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Some Causative Factors in Bank Deposit Supply Model in Nigeria: A Co-Integration Analysis

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ABSTRACT

In this study, we examined some of the factors that influence the commercial bank deposit supply behaviour in Nigeria. Specifically, we examined the impact of deposit interest rate, foreign exchange rate, Treasury bill rate and Growth rate of Gross Domestic Product on the deposit output behaviour of commercial banks. We identified these variables as suggested by theory in specifying a functional form. Using the technique of co-integration, we were able to conclude that deposit interest rate, foreign exchange rate; Gross Domestic Product influenced the behaviour of commercial banks in their effort at mobilizing deposit for investment in the country. This conclusion shed light on the recommendation made.

INTRODUCTION

The basic objective of this study is to examine using the technique of co-integration the impact of deposit interest rate, Treasury bill rate, Foreign Exchange rate and growth rate of Gross Domestic Product on the commercial bank deposit supply in Nigeria. The ability of the commercial bank to mobilize deposit for investment is crucial to the development of the economy. In this aspect, there are two sides to a given financial intermediation process of the commercial banks, thus, the inflow and the outflow sides. The inflow side forms the focus of this study. This aspect of intermediation is concerned with the activities involved in mobilizing funds from the surplus agents in the economy. In this area, commercial banks carry out the depository or treasury functions by generating deposit of various types and magnitudes from depositors and paying agreed interest amount on the various deposit.

The creditable performance of this intermediate function is believed by researchers to affect the overall performance of the economy in terms of aggregate output, for details see Udegbunam (1992). For instance efficient lending and investment operations by commercial banks would cause growth in the country's Gross Domestic Product (GDP). Similarly, the mobilization

of excess funds and deposit from surplus economic units would pool resources and make them ready for gainful allocation in the economy. Thus, what the banks lend or invest will be a function of what they (banks) mobilized in the inflow side intermediation function. Invariably, a country's output performance must depend on the general intermediation performance of the banks. In other words, a country's output performance must depend on the general fund mobilization behaviour of the commercial banks.

An obvious implication of this intermediation process is that development and forces at play in a country's money market, such as, the borrowing and lending of funds and sale and purchase of treasury Bill and Foreign Exchange Market, such as the demand and supply of Foreign Exchange and the socio-political climate such as the growth of Gross Domestic Product (GDP) influence commercial bank's performance in their ability to mobilize funds. In addition to these conditions commercial bank, exhibit such attitudes that are consistent with aggressive marketing, profit maximization and prudential behaviour in their effort in mobilizing deposit.

In the light of the above survey, this paper is structured accordingly for easy comprehension. Following this introduction in section I is the literature Review. Section III presents the methodology, while section IIV presents the Empirical Analysis. Finally, section V concludes the study.

LITERATURE REVIEW

The level of the deposit is postulated to depend on the rate of interest paid on each type of deposit and other macroeconomic factors. A notable factor that affects the ability of economic agents to save and hence the level of deposits among the financial institutions, is the disposable income of economic agents. Disposable income is the reminder of the income after subtracting tax from net income. A proxy for the income of economic agents in a country is the per-capita income. By implication, the income tax rate prevailing in the country is also an important factor of influence. Perhaps a much more influencing factor in the real taxes as argued in Ezirim (1999) is the withholding tax on interest rate paid by banks to their depositors. It is reasoned that high withholding tax rates reduce the willingness of relevant agents in depositing money with banks. Economic units are naturally averse to taxation generally. Apart from these, it is postulated that the aggregate level of economic activity (that is, the GDP) which determines the standard of living and welfare of the citizenry would go a long way to determining the ability of economic units to make deposit with the financial institutions. A buoyant economy with high GDP has a promise of boosting deposits than a poor one. If the level of economic activity grows, it is expected that savings would generally grow. Ajakaiye and Odusola (1995) advance the ratio of foreign saving to GDP as an important variable posing an influence on the level of financial savings. In as much as we recognize the huge leakages in an economy like Nigeria by way of the activities of economic looters (and

paradoxixally, genuine foreign investors to other economics), it is the thinking that it is difficult to measure this variable. It is, however, believed that a positive force attracting these Nigerian investors to the foreign economy is proxy by the strength of their currency. The relationship between Nigeria's local currency and the foreign currency is defined as the exchange rate. By implication, the Foreign Exchange rate prevailing in the country becomes a factor of influence on the level of deposits generated by the financial superstructure.

Alasia's (2003) study supported the position that the lending rate of interest, money market rate (treasury bill rate) and the prevailing socio-political trends in the country should be incorporated in the deposit model. According to Alasia (2003) a more encompassing model can be specified to incorporate many more factors such as institutional ratio, institutional habit and institutional deposits.

Studies on the effects of environmental factors on financial intermediation by financial institutions have shown that the application of the ratio of deposit to output as regressand in typical financial intermediation models have yielded more consistent and reliable estimates than other regressands. A previous consideration in defining the dependent variable of the supply side models earlier developed rates such as total deposits to the total national savings of the country. It was basically an attempt at determining the commercial banks' share of aggregate national savings. The essence of the intermediation activities of financial institutions, savings mobilization inclusive is to positively and significantly impact on macroeconomic magnitudes such as aggregate output for the ultimate growth and development of the economy on this much has been argued in Ojo (1984), Odedokun (1987), Ezirim and Emenyonu (1997) and Ezirim (1999, 2003). Thus commercial banks' intermediation activities must be related to aggregate output or other economic indicators as the case may be.

METHODOLOGY:

Sources of Secondary Data

It is important to describe the data used for the estimation before presenting and discussing the results. Data relating to total deposits of commercial bank; time, savings, and total deposits of commercial banks; average deposit rates of interest of commercial bank, average dollar/naira exchange rates and treasury bills rates were sourced from the Central Bank of Nigeria Statistical Bulletin and Annual Reports and Statement from the Accounts for various years.

Theoretical Consideration and Model Specification

In theory, a wide range of factors has been used to explain the behaviour of bank deposits supply models. Some are universal, while others are peculiar to

the peculiarity of the country. Again, some factors or determinants are clearly defined in their relation with bank deposit supply model, while others are ambiguous. In order to properly model bank deposit supply determinants, it is important to sift the factors to conform to the prevailing economic conditions of the environment. It is in the light of this, we identify the following determinants of bank deposit supply model.

(a) Deposit Rate of Interest (DRI)
(b) Treasury Bill Rate (TBR)
(c) Exchange Rate (FER)
(d) Gross Deposit Product (GDP)

The choice of these determinants is basically data availabilities. The lists might be more. The relationship between bank deposit and deposit interest rate is expected to be direct. Since an increase in bank deposit interest rate will lead to an increase in total deposit of the bank (time deposit and saving deposit). This relationship is evident in the work of cookery (1997) Ezirim, Emenyonu and Tanoglalu (2002). The relationship between Treasury Bill Rate and deposit supply is ambiguous. In the first instance an increase in Treasury Bill Rate might encourage holder of such bill to sell their holding, thereby leading to an increase in bank deposit. In another view, when the treasury bills rate increases, it is natural for banks to increase their holding by buying more, thereby leading to a fall in bank deposit output ratio, for details on this see, Udegburam 1992.

Exchange rate and bank deposit are expected to be ambiguously related. First, an increase in Exchange Rate will lead to an increase in total deposit of the banking sector. In another view, since banks are key players in the Foreign Exchange Market, to maximized profit, banks reduces their deposit at higher rates of foreign exchange. This relationship is well established in the works of Oaikhenan and Edo (2000). Gross Domestic Product is expected to be directly related to bank deposit. Increased GDP shows a good performance of the economy. An increase in GDP, will lead to an increase in bank deposit in an environment where banking practices are well institutionalized.

We can put this relationship in a theoretical framework or in a model form as follows:

$$SDt = f(DRI, TBR, FER, RGDP) \quad \text{.....(1)}$$
$$TDt = f(DRI, TBR, FER, RGDP) \quad \text{.....(2)}$$
$$TTDt = f(DRI, TBR, FER, RGDP) \quad \text{.....(3)}$$

Where

SDT is saving deposit output ratio, which is the ratio of savings to GDP.

DRI is deposit rate of interest

TBR is Treasury bill rate

FER if foreign exchange rate

RGDP is growth rate of GDP in the economy. This is the usual measure of the effect of economic factors to total deposit output.

TDt is the time deposit output ratio, which the ratio of time deposits

to GDP.

TTDt is total deposit output ratio of commercial bank that is the ratio of total deposit to GDP.

Equations 1 to 3 are bank's deposit supply models, which are stated in non-linear from determined by four variables already defined. We can transform these equations into log linear expression (Ln) to facilitate easy estimation. We introduced lagged variables to indicate that the model is in a continuous process of adjustment and finally we incorporate an error term which is common to all econometric models, given that by their nature, they are non-deterministic. Thus Equation 1 to 3 can be restated as follows

(4) $\text{Ln SDT} = \text{Lna}_0 + a_1\text{LnDRI} + a_2\text{LnTBR} + a_3\text{LnFER} + a_4\text{LnRGDP} + a_5\text{LnSDt-1} + \text{At}$

(5) $\text{LnTDt} = \text{Lnb}_0 + b_1\text{LnDRI} + b_2\text{LnTBR} + b_3\text{LnFER} + b_4\text{LnRGDP} + b_5\text{LnTDt-1} + \text{Bt}$

(6) $\text{LnTTDt} = \text{Lnc}_0 + c_1\text{LnDRI} + c_2\text{LnTBR} + c_3\text{LnFER} + c_4\text{LnRGDP} + c_5\text{LnTTDt-1} + \text{Ct}$

The apiori or presumptive signs are:

$A_5, b_5, c_5, a_4, c_4, a_1, b_1, c_1, > 0$; $a_2, b_2, c_2 \lessgtr 0$; $a_3, b_3, c_3, \lessgtr 0$; At Bt and Ct are all error term of equation 4, 5 and 6. They are expected equal to zero.

Technique of Analysis

The techniques of Analysis of investigation are in three stages. Firstly, the annual time series data of all the variables in the model are tested for stationarity. The reason being that the regression of two non-stationary series on each other possesses the potential of yielding spurious results. According to Engle and Granger (1987), the parameter estimates from such regression may be biased and inconsistent. We utilize the Augmented Dickey-Fuller (ADF) test proposed by Dickey and fuller (1981) in testing for unit root in their study. This is the standard method of investigating the stationarity of time series. Secondly, the variables are tested for co-integration to ascertain their convergence status. This is because variable that fail to converge in the long-run may be hazardous for policy making. The ADF test is also applied in this respect. Thirdly, the estimation of the model is done to examine the impact of the explanatory variable in facilitating bank deposit output supply in Nigeria. The estimation is carried out using the ordinary least square (OLS) technique, which is regarded as the Best Linear Unbiased Estimator (BLUE) that can be used in examining model of this nature (Gujarati 2002). This estimation is carried out on the condition that the variables possess the properties of stationarity and convergence.

The investigation span the period 1986 to 2006 (20years), which present a considerable degree of freedom that is necessary to appropriately capture the net effect of the explanatory variable on bank deposit output model, and the period 1986 was when market deregulated rates started.

Empirical Analysis of Result

Stationarity Test: - the ADF test for stationarity in the time series data of variable in the model was conducted and this yield results reported in Table 1.

Table 1: Stationarity Test Result (ADF)

Variable	Unit root coefficient	t-statistic	Normalized bias stat	Serial G(1)	Correlation G(2)
TTDt	0.33	1.34	3.81	0.03	0.05
SDt	0.50	2.11*	5.52*	0.04	0.07
SDt	0.22	1.24	2.23	0.02	0.09
DRI	0.51	2.12*	6.11*	0.03	0.10
TBR	0.41	1.27	3.91	0.06	0.08
FER	0.56	2.14*	6.61*	0.04	0.11
GDP	0.63	3.74*	14.02*	0.01	0.12
ΔTTDt	0.51	2.12*	6.11*	0.10	0.14
ΔSDt	0.67	3.68**	14.58**	0.12	0.15
ΔTDt	0.59	2.20*	8.5*	0.09	0.15
ΔDRI	0.78	3.78**	15.02**	0.06	0.16
ΔTBR	0.80	4.12**	17.12**	0.04	0.18
ΔFER	0.53	2.14*	6.12*	0.03	0.19
ΔGDP	0.65	3.65**	14.38**	0.12	0.21

* Mean significant at 5 percent

** Mean significant at 1 percent

Δ Means the first different. G(1) and(2) are Godfrey statistic that test for the first and second order serial correlation in residual respectively.

From table 1, it shows that some variables are stationary at level because their t-statistics and normalized bias statistics indicate that they have unit root coefficients, which are significant at the 5 percent level. The whole variables are stationary in the first difference as shown by the test instruments. Godfrey statistics indicate insignificant serial correlation, which make the test result highly dependable. It follows, therefore that all variables in the model are either stationary at level or first difference. Co-Integration Test:- We applied ADF test to test for long-run convergence of variables. The results are presented below in table II.

Table 2: Co-integration test Results (ADF)

Dependent variables	Variables	Coefficient	t-stat.	Serial stat. G(1)	Correlation G)2(
TTDt	DRI	0.08	3.00**	0.21	0.39
	TBR	0.14	5.01**	0.33	0.47
	FER	0.10	2.36*	0.50	0.83
	GDP	0.07	2.56*	0.19	0.41
SDt	DRI	0.10	3.50**	0.22	0.36
	TBR	0.12	4.03**	0.32	0.46
	FER	0.07	2.26*	0.12	0.35
	GDP	0.09	3.70**	0.41	0.71
TDt	DRI	0.08	3.65**	0.36	0.47
	TBR	0.15	5.12**	0.28	0.39
	FER	0.09	2.26*	0.41	0.59
	GDP	0.08	3.06**	0.62	0.83

* Mean, 5 percent and ** Mean, 1 percent significant levels.

The unit root coefficient in table II are all significant at 1 percent or 5 percent level as indicated by the t-statistics. This implies that all the explanatory variables in the model co-integrate with their dependent variables. In other words, they possess the characteristics that would cause them to converge in the long-run.

Since stationarity and convergence status are attained, we entered the model

for estimation in levels or first difference form. Model Estimation:- From table 3, An analysis of the results shows that the estimated equation was largely satisfactory both interms of the signs and statistical significance of the explanatory variables. For example, we noted that deposit interest variable is positive; this confirms the presumptive sign or apriori signs. This positive sign can be explained by the fact that, when deposit interest rate increase, it encourage depositor of fund to increase their funds. This is more prominent in the time deposit of commercial bank as the elasticity tends to be more elastic. In other word, a percentage change in interest rate lead to more than 1.56 percent change in deposit mobilization for this account. Interestingly, in addition to being correctly signed, this variable passed the significant test at 5 percent level.

From this empirical analysis is shown that an increase in Treasury Bill Rate will lead to an increase in the total deposit account of the banks as depositors now sell their bills for a higher profit. Although the significant level is 10 percent and the elasticity is very low, it however, indicates that banks can effectively use this means to increase their deposit mobilization bid. We note from the results that the Foreign Exchange variable appeared with a negative sign that shows that at higher rate of foreign Exchange, banks reduce their deposit. This behaviour is as aspect of the profit maximization motive of the banks. Again, interestingly, the relationship is highly significant at 1 percent level and the elasticity is very high. This shows that a percentage increase in Foreign Exchange will lead to 5.2 percent reduction in total deposit.

The results show too that the level of economic activities in the country (proxies by the RGDP) impacted positively and significantly on the total deposit of the banks. The level of significant is 1 percent, which is highly significant. The lagged values of all the variables are correctly signed and significant. The diagnostic tests obtained from our regression are quite impressive. For example, the R square and adjusted R square ranges from 76 percent to 90 percent in the entire model. The F-statistics are all in their conventional levels. Apart from the saving deposit account, the Durbin-watson statistics shows an absence of auto correlation in all the models.

Table 3: Model Estimation Results.

Dependent variables	Explanatory variables	Coefficient	t-stat.	Diagnostic
SDt	DRI	1.44	3.31**	
	TBR	0.11	5.17**	
	FER	-4.65	2.03*	
	GDP	3.01	2.21*	
	SDt-1	3.51	4.50**	
TDt	DRI	1.56	2.55*	
	TBR	0.05	4.30**	
	FER	-4.5	2.53*	
	GDP	2.22	2.73*	
	TdT-1	3.52	2.56*	
TTDt	DRI	1.49	2.11*	
	TBR	0.09	7.11***	
	FER	-5.21	2.63*	
	GDP	1.60	2.53*	
	TTDt-1	2.86	2.79*	

* Significant 1 percent ** significant at 5 percent *** significant at 10 percent.

Policy Implication.

The implications of our finding for policy are clearly unmistakable. Among these are the imperatives on the part of banks to evolve an aggressive marketing of customers for funds. Since deposits account response to higher interest rate, the ability of banks to provide higher incentive to depositor to increase their deposit calls for an effective policy and strategy on the part of the banking sector. But higher interest rates lead to higher cost of credit in terms of lending. Banks must decide on the effective balance between supply and demand for fund if they are going to optimise their profit.

On the part of monetary authorities, it is imperatives for them to tinker with foreign exchange rates interm of controlling the increment overtime. Since this reduces total deposit of bank in terms of channeling funds to buying for foreign exchange for profit, thereby hampering the real mobilization of funds for real investment. Admittedly, however, this will not be without its own side effects. It is then left for policy makers to take measures to mitigate these side effects.

The results also point at the imperative for policy makers to take measure to grow and develop the economy, since growth rate of GDP favours effective mobilization of funds by the banks. A favourable disposition of the performance of the economy will lead to increase in bank mobilization efforts in the economy.

SUMMARY AND CONCLUSION

In this study, we examined the impact of deposit interest rate, Treasury Bill, Foreign Exchange Rate and rate of GDP on commercial bank fund mobilizations effort in Nigeria, we tried to explain the behaviour of commercial bank output supply using variables suggested by theory. Using the technique of co-integration to test for stationarity and long-run convergence of the model, the model was highly dependable going by the unit root test. We estimated the model and results analysed. The results showed that deposit interest rate, Treasury Bill Rate, Exchange Rate and growth rate of GDP explain bank deposit mobilization in Nigeria. We discussed the policy implication of our findings. From the analysis, banks and policy markers must pay close attention to the behaviour of the aforementioned variables with a view to improving the banks effort of deposit mobilization for real investment in the country. Arising from the finding, it is in the interest of the economy to review the policy of abandoning the traditional operation of banks, which is lending in preference for foreign exchange trading as this withdraw funds from the deposit accounts and consequently affect the mobilization for investment in the economy.

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