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Abstract

The Nigerian government deregulated the financial market in 1987 in line with the McKinnon-Shaw financial liberalization paradigm. However, the subsequent policy reversal after the introduction of the structural adjustment programme has made the effect of interest rate on aggregate commercial bank deposits (CBD) mobilized unclear. This study is based on the pioneering work of Egboro (2004) who initially examined the appropriateness of these policy summersaults with data ending in 1999. However, in this present study we re-estimated an interest elasticity model of commercial bank deposits in Nigeria by employing more recent data that captured subsequent changes in the nation's financial landscape. The econometric technique applied is the two-stage least squares (2SLS) regression method given that the system of simultaneous equations is over-identified. The Statistical Bulletin of the Central Bank of Nigeria constitutes the source of data. Inter alia, the findings indicate that there is an inverse and statistically significant relationship between CBD and deposit interest rates. This relationship is inelastic in the short-run but elastic in the long-run. One of the important implications of the study is that the McKinnon-Shaw financial liberalization paradigm for less developed countries does not hold in Nigeria. Therefore, it may be concluded that there is presently no scope to use the lure of higher deposit rates to significantly stimulate increased commercial bank deposits in Nigeria.

Key words: Commercial bank deposits, interest rate elasticity, financial liberalization, Nigeria
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I. Introduction

The need for savings mobilization and investment in the process of capital formation cannot be over-emphasized. Most economists agree that the most important limiting factor to the economic development of underdeveloped countries is the dearth of capital. Commercial bank deposits (CBD) constitute one of the important sources of savings generally available to the society. As noted in Jhingan (2007) the process of capital accumulation involves three steps: increase in the volume of real savings; mobilization of savings through financial and credit institutions and investment of savings.

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Prior to the introduction of the Structural Adjustment Programme (SAP) in Nigeria, the financial landscape was characterized by heavy financial repression symbolized by interest rate regulation and credit controls (Iyoha, (1996)). The argument was that the policy of interference resulted in various distortions in the domestic economy, which include financial disintermediation, capital flight, acquisition of hedges rather than financial assets and excessive aggregate demand. Ikpeze (1988) posits that all these distortions conspired to reduce economic growth.

Therefore, it was no surprise that the CBN deregulated the financial system with effect from August 1, 1987. In the amendment to the subsisting monetary policy, interest rate determination was subjected to market forces while credit controls were abolished. One of the most flaunted impacts of deregulation is the mobilization of societal savings and the efficient utilization of such resources in the promotion of economic growth through upward or appropriate market adjustment of real deposit and lending rates. However, with effect from 1st January, 1994, the policy was modified and interest rate deregulation was dropped. Some measure of regulation was re-introduced into the interest rate management because of wide variations and unnecessarily high rates observed during complete deregulation. Deposit rates were set at 12.15% per annum while a ceiling of 21% was fixed for lending (CBN, 1995). This marked the beginning of guided deregulation of interest rates in Nigeria.

McKinnon (1973) avers that an increase in the real rate of interest will induce the savers of less developed countries to save more, such as will enable more investment to take place. Is this hypothesis true in the case of Nigeria? Similarly, Shaw (1973) made a strong case for the removal of financial repression via an increase in the real rate of interest.

In a pioneering work, Egboro (2004) applied the elasticity concept in his model formulation, which embedded the variables that influence mobilization of CBD in Nigeria. As stated in the report, the framework can assist commercial banks, researchers and policy makers to predict the likely response of depositors to a change in the rate of interest. Using the 2SLS regression technique and quarterly data for the period 1986 -1999, he found that the lagged value of nominal interest rate, level of technology, banking habit, gross domestic product (GDP) and lagged value of aggregate CBD are the variables that determine the level of CBD mobilization in the Nigerian aggregate commercial banking system. All the variables, including interest rate exhibited positive signs and their coefficients were less than one in the short run i.e. inelastic. Calculations of the steady state elasticities showed that all the identified short run variables had positive signs with coefficients less than unity except the GDP variable whose coefficient was

greater than one. In other words, only the GDP variable showed an elastic tendency in CBD mobilization in the long-run. The implication is that, contrary to the postulation in McKinnon (1973) and Shaw (1973), an increase in the rate of interest does not impact positively on CBD mobilization; rather, it is the GDP variable that impacts positively or negatively on mobilization of CBD. As the finding is inconsistent with the McKinnon-Shaw financial liberalization paradigm for less developed countries, liberalization in Nigeria is desirable to the extent of facilitating financial market expansion and promoting competition, and is not the panacea to desired improvement in CBD or savings mobilization for investment.

Given the oscillatory nature of government policy in the Nigerian financial sector (from regulation to deregulation and back to regulation in the form of guided deregulation), the effect of interest rate variations on CBD mobilization requires further study. Hence, this study seeks to re-estimate an interest elasticity model of commercial bank deposits (CBD) in Nigeria.

The paper is divided into four sections. Following the introduction is section two, which dwells on the review of both theoretical and empirical literature while section three focuses on the methodology and data analysis. Section four concludes the paper.

II. Brief Review of Literature

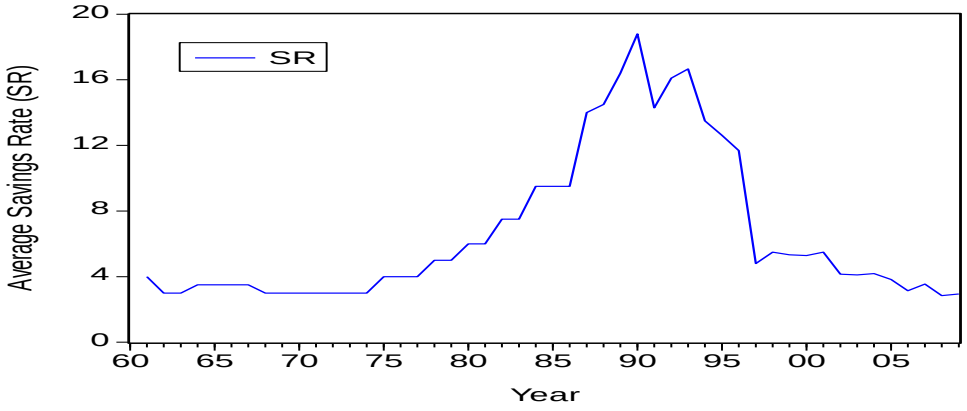
II.1 Trends in Deposit Rates and Growth of CBD in Nigeria

Soludo (2008) avers that rates are prices and must be right and attractive to reward depositors and encourage long-term savings. However, he observed that deposit rates are generally low, except for the period between 1986-1989 immediately following liberalization and the 1990-1995 period of banking sector distress.

Based on CBN (2009) Statistical Bulletin, Figure 1 shows the pattern of the average deposit (savings) rate in Nigeria from 1960 to 2009. Deposit rates were particularly low in the 1960s and 1970s as well as the first decade of the twenty first century. A 'hump" growth in commercial bank deposits rate stands out between 1987 and 1997.

The trend in commercial bank deposits (CBD) is depicted in Figure 2. Commercial bank deposits in nominal terms remained at a very low level from 1960 to 1990 with a gradual rise observed thereafter. An astronomic rise is noticeable from 2005 to 2009. This prodigious increase in CBD may be significantly linked to the banking sector reforms embarked upon by the Central Bank of Nigeria, especially the banks consolidation of 2005.

Figure 1: Average Savings (Deposit) Rate of Commercial Banks in Nigeria, 1960-2009 (percent)



When the nominal aggregate commercial banks deposit in the current year is expressed in terms of the implicit price deflator in order to take account of inflation, the real aggregate commercial banks deposits, RCBD trend, is as presented in Figure 3. Four distinct phases are observable: the stationary period of very low savings, 1960-1973; the gradual growth phase, 1974-1980; the modest phase, 1981-2005; and the astronomic deposit growth phase, 2006-2009. In terms of composition, Soludo (2008) noted that over 90% of the deposits mobilized by banks are short-term (0 to 365 days).

Figure 2: Aggregate Commercial Banks Deposits in Nigeria, ₦' Million, 1960-2009

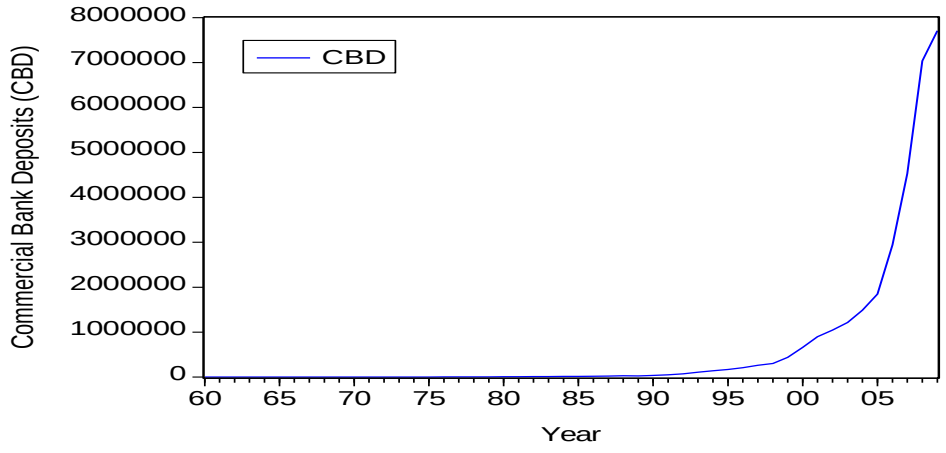
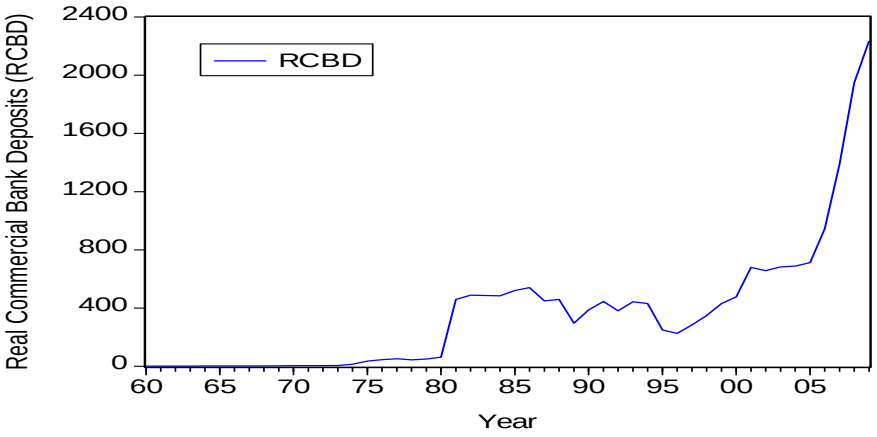


Figure 3: Aggregate Real Commercial Banks Deposits in Nigeria, ₦' Million, 1960-2009



II.2 Money Demand and Money Supply Theories

It has been postulated that savings deposit is a good proxy for money (see Akinnifesi and Phillips, (1978)), and that at equilibrium, the supply of savings deposit will equal its demand (see Egboro 2004). This review focuses on the supply side of savings deposit with a brief consideration for money demand.

Irvin Fisher, writing in 1911 indicated that money flows equals transactions flows, that is,

$$MV = PT \qquad (1)$$

where,

M = nominal quantity of money in circulation; V = transaction velocity of money

P = average price of transaction; T = number of transactions in a given time period

According to Glahe (1977), given the relevant constancy assumptions, the above Fisher's equation of exchange or identity can be transformed into the theory of price level determination;

$$P = \frac{MV}{T} \qquad (2)$$

The real money supply or real quantity of money in circulation m_s is represented by;

$$m_S = \frac{M_S}{P} = \left(\frac{1}{V}\right) * T \qquad (3)$$

But monetary equilibrium dictates that money supply equals money demand, $m_s = m_d$. Thus,

$$m_d = \frac{M_d}{P} = \left(\frac{1}{V}\right) * T \qquad (4)$$

With the advent of national income accounting, real national income replaces T and the average price of transactions became the implicit national income price index. Therefore, the demand for real quantity of money in terms of income transactions as against gross transactions can be written as;

$$m_d = \frac{M_d}{P} = \left(\frac{1}{V}\right) * Y \qquad (5)$$

The Cambridge cash-balance demand equation is structurally similar to equation 2, except that both equations are not theoretically equivalent as the economic line of reasoning differs in both (Glahe (1977) and Boorman and Havrilesky, (1972)). Keynes achieved further development of the Cambridge cash-balance demand theory. He asserts that the level of transaction and precautionary demand for money bear a stable relationship with income, while the speculative demand for money is a function of the rate of interest. Other important contributors to money demand theories after Keynes include Tobin, Baumol and Friedman.

Pratten (1985) explained that notes and coins are obviously money, and since the great majority of large transactions in the economy are settled by transferring claims on the banking system (by writing cheques), most measures of money include deposits in current accounts. Hence, in Nigeria, money supply has a narrow definition *(M_1)* and a wider or broad definition *(M_2)*. According to Anyanwu (1993), the narrow definition of money is:

$$M_1 = C + D \qquad (6)$$

where,

M_1 = narrow definition of money supply; C = currency outside bank; D = demand deposits

The broad definition of money is the sum of M_1, time deposits and savings, that is:

$$M_2 = C + D + T + S \qquad (7)$$

where,

M_2 = broad definition of money supply; T = time deposits; S = savings deposits

However, Ajayi and Ojo (1981) contend that money supply is determined by the behaviour of three economic factors. These include: the behaviour of banks concerning the amount of reserves that they decide to keep at any point in time; the behaviour of the non-bank public in dividing their money assets between currency and demand deposits; and the decision of the monetary authorities to change the size of high-power money as well as the right of the authorities to set the legal reserve ratio. Hence, the behaviour of the three factors above can be expressed via the multiplier using the narrow definition of money as follows:

$$M = C + D \quad (8)$$

$$C = cD \quad (9)$$

$$H = R + C \quad (10)$$

$$R = rD \quad (11)$$

where,

M = narrow money; C = currency outside banks; D = demand deposits; H = high-power money; R = reserves of the banking system; c = currency-deposit ratio; r = reserves-deposit ratio.

By substituting equations (9) and (11), equation (10) can be re-written as:

$$H = rD + cD = (r + c)D \quad (12)$$

$$D = H / (r + c) \quad (13)$$

By substituting (9) into (8),

$$M = (1 + c)D \quad (14)$$

Substituting equation (13) into (14), we have;

$$M = \left[(1 + c) / (r + c)\right] * H = kH \quad (15a)$$

where,

$$k = (1 + c) / (r + c) \quad (15b)$$

Equation (15b) links the money supply to what happens to the currency deposit ratio, the reserve ratio and high-power money. The economic importance of equation (15b) is better appreciated when it is written in linear form:

$$k = k(c, r) \tag{16}$$

To account for the change in the multiplier, we totally differentiate equation (16):

$$dk = k_1 dc + k_2 dr \tag{17}$$

where k_1 and k_2 denote partial derivatives of the multiplier k with regard to the arguments in (16). Partially differentiating equation (15b) and substituting its value into equation (17) will give;

$$dk = \frac{(r-1)dc}{(r+c)} - \frac{(1+c)dr}{(r+c)} \tag{18}$$

Equation (18) shows that a rise in the currency-deposit ratio, c, will lead to a distribution of assets against the banking system, that is, banks suffer a net loss of cash reserves. Similarly, a rise in bank reserve requirements reduces the potential ability of the banks to increase the money supply.

II.3 Economic Growth Models: The Role of Savings

Todaro and Smith (2009) observed that one of the principal strategies of development necessary for any take-off was the mobilization of domestic and foreign savings in order to

generate sufficient investment to accelerate economic growth. The economic mechanism by which more savings and more investment leads to more growth can be described in terms of the Harrod-Domar growth model, a simplified version of which is presented below:

$$\frac{\Delta Y}{Y} = \frac{s}{k} \tag{19}$$

where,

Y = national income; ΔY = change in national income; s = net savings ratio;

k = national capital-output ratio.

Equation (19) represents the famous Harrod-Domar theory of economic growth and it states that the rate of growth of GDP (ΔY/Y) is determined jointly by the net national savings ratio, *s* and the national capital-output ratio, *k*. More specifically, it states that the growth rate of national income will be directly related to the savings ratio (that is, the more an economy is able to save and invest out of a given GDP, the greater the growth of that GDP will be) and inversely related to the economy's capital-output ratio (that is, the higher the *k* is, the lower the rate of GDP growth will be).

Furthermore, to illustrate the role of savings in economic growth, a concise presentation of the Solow neoclassical growth model is given below, starting with a form of the Cobb-Douglas production function:

$$0\ y = Ak^{-\alpha} \qquad (20)$$

where,

y = output per worker; A = productivity of labour, which grows over time at an exogenous rate; k = capital per worker.

Equation (20) states that output per worker depends on the amount of capital per worker. Given that the labour force grows at rate *n* per year, capital per worker grows when savings are greater than what is required to equip new workers with the same amount of capital as existing workers have. Thus, the Solow equation may be written as;

$$\Delta k = sf\left(k\right) - \left(\delta + n\right)k \qquad (21)$$

This version of the Solow equation shows that the growth of *k* (capital deepening) depends on savings *sf(k)*, after allowing for the amount of capital needed to service depreciation, *δk*, and after capital widening, that is, providing the existing amount of capital per worker to net new workers joining the labour force, *nk* (Todaro and Smith, (2009)).

II.4 Financial Repression and Liberalization: The McKinnon-Shaw Hypothesis

The Mckinnon-Shaw financial repression paradigm opines that financial repression impact adversely on economic growth through high negative effect on the quality and quantity of real capital accumulation (McKinnon, (1973) and Shaw, (1973)). The three principal channels through which the hypothesized negative effect of financial repression works include: the Shaw's " debt intermediation hypothesis" which asserts that real deposit rates reduce financial deepening resulting in a shrinking in the volume of institutional credit; the McKinnon "complementarity hypothesis" which shows that the process of self-finance within enterprise is impaired because of low real yields on deposit; that low capital rates of interest produce bias in favour of current consumption as against future consumption resulting in lower aggregate saving and investment levels (see Athukoraia and Rajapatirana, (1993)).

The remedy for financial repression is implicit in the conceptual framework – financial liberalization and financial deregulation. This will involve keeping positive

and more uniformly high real rates of interest within comparable categories of bank deposits and loans by eliminating undue reserve requirements, interest ceilings and mandated credit allocations on the one hand while stabilizing the price level through appropriate macroeconomic measures on the other hand (Anyanwu, (1995)). However, the financial liberalization model has been severely attacked by the "Neo-Structuralists" development economists (see Van Wijnbergen, (1982) and Taylor, (1983), (1988)). Using a Keynesian adjustment mechanism, a mark-up pricing framework and a Tobin-type household portfolio model involving three assets (cash, bank deposits and loans in the unorganized money markets), the findings of these neo-structuralists cast doubt on the ability of high real interest rates to increase financial deepening and capital formation in developing countries.

Soyibo and Adekanye (1982) examined the impact of regulation and deregulation of the Nigerian banking system on the saving mobilization behaviour of Nigerians, using data generated between 1969 and 1989. Their model was a modified version of McKinnon as reported by Arrieta (1988). The findings of Soyibo and Adekanye reveal a weak support for the position that financial liberalization is a possible way of promoting savings in Nigeria. Also, the ex-post real interest rate is a significant determinant of savings. Anyanwu (1995) formulated his financial deepening function based on the theoretical framework of the McKinnon-Shaw financial liberalization paradigm. Employing data from 1960 to 1992, his findings show that interest rate deregulation did not positively affect financial deepening (increased savings mobilization) as predicted by the McKinnon-Shaw paradigm.

Aigbokhan (1995) applied Granger causality model to investigate the direction of relationship between real and financial sector reforms in Nigeria. His findings provide evidence to support the supply-leading hypothesis that financial development which envisages increase in the number of bank and bank offices promote "banking habit", liberalizes interest rates and tend to induce investment. Thus, financial development induces real sector growth.

Haron and Azmi (2006) studied deposit determinants of commercial banks in Malaysia. They found an inverse relationship between fixed deposit rates and the amount deposited by customers. According to the authors, a possible explanation for this occurrence is that in most cases upward trends in fixed deposit rates are made during the booming period when customers are exposed to other more rewarding investment opportunities, especially the unit trust schemes introduced by the government.

Kraft and Galac (2004) examined the experience of Croatia which liberalized its banking system in the early 1990s. Their research revealed an unusually high

connection between deposit rates and bank failures. The deposits mobilized were used to fund high risk assets, which eventually resulted in bank failures. They found that after the banking crisis, the financial terrain continued to be characterized by zero interest elasticity on deposits.

Mwega, et al (1990) tested the Mckinnon-Shaw hypothesis in relation to Kenya that an upward adjustment in real deposit rates significantly increases the private sector financial and non-financial savings. The results of their effort fail to support the Mckinnon-Shaw hypothesis, and instead find that the private saving rate and the real demand for money are non-significantly responsive to a representative deposit rate of interest.

Olubanjo, et al (2010) studied the interrelationship among interest rates, savings and investment in Nigeria. They employed two set of models – bivariate and simultaneous equation models. By using the two-stage least squares (2SLS) technique, results of the simultaneous equations system show that nominal deposit rate had a negative and statistically significant impact on gross national savings. Nwachukwu and Odigie (2009) employed error correction modeling procedure to determine what drives private savings in Nigeria. The findings indicate that saving rates (deposits mobilized) increases with both the growth rate of disposable income and the real interest rate on bank deposits.

Agrawal (2000) used panel data econometric method to study savings, investment and growth in five South Asian countries. The coefficient of real interest rate (deposit rate) was found to be positive but very small and not significant. Thus, their results support the notion that interest rates do not have much effect on savings.

III. Methodology, Data Analysis and Discussion of Findings

III.1 Model Specification

The model specification in this study draws from several theories of bank portfolio management and various empirical research works. The bank portfolio management theories, which suggest the basic explanatory variables in a CBD model, include the liquid asset theory, the commercial loan theory, the shiftability theory, the anticipated income

theory and the liability management theory Nwankwo (1999), Elliot (1984), Adekanye (1993) and Osofisan (1993).

For instance, the liability management theory assumes that increasing the interest rate (deposit rate) offered for funds will increase its supply and provide for liquidity needs. Commercial bank deposits form the bulwark of community savings and

from various macroeconomic models, savings is a function of income or GDP (see Sorensen and Whitta-Jacobsen (2010)). Thus, CBD is a function of deposit interest rate and GDP. Two other variables included in the CBD model – level of technology in the banking system, TEC and community banking habit, BH – are based on the concept of theoretical rationale (Labovitz and Hagedorn, (1976)).

Furthermore, the loanable funds theory views interest rate as a price, which is determined by supply of and demand for loanable funds. The major sources for the supply of loanable funds are savings (summarized principally in commercial bank deposits), while the major sources of the demand for loanable funds are investment demands. Movements in these two variables which are accentuated by the level of economic activities, determine changes in the interest rate. The described scenario (for the average deposit rate [DR] model) can be summarized by saying that deposit interest rate is a function of CBD, investment demand (loans and advances as proxy) and the level of economic activity of the community (real GDP as proxy).

Lewis (1955) hypothesized that as savings institutions are - pushed right under the individual's nose – people save more. Since community savings ultimately depends on income, the community banking habit, BH (number of banking institutions as proxy) is a function of income. Studies have shown that real GDP per capita, host country financial market and bank balance sheet conditions are determinants of bank expansion (see Fotopoulos, et al (2011) and Calcagnini, et al (1999)). Thus, in this study, BH is modeled as a function of real GDP and money supply (which affect both financial market conditions as well as bank balance sheet). Finally, the models incorporate some lagged variables under the partial adjustment framework (Iyoha (1976) and Gujarati (2009)). The complete double log specification of the simultaneous equations model is given below (see Koutsoyiannis (1977) and Elikwu (2010)):Type equation here.

$$LnCBD_t = \beta_0 + \beta_1 LnDR_t + \beta_2 LnTEC_t + \beta_3 LnBH_t + \beta_4 LnGDP_t + \beta_5 LnCBD_t(-1) + u_t \quad (22)$$

$$LnDR_t = \alpha_0 + \alpha_1 LnCBD_t + \alpha_2 LnVD_t + \alpha_3 LnGDP_T + \alpha_4 LnDR_t(-1) + w_t \quad (23)$$

$$LnBH_t = \lambda_0 + \lambda_1 GDP_t + \lambda_2 LnM_{2t} + z_t \quad (24)$$

Based on the eclectic theoretical approach reviewed earlier in this section, the *a priori* expectations for the model coefficients are: β_1, β_2, β_3, β_4, and β_5>0; a_1<0, a_2>0, a_3>0, a_4>0; λ_1>0, λ_2>0.

Where: CBD = commercial bank deposits; DR = average deposit rate; TEC = level of technology in the banking system (fixed assets as proxy); BH = banking habit of

the community (number of branches as proxy); GDP = real gross domestic product; CBD(-1) = one period lagged value of commercial bank deposits; VD = total investment demand (total loans and advances as proxy); DR(-1) = one period lagged value of average deposit rate; and M_2 = money supply (broadly defined); and u, v and z represent the stochastic disturbance terms.

All the three equations were subjected to both the order and rank conditions for identification:

(i) Order Condition

- In equation (22), K-M>G-1, that is, 3>2

  where; K = total number of variables in the system of equations, M = total number of variables in the particular equation, and G = number of equations in the system.

- In equation (23), K-M>G-1, that is, 4>2

- In equation (24), K-M>G-1, that is, 6>2

(ii) Rank Condition: The structural or behavioural equations were transformed into the following form;

$$-LnCBD_t + \beta_1 LnDR_t + \beta_2 LnBH_t + \beta_3 LnTEC_t + \beta_4 LnGDP_t + \beta_5 LnCBD_t(-1) + 0LnVD_t + 0LnDR_t(-1) + 0LnM_{2t} + u_t = 0 \quad (25)$$

$$\alpha_1 LnCBD_t - LnDR_t + 0LnBH_t + 0LnTEC_t + \alpha_3 LnGDP_t + 0LnCBD_t(-1) + \alpha_2 LnVD_t + \alpha_4 LnDR_t(-1) + 0LnM_{2t} + v_t = 0 \quad (26)$$

$$-0LnCBD_t + 0LnDR_t - LnBH_t + 0LnTEC_t + \lambda_1 GDP_t + 0LnCBD_t(-1) + 0LnVD_t + 0LnDR_t(-1) + LnM_{2t} + z_t = 0 \quad (27)$$

From the above transformation, the table of parameters can easily be constructed which shows that there are several non-zero determinants of order G-1. Thus, the rank condition is fulfilled and the system of equations is over-identified.

III.2 Estimation Technique

Given that the above system of equations is over-identified, the most appropriate analytical technique to employ to obtain unique statistical estimate of the parameters is the two-stage least squares (2SLS) regression method. The

technique requires the application of the ordinary least squares (OLS) procedure in two stages. In the first stage,

OLS is used to estimate the reduced form of all the equations in the model by regressing the dependent variables on all the predetermined variables. From this, the expected values of all the endogenous variables are obtained. In the second stage, each structural equation is estimated by OLS but the regressed values of the endogenous variables are used as instruments for the corresponding observed values while the predetermined or exogenous variables serve as their own instruments (Gujarati (2009) and Koutsoyiannis 1977)).

III.3 Sources of Data

The source of data for this study is the Statistical Bulletin of the Central Bank of Nigeria (CBN, 2008). Quarterly data spanning the period from 1986Q4 to 2008Q4 were employed in order to increase the sample size. This is because in large samples (as $n \rightarrow \infty$), the simultaneous equation bias tends to zero.

III.4 Data Analysis and Discussion

III.4.1 Presentation / Analysis of Results (2SLS Estimation)

In the first stage of the analysis, we obtained the reduced form parameter estimates of the endogenous variables:

Table 1: Dependent Variable : LnCBD

Variables	Coefficient	T-statistics	P-Value
Constant	-0.5200	-3.1795	0.021
LnTEC	-0.1393	-2.9919	0.0037
LnGDP	-0.0861	-3.1886	0.0020
LnCBD(-1)	0.4979	6.0015	0.0000
LnVD	0.1554	2.9459	0.0042
LnDR (-1)	-0.0525	-1.9399	0.0559
LnM2	0.5915	7.2135	0.0000
R^2 (Adjusted)	0.9993	**DW**	1.3156
F-stat	20925.10	**Prob (F)**	0.0000

Table 2: Dependent Variable : LnDR			
Variables	**Coefficient**	**T-statistics**	**P-Value**
Constant	0.5739	1.8507	0.0679
LnTEC	-0.0434	-0.4911	0.6247
LnGDP	-0.0980	-1.9141	0.0591
LnCBD(-1)	-0.0477	-3033	0.7625
LnVD	-0.0405	-0.4051	0.6865
LnDR (-1)	0.8698	16.9402	0.0000
LnM2	0.1934	1.2443	0.2170
R^2 (Adjusted)	0.9816	**DW**	1.2116
F-stat	773.5617	**Prob (F)**	0.0000

Table 3: Dependent Variable : LnBH			
Variables	**Coefficient**	**T-statistics**	**P-Value**
Constant	4.4128	12.2548	0.0000
LnTEC	-0.0909	-0.8841	0.3777
LnGDP	0.0436	0.7339	0.4651
LnCBD(-1)	0.0269	0.1474	0.8832
LnVD	0.1101	0.9484	0.3457
LnDR (-1)	0.2238	3.7539	0.0030
LnM2	0.1260	0.6979	0.4872
R^2 (Adjusted)	0.8452	**DW**	0.1746
F-stat	80.1573	**Prob (F)**	0.0000

The results of the second stage estimation using the newly generated instrumental variables provide the following unbiased estimates:

Table 4: Dependent Variable : LnCBD			
Variables	**Coefficient**	**T-statistics**	**P-Value**
Constant	-7.4143	-3.1202	0.0025
LnTEC	0.0231	0.4345	0.6658
LnGDP	-0.1073	-2.2630	0.0263
LnCBD(-1)	0.7423	0.0990	0.0000
LnDR Hat	-0.3767	-2.9000	0.0048
LnBH Hat	1.6204	3.0695	0.0029
R^2 (Adjusted)	0.998990	**DW**	1.8804
F-stat	17208.83	**Prob (F)**	0.0000

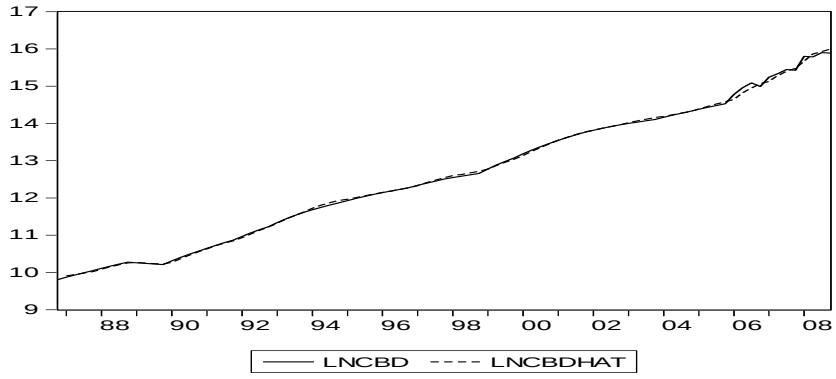
Table 5: Dependent Variable : LnDR			
Variables	**Coefficient**	**T-statistics**	**P-Value**
Constant	0.7398	2.7293	0.0077
LnCBD Hat	0.1353	1.7390	0.0857
LnVD	-0.1063	-1.2647	0.2095
LnGDP	-0.0704	-2.2705	0.0258
LnDR(-1)	0.8853	18.7907	0.0000
R^2 (Adjusted)	0.9819	**DW**	1.2373
F-stat	1180.178	**Prob (F)**	0.0000

Table 6: Dependent Variable : LnBH			
Variables	**Coefficient**	**T-statistics**	**P-Value**
Constant	5.9375	59.9916	0.0000
LnGDP	0.0209	0.4273	0.6702
LnM2	0.1219	2.3563	0.0207
R^2 (Adjusted)	0.8133	**DW**	0.1088
F-stat	192.7134	**Prob (F)**	0.0000

The parameter estimates and other statistics including the DW statistic bear some resemblance to results from simultaneous equations system in other studies (for instance, see Olofin et al (2009)). However, in line with the objectives of this paper, our dominant attention is on the regression results in Table 4 that relates to the commercial bank deposits (LnCBD)

The regression results presented in Table 4 provides good and unbiased estimates of the determinants of commercial bank deposits in Nigeria. R^2 (adjusted) is the adjusted coefficient of multiple determination; and DW is the calculated Durbin-Watson statistic. The t-statistics and p-values are displayed in the relevant columns. The overall explanatory power of the CBD equation is quite good as shown by the level of significance of the F statistic (1% critical value). The regressors in the CBD equation (Table 4) explain 99.9% of the variability in the levels of CBD. Figure 4 illustrates the excellent and positive co-variation between the actual and fitted values of CBD.

Figure 4: Actual and Fitted Values of CBD



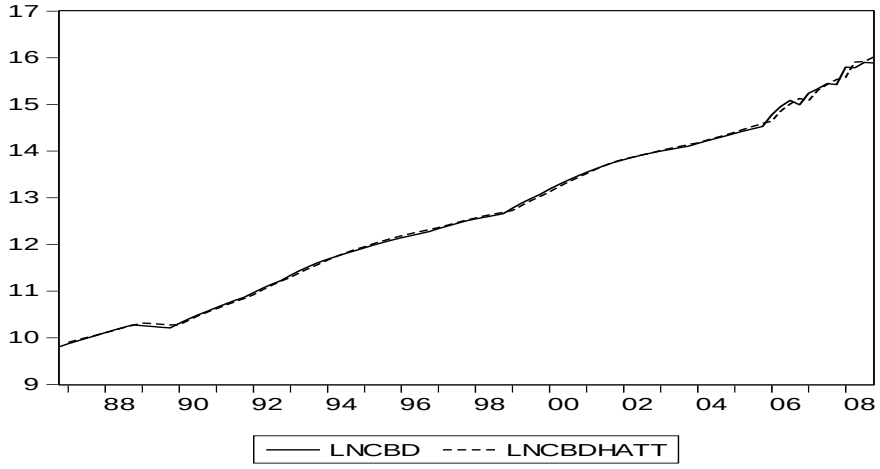
The coefficients of three explanatory variables, namely, deposit rate, banking habit of the community and the one period lagged value of CBD were found to be statistically significant at the 1% level while that of the real gross domestic product is statistically different from zero at the 5% level. Only the parameter for the level of technology is statistically insignificant, even at the 10% level. The positive a priori expectations for the banking habit (BH) and the one period lagged value of CBD variables were realized while the other variables, that is, deposit rate and real gross domestic product (GDP) had negative signs contrary a priori expectations. The DW statistic, which is 1.8804, shows the absence of serial correlation.

Furthermore, in order to obtain a more parsimonious model, the level of technology variable was dropped in the subsequent regression and the result is presented in table 7. The actual and fitted values of commercial bank deposits (CBD) with respect to the parsimonious model are shown in Figure 5 below. Again, we observe an excellent fit between the actual and predicted values of CBD.

Table 7: Dependent Variable : LnCBD

Variables	Coefficient	T-statistics	P-Value
Constant	-7.0940	-3.1566	0.0022
LnDR Hat	-0.3656	-2.8850	0.0050
LnBH Hat	1.5468	3.1099	0.0026
LnGDP	-0.0944	-2.5644	0.012
LnCBD(-1)	0.7669	9.4970	0.0000
R^2 (Adjusted)	0.9990	**DW**	1.9267
F-stat	21723.53	**Prob (F)**	0.0000

Figure 5: Actual and Fitted Values of CBD (Parsimonious model)



Generally, the parsimonious model as represented in table 7 produced superior results in comparison to those contained in table 4 as all the explanatory variables were found to be statistically different from zero. The DW statistic is closer to the ideal level of 2 (a clear indication of the absence of serial correlation), the F statistic is better, the R^2 (adjusted) is higher and the coefficients of the regressors are more statistically significant.

Besides, we estimated the long-run elasticities of the determinants of commercial bank deposits in Nigeria. The variables in table 7 are in logarithmic form; hence the parameter estimates represent the short-term elasticities. This is the case for models that can be expressed in the form of an adjustment equation (see Greene (2003)), which are summarized in Table 8.

Table 8: Short-Run Elasticity Coefficients of CBD Model

DR	-0.3656
BH	1.5468
GDP	-0.0944

The next step is to calculate the long-run steady state elasticities to measure the effect of sustained changes of explanatory variables on the dependent variable, CBD. This was done by allowing the value of the endogenous variable to be stationary (that is, set {LnCBD = LnCBD (-1)} and solve the expression, $\alpha/1-\beta$. The above procedure is clearly explained in Iyoha (2004). A further substantiation is found in Green (2003). Additionally, Hughes, Knittel and Sperling (2008) in their

simultaneous equations-based study averred that the fully adjusted coefficients – steady state – are generally interpreted as long-run elasticities in the literature.

Thus,

$$LnCBD - 0.7669LnCBD(-1) = -7.0940 - 0.3656LnDRHat + 1.5468LnBHHat - 0.0944LnGDP \quad (28)$$

Therefore,

$$0.2331LnCBD = -7.0940 - 0.3656LnDRHat + 1.5468LnBHHat - 0.0944LnGDP \quad (29)$$

Divide both sides of equation (29) by 0.2331, we have:

$$LnCBD = -30.4333 - 1.5684LnDRHat + 6.6358LnBHHat - 0.4050LnGDP \quad (30)$$

where LnCBD = steady state natural logarithm of CBD

The coefficient of the explanatory variables in Equation (30) in its logarithmic form represent the long-run steady-state elasticities which shows the effects of sustained changes in the regressors on CBD. The variables and their relative steady-state elasticity coefficients are summarized in Table 9.

Table 9: Long-Run Elasticities of the CBD Model

DR	-1.5684
BH	6.6358
GDP	-0.4050

The resulting postulations from the above analysis can be summarized in the following representations:

(a) Short-Run Equation;

$$CBD = f\{DR, BH, GDP, CBD(-1)\} \quad (31)$$

$f_1<0$, $f_2>1$, $f_3<0$, $f_4>0$,

(b) Long-Run Equation;

$$CBD = f\{DR, BH, GDP\} \quad (32)$$

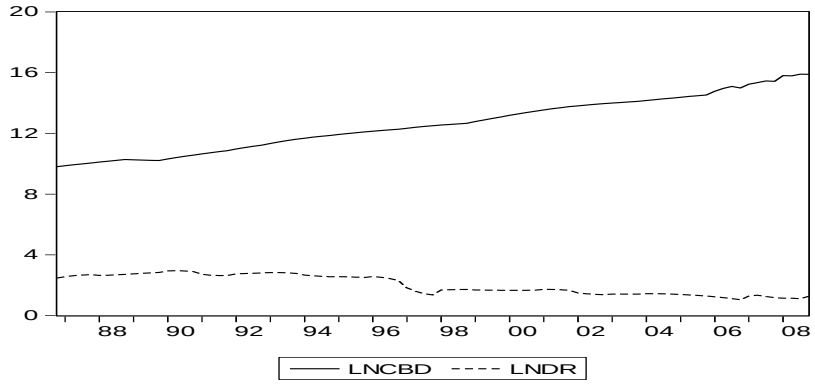
$f_1<0, f_2>1, f_3<0$

The results in these equations are the basis for the ensuing discussion in the section that follows.

III.4.2 Discussion of Results

The results of this study have tended to defy a priori expectations that high interest rates on deposits will lead to commensurate high commercial bank deposits as the above analysis resulted in a negative sign for the interest elasticity coefficient. The model employed in this study adequately captures the general behaviour and response of Nigerian depositors to changes in deposit interest rates over time. The explanation for this deviation from theoretical postulation is due to institutional failures and hence, it becomes difficult to use interest rate as a reliable predictor of deposit mobilization of commercial banks in Nigeria since there is no valid evidence to link the growth in commercial bank deposits over time to changes in the rate of interest. Figure 6 is a plot of the actual time series data, and the diagram clearly portrays the negative relationship between commercial bank deposits and interest rates.

Figure 6: Actual Plot of LnCBD and LnDR Time Series Data



The outcome of this work differs significantly from the findings in Egboro (2004). In the previous work, Egboro employed the one-period lag of deposit interest rate on savings as a regressor in the CBD equation and found that the coefficient of interest rate possessed the a priori positive sign but not statistically significant even at the 10% level. In this revised study, the deposit rate is not only statistically significant at the 1% level but possess a negative sign, which agrees with empirical reality as shown in Figure 6. Furthermore, our findings run contrary to the financial liberalization paradigm of Mckinnon (1973) and Shaw (1973) who stated expressly that the higher the real interest rate, the greater will be the

accumulation of money balances and the larger will be the inducement to invest. However, this study agrees with the empirical analysis undertaken by Anyanwu (1995) who found that for the period between 1960 and 1992, interest rate deregulation did not positively affect financial deepening in Nigeria as predicted by Mckinnon and Shaw.

Additionally, the inverse relationship between CBD and deposit rate is in consonance with the findings of Soyibo and Adekanye (1992) who sought to validate the McKinnon-Shaw hypothesis using Nigerian Data. They found that the interest rate in their savings equation was not significant and it had a wrong sign. Furthermore, Olubanjo et al (2010) also found an inverse relationship between gross national savings and nominal deposit rate (see Haron and Azmi, (2006) for a similar case in Malaysia). However, our study differs from that of Soyibo and Adekanye in that the elasticity coefficient of the deposit interest rate in the present study, though negative, is statistically significant. Nnanna (2003) averred that the role of real interest rate as a determinant of savings is ambiguous in the literature, especially in developing countries.

The inelastic (short run) and negative relationship between interest rate and CBD gives the general impression that on the average, suppliers of deposits to commercial banks are rational and they possess individual and distinct utility maximizing preferences. Put differently, the rate of return on CBD does not constitute the sole criterion for the placement of deposits. All the conditions for the maximization of a consumer's (depositor's) satisfaction are contained in his utility function (Henderson and Quandt, (1980); also see Pearce (1983) and Muth (1961)).

Viewed in this way, bank depositors can be classified into three categories, namely: risk seekers, risk averters and indifferent depositors. On the one hand, the risk seekers exhibit a preference for high returns on deposits and seek to patronize new generation banks that flaunt high deposit interest rates, especially in the 1990s. On the other hand, the risk averters and indifference depositors are made up of customers who are more interested in the safety of their deposits and tend to be indifferent to rates of returns on bank deposits. The latter group constitutes the bulk of depositors in Nigeria and they place their deposits with the older generation banks who capitalize on their good will and oligopolistic structure to keep deposit rates very low and thus, reap abnormal profits. The above trend was forced on the nation's banking public by the massive and monumental bank failures in colonial Nigeria and the unprecedented bank failures / distress of the 1990s and beyond in post-independent Nigeria (see Rapu (2004) and CBN 1995)). Additionally, institutional failures have been greatly aggravated by the weak supervisory and regulatory framework of monetary authorities.

Another major finding of this study is the existence of a significant and positive relationship between the two variables – commercial bank deposit and banking habit, which is proxied by the prevalence and number of bank offices and branches. Thus, increased savings or deposits are significantly correlated with the growth in the nation's branch network.

Additionally, both the short and long run elasticities of the banking habit variable are greater than unity and this shows that there is a high degree of responsiveness of aggregate deposit mobilization to bank network expansion. This finding is in harmony with the assertion of Lewis (1955) that as savings institutions are pushed right under the individual's nose, people will save more. This postulation has been given impetus by the supply following hypothesis which states that development and expansion of the financial sector precedes the demand for its services. The financial sector mobilizes and channels resources from savers to investors and thereby induces real sector growth (Porter (1936); Mckinnon (1973) and Shaw (1973)).

Moreover, the positive and statistically significant coefficients of the lagged value of the CBD variable is supported by the postulations in Koyck's distributed lagged model (see Koyck (1954) and Koutsoyiannis (1977)). In addition, Iyoha (1976) observes that the distributed lag model demonstrates that habit persistence is characteristic of human behaviour and that the existence of lagged adjustment may be explained by the prevalence of institutional inertia and / or a positive cost of adjustment.

Furthermore, the coefficient of the real GDP variable was found not only to be inelastic but possessed a negative sign contrary to *a priori* expectation (actual data plot showed a positive relationship between CBD and real GDP variables). This discrepancy might be due to some form of interaction between the real GDP and DR variables. Consequently, by way of future studies, we suggest that consideration may be given to a model formulation that takes the interaction amongst all variables into account through higher order polynomials (see McClave and Benson (1988)).

IV. Conclusion

The paper evaluated the determinants of aggregate commercial bank deposits (CBD) in Nigeria. A number of findings emanated from the study. First, there exist a statistically significant but inverse relationship between the deposits mobilized by commercial banks and the interest rates on deposits. Second, the aforementioned relationship is inelastic in

the short-run but elastic in the long-run. Third, there is a significant and direct relationship between the banking habit of the community as proxied by the number of banking institutions/branches and mobilized bank deposits. Moreover, this relationship was found to be elastic both in the short-run and in the long- run.

The inverse relationship between the level of commercial bank deposits and savings rate can simply be interpreted to mean that over time during the period covered by the study, falling deposit rates were increasingly associated with higher levels of CBD. The basic reasons behind this finding have to do with institutional failures that have greatly eroded the confidence of the Nigerian banking public coupled with the increasing oligopolistic structure of the banks.

One of the important implications of the study is that contrary to the postulation in McKinnon (1973) and Shaw (1973), an increase in the savings rate of interest has no positive impact on CBD mobilization. As the finding is inconsistent with the McKinnon-Shaw financial liberalization paradigm for less developed countries, liberalization in Nigeria is desirable to the extent of facilitating financial market expansion and promoting competition, and is not the panacea to desired improvement in CBD or savings mobilization for investment. Therefore, unless something is done to redress the situation, it may be concluded that there is presently no scope to use the lure of higher deposit rates to significantly stimulate increased commercial bank deposits in Nigeria.

A second implication of the study is that given a scenario of increasingly higher levels of CBD or liquidity in the banking system with falling deposit rates, it is needless for the Central Bank of Nigeria (CBN) to reduce the monetary policy rate or discount rate if decisions were made on the basis of interest rate on deposits. This is because a reduction in the discount rate will lead to a fall in the lending rates charged by commercial banks. As Anyanwu (1993) noted, reduction in the interest rates will result in attractive borrowing or low cost of borrowing, and hence an expansion in liquidity, investment, and aggregate demand. Eventually, the problem of inflation will be aggravated.

In order to expand aggregate commercial bank deposits in Nigeria, we recommend that the apex monetary authorities should embark on appropriate measures to defuse savers' apathy or indifferent attitude vis-a vis changes in deposit rates by providing a sustainable sound and safe banking environment. Additionally, the branch network of commercial banks in the country should be further expanded in order to encourage banking habit and increase savings. The findings of this work show that a significant positive relationship exists between the banking habit of the community as proxied by the number of banking institutions and mobilized bank deposits.

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