = excess money supply
- λ = a parameter $\lambda > 0$
- w_t = random error term

In a closed economy, nominal interest rate can, therefore, be expressed by combining equations (2) and (3) to give

$$i_t = \alpha - \lambda EMS_t + P_t^* + w_t \quad \dots\dots\dots (4)$$

This implies that the nominal interest rate is affected largely by the component of excess money supply and expectations of price inflation.

The excess money supply can be expressed as

$$EMS_t = \log m_t - \log m_t^d \quad \dots\dots\dots (5)$$

The liquidity effect, which is denoted by EMS as indicated above, refers to the extent to which the money stock exceeds its demand during a period. EMS could be negative or positive. When it is positive, money supply has exceeded its demand; and it is expected, in this case, to exert a downward pressure on the level of interest rates. When EMS is negative, demand for money has surpassed money supply. In this case, there should be an upsurge in the level of interest rates as wealth owners transact wealth for money in order to satisfy their demand.

Also, we assume that adjustment in the stock of real money balances takes the form of

$$\Delta \log m_t = \beta (\log m_t^d - \log m_t) \quad \dots\dots\dots (6)$$

where β is such that $0 \leq \beta \leq 1$ indicating the coefficient of adjustment. $\Delta \log m_t$ is the first different of money supply. We may linearise equation (1) in the logarithmic form and state as follows:

$$\log m_t^d = K_0 + K_1 \log y_t - K_2(r + P_t^*) - K_3 P_t^* \quad \dots\dots\dots (7)$$

If we make the appropriate substitutions as made by Edwards and Khan (1985) involving equations (4), (5), (6) and (7) we have an expression for nominal interest rates in a close economy given by

$$i_t = \alpha_0 + \alpha_1 \log y_t + \alpha_2 \log m_{t-1} - \alpha_3 P_t^* + w_t \quad \dots\dots\dots (8)$$

Equation (8), which was derived by Edwards and Khan after considering the Fisher and liquidity effects of persistent changes in money supply on nominal interest rates in a closed economy, will be estimated using the Nigerian data.

In order to gain further insight into the liquidity effect of monetary developments on interest rates during the period of the deregulation it is necessary to throw more light on the monetary policy measures introduced during the programme period. These comprise of measures introduced initially for purposes of stabilization and those designed to foster market allocative mechanism contained in the deregulatory measures in the monetary and financial markets. The former consists of the transfer of private sector deposit with banks, such as deposits awaiting remittance for import to the Central Bank. The transfer of such deposit led to sharp reduction in money supply and caused an increase in the demand for money as banks contract their assets. The trade and exchange deregulation was accompanied by large depreciation in the exchange rate. Apart from the persistence of the depreciation, the regime of exchange rate has been continually deregulated and modified, measures which have increased the flexibility of the rate. These measures also have caused tremendous increases in the demand for money and are unlikely to have neutral effects on excess liquidity in the system. In addition, steps taken toward the reform have involved the simplification of the format for sectoral allocation, interest rate deregulation, and rationalization of the procedure for licensing new banks. The interest rate deregulation has been achieved through progressive increases in the fixed rates initially; then upward review in the minimum rediscount rates. This was followed by the introduction of an auction market for treasury securities which has meant the determination of the rates on the securities by the market. The minimum rediscount rate has since been adjusted to reflect the new treasury bill rates determined in the market. Other measures which had tremendous impacts on the supply and demand for money and hence on the interest rates included the withdrawal of deposits of government ministries and parastatals from banks to the Central Bank and the issuance of stabilization securities to drain bank excess liquidity. The paragraphs that follow reflect an attempt to ascertain the status of liquidity in relation to demand for money using narrow money (M1) as a measure of domestic liquidity.¹

Tables 2A and 2B give a measure of excess liquidity in the Nigerian economy using the narrow money as indicator of domestic liquidity.² The data are generated from demand functions computed by using deposit and lending rates as explanatory

variable in each case (see Equations (12a) and (12b)). It could be observed from the last column of each of the tables that between 1986 and 1990, the first five years of the programme, EMS, which is measured by the residual of the demand for money function, is negative indicating that throughout that period the Nigerian money market was in a condition in which the demand for money exceeded its supply. Thus, nominal interest rates assumed upward trend during the period. The factors attributable to the tight monetary situation during the period included several measures put in place as part of the programme itself. For example, as part of the stabilization measures, banks were required to transfer the deposits awaiting payments for imports to the Central Bank. The sudden withdrawal of funds stimulated demand for fund while also reducing the supply. Also the initial depreciation in the exchange rate of the naira following the switch from a regime of fixed exchange rate to market determined exchange rate generated intensified pressure on demand for money balances. The increase in demand for money balances arising from this factor has been accentuated by the sustained depreciation in the naira exchange rate. Other factors attributable to the excessive demand pressure on money during the deregulation included the several deregulatory measures introduced to achieve appropriate pricing in all sectors of the economy; the issuance of stabilization securities to banks; the transfer of deposits of government ministries and parastatals to the Central Bank; the disallowance of foreign deposits as guarantee for naira loans, etc. The sustenance of the excessive demand for money balances has been responsible for the upward pressure on domestic interest rates. Since these measures were appropriate and inevitable at the time they were introduced it followed that the upsurge in interest rates witnessed during the period of deregulation was an unavoidable consequence of the financial reform.

Only in 1991 is EMS positive. During this period, it is difficult to attribute the behaviour of interest rates to money market conditions alone as ceilings were placed on bank rates. However, the fact that banks were able to observe the ceilings seems to suggest that the excess liquidity position could have aided their willingness to comply with guidelines. However, it should be realized that the secondary effect of a sustained positive increase in domestic liquidity is inflationary and may be accompanied by inflationary expectations which may activate the Fisher effect on the interest rates.

The Effects of External Factors

The version of equation (8) derived for the general case of semi-open economy is more interesting for obvious reasons. To obtain this equation Edwards and Khan (1985) combine the equations linearly for completely closed and perfectly open economy such that

$$i_t = \psi (i_t^* + e_t) + (1 - \psi) (r_t + P_t^*) \quad \text{..... (9)}$$

where e_t = expected rate of depreciation of the national currency
 ψ = a parameter measuring the degree of openness. The closer ψ is to unity the more open the economy.

In order to take account of the lag in the response of the domestic interest rate to changes in the foreign interest rate, they assume a partial adjustment framework, i.e.

$$\Delta i_t = \Theta [(i_t^* + e_t) - i_{t-1}] \quad 0 \leq \Theta \leq 1$$

This implies:

$$i_t = \Theta (i_t^* + e_t) + (1 - \Theta)i_{t-1} \quad \text{..... (10)}$$

Combining (8), (9) and (10) Edwards and Khan obtain an equation for a semi-open economy, stated as follows:

$$i_t = b_0 + b_1 (i_t^* + e_t) + b_2 \log y_t + b_3 \log m_{t-1} + b_4 p_{*t} + b_5 i_{t-1} \quad \text{..... (11)}$$

Thus, the impacts of the foreign interest rates and expected change in exchange rate on the level of domestic nominal interest rates are considered to be equal and measured by b_1 in Equation (11). However, while the foreign interest rate and the expected change in exchange rate measure the net return on assets, in the case of a developing country undertaking reforms in its financial sector, foreign interest rates and the expected change in exchange rate may exert different impacts on nominal interest rates. An expected change in the naira exchange rate affects domestic nominal interest rates through its effect on both the transactions and speculative demand for money.³ If, for instance, the exchange rate is expected to depreciate, importers expect to require more units of local currency to finance foreign payments. The expectation of the depreciation also heightens inflationary expectation, increasing the demand for money balances. This will tend to exert upward pressure on lending rates. Similarly, an expected depreciation in exchange rate may cause a shift of assets in domestic currency to foreign currency denominated assets thereby putting pressure on interest rate. It may also dampen the willingness of residents to repatriate foreign earnings or reduce corporate incentives to effect capital inflow. However, because of capital controls, capital transfer is small and the exchange rate impact tends to be larger than the foreign interest rate impact in the demand for money in developing countries with significant control on capital outflow. This suggests that the impacts of the expected change in exchange rate and foreign interest rate should be separately reflected in a model for determining domestic interest rates.

Further, we assume that capital owners have an expected foreign interest rate (rfe) at any time t which motivates the transfer. We postulate that the change in domestic interest rates is directly proportional to the divergence between the expected foreign

interest rate and its actual level. This implies that the domestic interest rates adjust according to a partial adjustment framework modelled as:

$$\Delta i_t = \Theta \{(rfe)_t - rf_t\}, \quad 0 \leq \Theta \leq 1 \quad \dots\dots (12)$$

where rf = actual foreign interest rate,
 Δi_t = absolute change in domestic nominal interest rate.

We modify equation (8) to reflect the openness of the economy and the exchange rate factor as highlighted above to obtain Equation (13) below

$$i_t = \varphi_0 + \varphi_1 \log y_t + \varphi_2 \log m_{t-1} - \varphi_3 p_t + \varphi_4 e + \varphi_5 (rfe)_t + w_t \quad \dots\dots (13)$$

Combining Equations (12) and (13) we obtain

$$i_t = C_0 + C_1 \log y_t + C_2 \log m_{t-1} + C_3 p_t + C_4 e_t + C_5 (rf)_t + C_6 i_{t-1} \quad \dots\dots (14)$$

Equation (14) will be estimated for our semi-open economy in our bid to empirically investigate the behaviour of interest rates. Since an expected depreciation in exchange rate increases the demand for money which in turn increases domestic nominal interest rates the relationship between nominal interest rate and expected change in exchange rate is inverse. An expected rise in foreign interest rates will increase capital outflow, reduce money supply and induce an upward pressure on domestic nominal interest rates, thereby producing a direct relationship on the rates. Thus, *a priori* expectations are that $c_4 < 0$ and $c_5 > 0$ in equation (14) above.

PART III ESTIMATION OF EQUATIONS

In order to investigate the determinants of domestic nominal interest rates in Nigeria during the period of the deregulation we shall estimate equations (8) and (14) which are derived for the closed and semi-open economy respectively.⁴ In their empirical study on the demand for money in Nigeria, Oresotu and Mordi (1992) found that the elasticity of income in the demand for money function increases from a magnitude which is less than unity in the short-run to a value close to 2 in the long-run. Thus, we shall not equate the coefficients of income and the lagged money stock in equations (8) and (14) to unity as done by Edwards and Khan (1985) in their work for Colombia and Singapore. We shall, however, estimate the demand for money equation with a view to obtaining the estimates of the excess money supply (EMS) during the period under review. The EMS is the estimated regression residual for each year. We shall explain this further when discussing the liquidity effect.

Data

The data for computing the equations are drawn from the period 1970 to 1991. The values of the variables appearing in the equations are annual averages except for real income which is taken to be the measured Gross Domestic Product (GDP) for each year.⁵ For foreign interest rates, the Eurodollar rate prevailing in the United Kingdom as published in the International Financial Statistics of the International Monetary Fund (IMF) are used in view of the fact that the U.K. has been Nigeria's traditional trading partner. Also, it is thought that because of the high level of interest rates in the U.K, capital flows to and from U.K. will predominate other areas. The inflation rate figures used are passed on annual averages of the consumer price index (CPI). In the estimation both expected price and exchange rate changes (i.e. $P^* = 1/p dp^*/dt$ and $e^* = 1/e de^*/dt$) are equalized to the actual changes during the period in order to avoid complications.

Estimation Results

Interest Rates in Completely Closed Nigerian Economy

$$(il)_t = 177.0412 + 49.7245 \log y_t - 13.7364 \log m_{t-1} + 0.0578 P_t \dots\dots (8a)$$

(2.862) (3.1287) (-2.13) (0.8685)

$$\bar{R}^2 = 0.2849 \quad SE = 4.3278 \quad D.W. 0.599$$

$$(id)_t = -164.2942 + 39.3253 \log y_t - 5.0856 \log m_{t-1} + 0.0439 P_t \dots\dots (8b)$$

(-2.5746) (2.3986) (-0.7644) (0.6396)

$$\bar{R}^2 = 0.2126 \quad SE = 4.4646 \quad D.W. = 0.381$$

As should be expected, the equations show that the explanatory variables do not adequately determine domestic nominal interest rates as could be observed from the low values of the adjusted R^2 . The results strongly suggest that there are other factors in the interest rates determination than the domestic factors alone. The Nigerian economy is not closed; and as argued in Part II above, foreign factors could exercise some influence on the levels of domestic interest rates.

Interest Rates in a Semi-Open Nigerian Economy

$$(il)_t = -5.8983 + 3.5565 \log y_t + 0.0236 p_t + 0.8582 (il)_{t-1} \dots\dots (14a)$$

(-0.1046) (0.2378) (0.5552) (4.7721)

$$-0.0539 e_t - 2.9185 \log m_{t-1} + 0.1605 (rf)_t$$

(-1.3326) (-0.4622) (0.5687)

$$\bar{R}^2 = 0.7218 \quad S.E. = 2.7237 \quad H = 1.039$$

$$\begin{aligned}
 (id)_t = & -13.0814 + 2.6337 \log y_t + 0.8691 (id)_{t-1} + 0.0014 p_t \\
 & (-0.289) \quad (0.2297) \quad (5.6508) \quad (0.0398) \\
 & -0.0363 e_t + 0.697 \log m_{t-1} + 0.1225 (rf)_t \\
 & (-0.9595) \quad (0.01440) \quad (0.5175) \quad (14b) \\
 \bar{R}^2 = & 0.7947 \quad S.E. = 2.2915 \quad H = 1.42
 \end{aligned}$$

Equations (14a) and (14b) are estimated for the semi-open Nigerian economy for average bank lending rate (il) and deposit rates (id), respectively. The explanatory variables added to the closed economy equations, in view of the discussions presented in Part II of this paper, are the expected depreciation in the naira exchange rate, lagged value of the interest rate, and the expected level of foreign interest rate (as proxied by the Eurodollar rates in the U.K.). The results indicate much improvement on the close economy assumption. The adjusted \bar{R}^2 are much higher in both cases. Of importance is the new status of the expected exchange rate depreciation, the coefficients of which are correctly signed in both equations. Also, in the case of the average bank lending rates, the coefficient of the expected exchange rate depreciation is significantly different from zero. The values of H-statistic in both equations indicate that the presence of autocorrelation of the first order is not significant, implying the absence of bias in the estimated coefficients in the two equations. However, the coefficients of all other variables, except the lagged dependent variable, are not significantly different from zero. The results indicate that, in the case of the lending rate, there is strong evidence to suggest level of the lending rate are important determinants of nominal bank lending rates in Nigeria. The influences of domestic income, foreign interest rates and expected inflation rate on domestic nominal interest rates could be regarded as minor.

In the case of average deposit rate, only the lagged value, that is, the preceding year's average level of the rates, appears relevant, indicating that banks place more consideration on the preceding level of deposit rates in order to determine what to offer in the current year. All other factors, such as inflationary expectation, expected change in exchange rate and expected foreign interest rates, either do not influence or play minor role in the determination of the deposit rates paid by Nigerian banks. This result has important implication for policy because one of the objectives of the interest rates deregulation is the promotion of savings mobilization and financial intermediation with the overall objective of making resources available for investment. The neglect by banks of inflationary expectation, the expected foreign interest rates and change in exchange rate, which affect depositors' return on financial assets could intensify capital flight, discourage savings, and exacerbate the decision to invest in real resources as a store of wealth against inflation hedges.

The emergence of the expected change in the exchange rate as a significant factor

in the determination of domestic nominal interest rates also has tremendous implication for macroeconomic policy. This has to do with the fundamental causes of instability in the foreign exchange market. Studies have revealed that the major causes of the persistent depreciation in the exchange rate are the perennial shortage of foreign exchange largely due to the mode of financing of the budget deficits of government which have been high throughout the reform periods. The channel of causation of the fiscal deficit on exchange rate is largely through the high powered money injected into the economy by the Central Bank to enable government pay for goods and services acquired. This accrues as incomes, part of which is deposited in banks and part of which is used for foreign exchange transactions in the official and parallel markets. Even when the depreciation in the official market is under-played through official action, the fast depreciation in the exchange rate in the parallel market causes a widening parallel market premium which inevitably pulls up the rate in the official market. The persistent depreciation causes expectations to be formed by economic agents especially banks and other market operators, thus depreciating the rate in all segments of the FEM. This was the major cause of the recent deregulation of the FEM. The expectation about the depreciation led to increased demand for money resulting in excess demand situation in the money market, thus driving up the nominal interest rates.

On the joint role of foreign interest rates and the change in exchange rate as a factor affecting domestic interest rates the under-listed results are obtained using the addition of the two variables as an explanatory variable.

$$\begin{aligned}
 (il)_t = & -0.9653 + 0.8078 \log y_t - 0.5601 \log m_{t-1} + 0.0214 (i_t^* + e_t) + 0.256i_{1t-1} \\
 & (-0.0176) \quad (0.0573) \quad (-0.1153) \quad (1.1841) \quad (5.2495) \\
 & +0.256P_t \\
 & (0.6125) \quad \dots\dots\dots (11a)
 \end{aligned}$$

$$\bar{R}^2 = 0.7324 \quad SE = 2.6714 \quad H = -0.465$$

$$\begin{aligned}
 (id)_t = & -10.3122 + 0.9647 \log y_t + 1.6393 \log m_{t-1} + 0.0138 (i_{*t} + \bar{e}_t) \\
 & (-0.235) \quad (0.0896) \quad (0.4538) \quad (0.8461) \\
 & +0.8917 (id)_{t-1} + 0.0025 p_t \\
 & (6.3717) \quad (0.0707) \quad \dots\dots\dots (11b)
 \end{aligned}$$

$$\bar{R}^2 = 0.8047 \quad SE = 2.2353 \quad H = 1.22$$

As before, *il* = lending rates; *id* = deposit rates; all other variables are as defined previously in Part I; the t-ratio is in parenthesis below each coefficient. These results are certainly not as satisfactory as in the cases when the variables enter separately.

The coefficient of the sum variable is not significant in any of these equations, whereas in the above equations the coefficients of the expected exchange rate change are significant for the lending rate.

Imperfection in the Inter-bank Market

The effects of the changes in domestic liquidity conditions, inflationary expectation (Fisher effect), and changes in external factors on nominal interest rates are consolidated in equations (8) and (14) above. The extent to which these factors are significant determinants of domestic nominal interest rates in the Nigerian economy are revealed by the estimation of the above equations using the Nigerian data. Although the F-ratios indicate that satisfactory proportions of the variations in the lending and deposit rates were explained, the equations have not accounted for between 19 and 27 per cent of the variations in the levels of domestic nominal interest rates. This suggests the possible influence of other important factors not captured in the equations.

It has been suggested that although there are many banks, the current structure of the banking system tends to be oligopolistic as few old, but well established commercial banks are usually in surplus funds to the extent that they can exercise considerable market power over the other banks that are in perpetual need of reserves. The greater the pressures on the lopsided distributed supply the higher the inter-bank interest rates charged. Such pressures are reinforced by the nature and financial condition of the banks demanding funds. For example, as merchant banks are not naturally designed to mobilize deposits, their deposit liabilities tends to be persistently short of their normal needs. Also, commercial banks in temporary shortage of funds contribute their own quota to the demand pressures. There is also a group of illiquid banks with large holdings of non-performing loan portfolio which also patronize the market. It could be observed that the demand side of the market comprises banks always in desperate need of funds, a factor which is alleged to have been exploited by the few liquid commercial banks. Thus, it is claimed that inter-bank interest rates have exhibited abnormal high fluctuations because of the activities of the few banks which are in surplus funds. This has the tendency to increase the direct cost of funds to banks and therefore raise nominal interest rates.

PART V SUMMARY AND CONCLUSIONS

This paper has reviewed the measures introduced to effect a reform of the Nigerian financial system with a view to assessing their impact on the level of domestic interest rates. The measures comprise those introduced to reform the financial structure; those for monetary policy reform; and those directed to aid capital movements and

foreign exchange market. With the aid of a model designed to combine the Fisher and liquidity effects, as well as the foreign factors on the levels of domestic nominal interest rates, the paper attempts to quantify the impacts of inflationary expectation, expected change in exchange rate, and expected foreign interest rates. The most important factors affecting the domestic nominal bank lending rate in Nigeria are the persistent exchange rate depreciation and the preceding levels of the rate itself. The identified channel of causation is the demand for money especially for transaction purposes, which increases as the exchange rate depreciates. The increase in the demand for money tightens the liquidity position leading to a rise in the lending rates charged by banks. The persistent exchange rate depreciation has sustained the increase in the bank lending rates which have remained high since the deregulation of the rates.

The study also reveals that neither inflationary expectation, exchange rate depreciation, nor the level of expected foreign interest rates has influenced banks' decisions on the deposit rates. Thus, even with the deregulation of interest rates inflationary expectations, exchange rate depreciation and developments in foreign interest rates could still cause distortionary investment in real assets in the form of inflation hedges and capital flight, contrary to policy objective. This is detrimental to the achievement of policy goals for liberalizing interest rates. The other factor affecting the level of nominal interest rates is the inefficiency of the inter-bank market which tends to raise banks' direct cost of funds. While their direct costs have been heightened by the oligopolistic structure perverting the distribution of liquidity, their administrative costs remain high generally. This institutional factor explains about one fifth of the variations in the levels of domestic deposit and lending rates.

Table 2A
EXCESS LIQUIDITY AS MEASURED BY NARROW MONEY (M1)
1970-1991*

Year	Observed Values (M1)	Fitted Values (M1)	Residuals	Standardized Residuals (EMS)
1970	3.67282	3.58321	0.08962	1.96483
1971	3.68244	3.69668	-0.01424	-0.31227
1972	3.68968	3.73914	-0.04946	-1.08448
1973	3.73834	3.77515	-0.03682	-0.80718
1974	3.80011	3.83854	-0.03844	-0.84270
1975	3.93408	3.90408	0.03000	0.65778
1976	4.02910	4.04373	-0.01463	-0.32074
1977	4.12358	4.14544	-0.02187	-0.47944
1978	4.15204	4.16557	-0.01353	-0.29668
1979	4.19670	4.19275	0.00395	0.08660
1980	4.24433	4.23970	0.00463	0.10142
1981	4.23838	4.20755	0.03083	0.67589
1982	4.22128	4.20442	0.01686	0.36969
1983	4.18073	4.16183	0.01890	0.41449
1984	4.06671	4.08062	-0.01391	-0.30505
1985	4.08985	4.06773	0.02212	0.48496
1986	4.07518	4.09469	-0.01951	-0.42781
1987	4.03685	4.05629	-0.01945	-0.42639
1988	3.97472	3.99658	-0.02186	-0.47934
1989	3.93550	3.94929	-0.01379	-0.30233
1990	3.90518	3.96003	-0.05489	-1.20252
1991	4.11032	3.99487	0.11545	2.53128

Table 2B
EXCESS LIQUIDITY AS MEASURED BY NARROW MONEY (M1)
1970-1991*

Year	Observed Values (M1)	Fitted Values (M1)	Residuals	Standardized Residuals (EMS)
1970	3.67282	3.59106	0.08176	1.82455
1971	3.68244	3.68991	-0.00747	-0.16666
1972	3.68968	3.73064	-0.04095	-0.91393
1973	3.73834	3.77003	-0.03170	-0.70740
1974	3.80011	3.83633	-0.03622	-0.80836
1975	3.93404	3.91263	0.02145	0.47867
1976	4.02910	4.04444	-0.01535	-0.34247
1977	4.12358	4.14603	-0.02245	-0.50100
1978	4.15204	4.15560	-0.00355	-0.07931
1979	4.19670	4.18439	0.01232	0.27483
1980	4.24433	4.24545	0.00113	-0.02516
1981	4.23838	4.19879	0.03959	0.88346
1982	4.22128	4.19387	0.02741	0.61169
1983	4.18073	4.15224	0.02849	0.63585
1984	4.06671	4.08601	-0.01930	-0.43077
1985	4.08985	4.09078	-0.00093	-0.02085
1986	4.07518	4.11411	-0.03893	-0.86887
1987	4.03685	4.06855	-0.03170	-0.70744
1988	3.97472	3.99981	-0.02510	-0.56009
1989	3.93550	3.94585	-0.01035	-0.23090
1990	3.90518	3.94726	-0.04208	-0.93910
1991	4.11032	3.99412	-0.11620	2.59325

* The Interest rate variable is the deposit.

NOTES

1. In order to discuss liquidity effect on domestic interest rates, it should be recognized that its measure is not intertemporal change in the money supply, although monetary and credit targets including analysis of monetary developments have focused on intertemporal changes in monetary aggregates. This sharp distinction between intertemporal analysis and accurate measure of excess liquidity during a period must be borne in mind as an increase in money stock during a period may not necessarily translate into excess supply or demand during that period. It should also be realized that liquidity effect is measured in real terms in contrast to nominal terms in this paper, although it is possible to apply price adjustment. However, when this is done the result is independent of the general price level during the period as against intertemporal comparison which should rely on the general price levels during two review periods. These differences must be noted because restrictive monetary policy based on intertemporal computation of changes in monetary aggregates could turn out to produce excess supply of money during the period. In other words, a restrictive monetary policy need not be tantamount to a tight monetary situation. The liquidity effect is a measure of disequilibrium in assets holdings. The desire to reallocate wealth arises from the excess of that component of wealth in the portfolio of assets. In this paper we have decided to measure it as the difference between the supply and demand for money stock. It could be measured in other ways. However, whichever is adopted, insofar as it reflects a measure of the disequilibrium the behaviour of assets holders remains same.
2. MI is the most suitable indicator of liquidity in the view of the study.
3. Oresotu, F.O. and Mordi, Charles, N.O. "The Demand for Money Function in Nigeria: An Empirical Investigation," *Economic and Financial Review*, Central Bank of Nigeria, March, 1992.
4. Equation (11) was estimated for Columbia and Singapore using quarterly data series under the assumption of unit income elasticity of demand. The explanatory variables were found to be significant factors in determining the domestic nominal interest rates in both countries. See IMF Staff Papers, September 1985.
5. Absence of quarterly GDP has prevented the use of quarterly data in the estimation of the equation in the Nigerian case. However, it appears that quarterly series are more appropriate because the model to be constructed attempts to capture the effect of monetary disequilibrium on interest rates. Annual data may not reflect most of these disequilibrium effects.

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