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Empirical Investigation of the Impact of Deposit Rates on Fund Mobilization by Deposit Money Banks in Nigeria

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Abstract

The objective of this paper is to investigate the nature of the relationship between deposit rates (disaggregated into various categories of deposit rates charged by DMBs in Nigeria) and deposit mobilization in Nigeria within the period 1981 and 2012 using annual data collected from the Statistical Bulletin published by the CBN. Using the OLS multiple regression, unit root tests, co-integration, error correction mechanism (ECM) and Granger causality tests, the empirical results report no significant relationship between all categories of deposit rates and total deposit liabilities of DMBs in Nigeria. The same results were also obtained with respect to the impact of deposit rates on time, savings and foreign currency deposits. In addition, the paper found no granger causality relationship between deposit rates and deposit liabilities. It is therefore recommended that a policy of interest rate liberalization alone may not be enough to induce higher levels of fund mobilization. The government should pursue programmes aimed at boosting investment and growing the economy to increase incomes that would release further savings for sustainable growth.

Keywords: Deposit rates, Fund Mobilization, co-integration, Error correction mechanism, Granger causality

1.0 Introduction

The financial system plays a vital role in the economic growth of any country by providing the platform through which funds are mobilized from savings-surplus economic units to savings-deficit economic units which in turn are translated to investments and growth. As opined by Okafor (1983), the financial system is composed of all the financial intermediaries including Deposit Money Banks (DMBs), financial markets both money and capital markets, financial products of all shades as well as the rules and regulations that are periodically churned out by the regulatory authorities to regulate and guide operations in the financial system. Deposit money banks are by law empowered to function as financial intermediaries and hence mobilise savings across all income levels and geographical areas adequately, timely and at a minimal cost (Torbira and Ogbulu, 2014). Thus, the extent to which DMBs perform this intermediation function goes a long way in defining the course of development of any nation. Given the functional relationship between savings and investment and growth, it is imperative that DMBs (should) discharge their intermediation function creditably and optimally to ensure stable and sustainable development of the economy. However, this is as far as theory goes because the extent to which DMBs could achieve this goal depends to a large extent on the interest rate structure in the economy as well as the savings and investment behavior of the public. Although several studies have been undertaken overtime to examine the nature of the relationship between deposit rates and savings mobilization by DMBs or commercial banks in many countries as well as in Nigeria, the results have not been conclusive.

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In some studies like McKinnon (1973), Shaw (1973),Mashamba, Magweva and Gumbo (2014), Fry (1978, 1980) as well as Corsepius and Fisher (1986), the results of their studies showed a positive and significant relationship between deposit rates and savings thus supporting the McKinnon-Shaw hypothesis of real interest rates stimulating savings in an economy. On the other hand, the empirical results of studies by some scholars like Mwega, Ngola and Mwangi (1990), Giovanni (1983, 1985), Onwumere, Okore and Ibe (2012) as well as that of the trioObute, Asor and Itodo (2012) fail to find any significant relationship between interest rates and savings mobilization. In addition, some other works reported a significant but negative relationship between deposit rates and aggregate savings as found in the works of Mashamba, Magweva and Gumbo (2014) and Simon-Oke and Jolaosho (2013). The controversy is still on as no consensus has been reached as to the nature and extent of the relationship between interest rates and aggregate savings.

1.1 Objective of the Study

In view of the above, the broad objective of this paper is to carry out an empirical investigation of the relationship between deposit rates and fund mobilization by DMBs in Nigeria. In specific terms, the paper attempts to:

(i). Investigate the relationship between total deposit liabilities of DMBs and deposit rates in Nigeria.
(ii). Empirically test the impact of deposit rates on time, savings and foreign currency deposits of DMBs in Nigeria.
(iii). Examine whether there is any long run relationship between deposit rates and total deposit liabilities of DMBs in Nigeria.
(iv). Find out whether there is any long run relationship between deposit rates and time, savings and foreign currency deposits of DMBs in Nigeria.
(v). Examine the direction of causality among deposit rates, total deposit liabilities and time, savings and foreign currency deposits of DMBs in Nigeria.

1.2 Research Hypotheses

To achieve the objectives of the paper, the following hypotheses have been formulated:

Ho_1: There is no significant relationship between total deposit liabilities (TDL) and deposit rates in Nigeria.
Ho_2: Deposit rates have no significant impact on time, savings and foreign currency deposits (TSFD) in Nigeria.
Ho_3: There is no significant long run relationship between deposit rates and total deposit liabilities (TDL) in Nigeria.
Ho_4: There is no significant long run relationship between deposit rates and time, savings and foreign currency deposits (TSFD) in Nigeria.
Ho_5: There is no significant Granger causality relationship between total deposit liabilities and deposit rates in Nigeria.
Ho_6: There is no significant Granger causality relationship between time, savings and foreign currency deposits (TSFD) and deposit rates in Nigeria.

The remaining parts of the paper are arranged as follows. Section 1 as already indicated deals with introduction while Section 2 contains review of related literature including a review of the empirical literature. Section 3 presents the research methodology and data collected for the study while Section 4 deals with analysis and results. In Section 5, we have conclusion and recommendations.

2.0 Review of Related Literature

It is necessary to commence the review of our empirical literature by first examining the theoretical underpinning of the interest rate-savings nexus as propounded by the Classical economists through to the Keynesian, Neo-Keynesian and the Modern theorists.

2.1. Theoretical Framework

Obviously, the acts of saving and lending, borrowing and investing are intimately connected through the efficient functioning of the financial system and a common denominator that runs through all of them is the rate of interest. The rate of interest is the price a borrower must pay to secure scarce funds from the savings-surplus economic units. In this way, it is the price of credit. On the other hand, interest rates are also seen as a reward for waiting or postponing current consumption for future consumption given that a rational individual will always prefer current consumption of goods and services over future consumption. Hence, the only way to induce or encourage the individual or economic unit to consume less now and save more is to offer a higher rate of interest on current savings.

As pointed out by Rose (2003), the popular theories that have been propounded to examine the forces that determine the rate of interest in the financial system include The Classical Theory, The Liquidity Preference Theory, The Loanable Funds Theory, The Rational Expectations Theory as well as the Hicks-Hansen Modern Theory of Interest Rates.

The Classical Theory

This is one of the oldest theories of interest rate determination developed in the 18th and 19th centuries by a number of British economists. The Classical theory posits that the rate of interest is determined by two forces. First, the supply of savings derived mainly from households and secondly, the demand for investment capital derived mainly from the business sector. Thus, the Classical theory emphasizes the important roles which savings and investment demand play in determining market interest rates. The supply of savings is assumed to have a positive relationship with market interest rates while the demand for investment is negatively related to market interest rates. The long run equilibrium interest rate in the model is therefore established at the point where the total supply of savings is equal to the total quantity of investment demand. As elegant as the theory is, it has come under severe criticism for ignoring other factors other than interest rates that influence savings. For example, economists today recognize that income is more important in determining the volume of savings than interest rates.

The Liquidity Preference Theory

The Liquidity preference theory developed by Keynes (1936) is seen as a short term theory of the rate of interest in contrast to the Classical theory usually regarded as a long term model of interest rate determination in the economy. The theory is predicated on the equality of the demand for money (cash balances) and supply of money in the money and capital markets. The demand for money (cash balances) is made up of the demand for transactions, precautionary and speculative purposes while the supply of money is heavily influenced by the monetary authorities. Within the Liquidity preference model, the dominant determinant of both the transactions and precautionary demand for money is income and not interest rate. However, demand for money for speculative purposes bears an inverse relationship with the level of interest rates thereby generating a total demand for money which is negatively related to interest rates. A major limitation of Keynes liquidity preference theory is its narrow consideration of only the demand and supply of money (cash balances) in the determination of the equilibrium rate of interest in the economy without incorporating the demand for credit by different economic agents in the system which invariably exert a lot of influence on the cost of credit.

The Loanable Funds Theory of Interest Rates

The Loanable funds theory of interest rates has become very popular among academics and practitioners alike because it attempts to provide a comprehensive treatment of the factors that determine the equilibrium level of interest rates in the financial system-households, businesses and the government sector. The theory therefore brings together elements of both the classical and liquidity preference theories by incorporating in its postulation and analysis the total demand for loanable funds and total supply of loanable funds. Total demand for loanable funds is the sum of all credit demands from all sectors of the economy which includes businesses, households and the government sector while the total supply of loanable funds is the aggregate of domestic and foreign savings, the creation of money by the banking system and the hoarding or dishoarding of cash balances by the public. According to the loanable funds theory, the supply of loanable funds (aggregate savings) is positively related to interest rates while the demand for loanable funds is expected to be inversely related to the rate of interest. Thus, the forces of demand and supply of loanable funds determine not only the volume of lending and borrowing but also the rate of interest which tends to equilibrium at the point where the supply of loanable funds is equal to the demand for loanable funds (Rose, 2003).

The Rational Expectations Theory of Interest Rates

The Rational Expectations theory is built on the assumption of efficient money and capital markets where new information about interest rates, asset prices and other market parameters are instantaneously transmitted and digested by the public in forming expectations regarding future changes in interest rates and asset prices. Within this paradigm, equilibrium interest rates impound all relevant information very quickly and change only when relevant new information appears.

Therefore, as presented by Rose (2003), forecasting market interest rates is virtually impossible on a consistent basis because interest rate forecasters must know what new information is likely to arrive in the marketplace before that information appears and must also assess how that new information will influence interest rates and asset prices when it does arrive. Finally but not the least, the Modern Theory of Interest also known as The General Equilibrium Theory of Interest or The Hicks-Hansen Theory of Interest following the phenomenal works of both Hicks (1980) and Hansen (1976) who incorporated both real and monetary factors to demonstrate that investment, savings, liquidity preference and money supply are all necessary elements in a comprehensive and determinate interest rate theory culminating in the IS and LM curves. As presented by Jhingan (2009), the equilibrium between the IS and LM curves provides a determinate solution. Having surveyed the array of views propounded on the factors that shape the behavior of interest rates in the financial system, it is clear that the theoretical consensus is that interest rates bear a positive relationship with aggregate savings. That is, higher real interest rates stimulate growth in savings.

2.2 Empirical Literature Review

The literature of finance is replete with a good number of studies that have been undertaken to investigate the relationship between interest rates and savings in both the developed and developing economies. Some of these are country-specific while others are cross-country studies using time series or pooled data sets. For example, Fry (1978,1980) found in his study that aggregate savings to be significantly interest rate elastic in seven Asian countries using 1960 pooled data. In his Fry (1980) expanded study, the author used pooled time series data to estimate national savings functions for 14 Asian countries and found that real deposit rates exert a positive and significant effect on national savings. However, Giovanni (1983,1985) could not reproduce these results for the same countries using the same model and 1970 pooled data. In addition, both Wijnbergen (1983) and Buffe (1984) indicated that financial savings need not be interest elastic and if they are, may not be translated into increased credit to the private sector. They argued that they may be used to raise cash and foreign asset reserves held by those financial institutions or used to finance fiscal deficits of government. In a recent study by Mashamba, Magweva and Gumbo (2014), the authors investigated the relationship between banks' deposit rates and deposit mobilization in Zimbabwe for the period 1980-2006 using OLS, ADF unit root tests and correlation coefficients. The study found that there is a positive and significant relationship between deposit rates and bank deposits in Zimbabwe and therefore recommended that banks in Zimbabwe should tap into the unbanked markets through massive branch expansion and offering higher interest rates to attract more deposits.

Ina cross-country survey of Asian countries, Corsepius and Fisher (1986) set out to present a more comprehensive survey of empirical studies on interest rates elasticity of savings in order to determine whether high positive interest rate elasticities are a reasonable assumption for developing countries for the period 1950-1983. The results of the survey indicated that for almost all of the Asian countries surveyed, the expected positive impact of interest rates on financial savings is unambiguously supported by empirical evidence but the interest elasticity of savings in real assets failed to yield statistically significant results. In another study, Gaire (2011), analyzed the relationship between interest rates and savings behavior in Nepal for the period between 1975 and 2010 using annual data published by the Nepal Ratra Bank (NRB). The empirical findings of the investigation showed that there is a long run relationship between real interest rates and savings behavior in Nepal. In addition, the correlation coefficient tests indicated a strong and positive correlation between real interest rates and gross domestic savings ratio. The findings also showed that real interest rates affect the growth rate of bank deposits positively but negligibly. The author therefore argued that influencing bank deposits by manipulating interest rates appear not to be a practical policy option for Nepal. The work by Onwumere, Okore and Ibe (2012) took a careful look at the impact of interest rate liberalization on savings and investment in Nigeria from 1976-1999. The authors employed the OLS regression technique and the empirical findings revealed that interest rate liberalization had a negative and insignificant impact on savings but a negative and significant impact on investments leading the authors to posit that interest rate liberalization policy embarked upon in Nigeria was counter-productive. The authors therefore recommended distinguishing between loan and deposit transactions as well as wholesale banking from retail banking in policy making such that interest rate liberalization should be phased and gradual beginning with wholesale, lending and then deposit rates. However, a major defect of this study is the presence of autocorrelation in the Pre-liberalization lending regression and the Post-liberalization estimated regression for savings and deposit rates given the D-W statistic values of 1.259 and 0.975 respectively. Hence, the empirical findings may not be reliable for analysis and policy formulation.

Obute, Asor and Itodo (2012) examined the impact of interest rate deregulation on economic growth in Nigeria through savings and investment as well as undertaking a comparative analysis between the impact of regulated and deregulated interest rate regimes on economic growth in Nigeria. The authors estimated four separate models to capture these relationships using Real Deposit Rates and Total Savings; Real Lending Rates and Investments; Investments and Economic Growth and then Real Lending Rates and Real GDP for both the regulated era (1964-1986) and the deregulated era (1987-2009). The findings of the study revealed that real deposit rates have no significant impact on total savings before and after deregulation. Real lending rates also did not report any significant impact on investments before and after deregulation. However, the results showed that investment has appositive and significant impact on GDP before and after deregulation. The authors therefore recommended that interest rates should be effectively deregulated to allow Nigeria reap the full benefits of financial reforms introduced since 1986. In the study carried out by Simeon-Oke and Jolaosho (2013), the authors assessed the impact of real interest rates on savings mobilization in Nigeria using the Vector Auto-regression (VAR) technique on a time series data set from 1980-2008. The results of the study revealed that real interest rates have a negative and significant impact on the level of savings mobilization in Nigeria. The authors observed the need for government to bridge the gap between savings and lending rates and increase per capita income to stimulate savings for investment and economic growth. Furthermore, Mwega and Ngola (1991) also conducted a study to test the relationship between interest rates and financial and non-financial savings in Kenya. The empirical findings of the study failed to support the McKinnon-Shaw hypothesis that real interest rates have a significant and positive impact on financial and non-financial savings which in turn support higher level of investment. Instead, the findings revealed that real deposit rates have no significant influence on both financial and non-financial savings in Kenya. In addition, the results reported that higher interest rates dampen (constrict) demand for credit suggesting that a policy of interest rate liberalization would in effect be stag-inflationary in Kenya. In yet another cross-country study, Seck and El Nil (1993) tested some causal relationships implied in the McKinnon-Shaw thesis for a sample of thirty African countries using pooled data. the results of the study revealed that (i) real deposit rates have a positive and significant impact on economic growth (ii) foreign savings and domestic savings both have a strong and positive impact on investments (iii) interest rates have a negative impact on investments and (iv) deposit rate positively influenced financial savings. The paper by Wafure (2012) set out to evaluate the impact of financial sector reforms on private savings in Nigeria from 1970-2009 by employing co-integration and the ECM techniques. The empirical results showed that consumer price index (CPI), savings rate and per capita income have a significant and negative relationship with savings. Hence, the author recommended encouraging financial sector reforms especially in the area of bank consolidation, mergers and acquisitions and corporate governance. In their study, Acha and Acha (2011) examined the implications of interest rates for savings and investments in Nigeria. The authors employed the OLS and correlation analytical techniques on data collected for the period 1970-2005. The findings of the study indicated that interest rates have a negative and insignificant impact on both savings and investments within the period under review.

In his own study, Uremadu (2007) investigated what the author termed the core leading determinants of financial savings in Nigeria as an aid to national monetary policy formulation. By employing the OLS technique, the author reported a positive and significant impact of GDP growth rate, per capita income, interest rate spread, broad money supply and debt service ratio on savings while real interest rate and inflation were found to have a negative impact on savings. The author recommended an improvement in per capita income by reducing unemployment to accelerate growth through savings. In yet another work of his, Uremadu (2009), the author examined this time around the impact of dependency ratio and other selected macro-economic indicators on savings mobilization in Nigeria using the multiple OLS and ECM methodology. The empirical findings showed that (i) demographic factors impact positively but insignificantly on savings ratio (ii) interest rate spread leads savings ratio (iii) domestic inflation has a negative and significant impact on savings ratio and (iv) foreign private investment impact positively and significantly on savings ratio. In another related study, Orji (2012) investigated the determinants of savings in Nigeria as well as the impact of bank savings and bank credits on Nigeria's economic growth. The author employed the Distributed Lag-ECM technique using data collected from 1970-2006 and the findings report a positive and significant impact of per capita income, financial deepening and interest rate spread on growth and also a negative and significant impact of interest rate and inflation rate on private domestic savings.

From the above empirical survey, it is evident that there is as yet no consensus on the nature and extent of the relationship between interest rates and savings contrary to the McKinnon-Shaw thesis of a positive relationship between interest rate liberalization and aggregate savings predicated on the classical theoreticapriori expectation of higher real interest rates exerting a positive influence on savings. In addition and more recently, is the controversy as to whether interest rates lead or lag aggregate savingswith its attendant implications for policy formulation. The present paper therefore, is an attempt to contribute to this debate by examining the relationship between aggregate savings and a set of disaggregated deposit rates and not a representative single interest rate as in earlier works.

3.0 Methodology and Data

The methodology adopted for this paper involves the specification of two models to test the relationship between deposit rates and two measures of aggregate savings within the McKinnon-Shaw (1973) paradigm using the multiple regression, co-integration, error correction mechanism (ECM) and Granger causality tests. To estimate the impact of different types of deposit rates on total deposits of DMBs in Nigeria, we specified two models in the log transform thus:

$$\text{Log(TDLt)}=\beta_0+\beta_1\text{log(SMSRt)}+\beta_2\text{log(SVRt)}+\beta_3\text{log(TMSRt)}+\beta_4\text{log(VMSRt)}+\mu\ldots\ldots\ldots(1)$$

And

$$\text{Log(TSFDLt)}=\lambda_0+\lambda_1\text{log(SMSRt)}+\lambda_2\text{log(SVRt)}+\lambda_3\text{log(TMSRt)}+\lambda_4\text{log(VMSRt)}+\mu\ldots\ldots\ldots(2)$$

Where

TDL= Total deposit liabilities of DMBs in Nigeria.
TSFD= Time, Savings and Foreign currency deposits of DMBs in Nigeria.
SMSR= Six months (period weighted average) deposit rates of DMBs.
SVR= Normal savings rateof DMBs.
TMSR= Three months (period weighted average) deposit rates of DMBs.
VMSR= Twelve months (period weighted average) deposit rates of DMBs.
βiand λi are the parameters of the models and μ_i the error terms where all βi and λi are expected to be positive in accordance with theoretical expectation.

3.1 Data

The data on the variables specified in equations (1) and (2) above were sourced from Statistical Bulletin (2012) published by the Central Bank of Nigeria (CBN) for the period 1981 to 2012.

4.0 Analysis and Results

The analysis and results of the study are presented in this section beginning with the summary of the descriptive statistics of the variables specified in models (1) and (2) using the E-Views 7 statistical package.

4.1 Summary Descriptive Statistics

In Table 2, we have the summary of the descriptive statistics of the variables. The mean of SMSR is 12.21559% with a standard deviation of 4.792515% while the mean of SVR is 8.069905% and standard deviation is 5.193710%. For TDL, the mean value is N2112015.0 million and a standard deviation of N3766257.0 million.

Table 2: Descriptive Statistics

	SMSR	SVR	TDL	TMSR	TSFD	VMSR
Mean	12.21559	8.069905	2112015.	12.11949	1265474.	12.34170
Median	11.17272	5.745000	196661.0	11.27315	130069.6	11.33195
Maximum	23.26000	18.80000	13132097	23.60000	8062105.	23.99000
Minimum	4.899284	1.410541	10676.90	5.500000	5796.000	4.704871
Std. Dev.	4.792515	5.193710	3766257.	4.454997	2254529.	5.114675
Skewness	0.799808	0.548353	1.836400	0.681239	1.859404	0.766046
Kurtosis	2.947196	1.938934	4.931625	3.024198	5.062661	2.775325
Jarque-Bera	3.415414	3.104833	22.96084	2.475910	24.11213	3.197045
Probability	0.181281	0.211736	0.000010	0.289977	0.000006	0.202195
Obs	32	32	32	32	32	32

Source: Author's Computation.

For TMSR, the mean value is 12.11949% and a standard deviation of 4.454997% while the mean of TSFD is N1265474.0 million with standard deviation of N2254529.0 million. In the case of VMSR, its mean value is 12.3417% and standard deviation of 5.114675%. The p-values of the Jarque-Bera statistics for SMSR, SVR, TMSR and VMSR are not significant thus we accept the null hypothesis that the variables are normally distributed. However, the variables TDL and TSFD are not normally distributed since the p-values of their Jarque-Bera statistics are significantly different from zero at the 5% level of significance.

Correlation Matrix

Table 3 presents the correlation matrix for the variables. The correlation coefficient between SVR and TDL for example is -0.604035 while for TSFD and SMSR is -0.374370.

Table 3: Correlation Matrix

	SMSR	SVR	TDL	TMSR	TSFD	VMSR
SMSR	1.000000					
SVR	0.738561	1.000000				
TDL	-0.373157	-0.604035	1.000000			
TMSR	0.987517	0.704989	-0.340326	1.000000		
TSFD	-0.374370	-0.603329	0.997444	-0.342876	1.000000	
VMSR	0.988131	0.779273	-0.407117	0.976862	-0.411344	1.000000

Author's computation

The correlation coefficient for VMSR and TSFD is -0.411344 and between VMSR and SVR is 0.779273. In sum, the deposit rates are all negatively correlated with TDL and TSFD respectively.

4.2 Level Series Regression Results.

In Tables 4 and 5, we have the results of the level series multiple regression models as specified in equations (1) and (2). From the regression results, it is evident that the D-W statistics for both models are approximately 1.0 suggesting the presence of positive auto-correlation in the estimated models which may render the estimated results unreliable for both analysis and policy formulation (Ogbulu, 2010).

Table 4: Level Series OLS Multiple Regression Results (Model 1)

Dependent Variable: Log (TDL)
Method: Least Squares
Sample: 1981 2012
Included Observations: 32

Variable	Coefficient	Std. Error.	t-Statistic	Prob.
C	10.43057	1.055349	9.883527	0.0000
Log(SMSR)	-2.424663	3.826181	-0.633703	0.5316
Log(SVR)	-3.379048	0.359836	-9.390518	0.0000
Log(TMSR)	8.336401	2.973542	2.803525	0.0092
Log(VMSR)	-2.486414	2.832925	-0.877684	0.3879

R-squared	0.889421	Mean dependent var	12.46339
Adjusted R-squared	0.873039	S.D.dependentvar	2.363001
S.E.of regression	0.841975	Akaike info criterion	2.636468
Sum squared resid	19.14090	Schwarz criterion	2.865490
Log likelihood	-37.18349	Hannan-Quinn criter	2.712382
F-statistic	54.29234	Durbin-Watson stat	0.905763
Prob(F-statistic) 0.000000			

Source: Author's Computation.

Table 5: Level Series OLS Multiple Regression Results (Model 2)

Dependent Variable: Log (TSFD)
Method: Least Squares
Sample: 1981 2012
Included Observations: 32

Variable	Coefficient	Std. Error.	t-Statistic	Prob.
C	10.05446	0.956724	10.50926	0.0000
Log(SMSR)	0.271004	3.468614	0.078130	0.9383
Log(SVR)	-3.310334	0.326208	-10.14791	0.0000
Log(TMSR)	7.460503	2.695657	2.767601	0.0101
Log(VMSR)	-4.393459	2.568181	-1.710728	0.0986

R-squared	0.907804	Mean dependent var	12.00133
Adjusted R-squared	0.894145	S.D.dependentvar	2.346037
S.E.of regression	0.763290	Akaike info criterion	2.440244
Sum squared resid	15.73053	Schwarz criterion	2.669266
Log likelihood	-34.04391	Hannan-Quinn criter	2.516158
F-statistic	66.46361	Durbin-Watson stat	1.010236
Prob(F-statistic)	0.000000		

Source: Author's Computation.

4.3 Unit Root Tests

The presence of auto-correlation in the level series multiple regression estimates in section 4.2 above suggests that we examine further the time-dependent features of the variables specified in our models since many economic variables have been found to be time-varying in nature (Gujarati and Porter, 2009; Brooks, 2008). In Table 6, we present the results of the Augmented Dicky-Fuller (ADF) tests conducted to test for the stationarity of the series.

Table 6: ADF Unit Root Test Results

Variable	ADF test statistic at level	ADF Test statistic at 1st diff.	Order of Integration
Log(TDL)	0.304010	-6.406813	1(1)
Log(TSFD)	1.176952	-3.512175	1(1)
Log(SMSR)	-2.571402	-5.188858	1(1)
Log(SVR)	0.083376	-5.893228	1(1)
Log(TMSR)	-2.748184	-5.119006	1(1)
Log(VMSR)	-2.265489	-5.154742	1(1)

Critical Values: 1% -3.670170; 5% -2.963972; 10% -2.621007.
Source: Author's Computation.

The results of the ADF unit root tests show that all the variables in the two models are integrated of order one. That is, they become stationary after the first differencing.

4.4 Co-integration Tests

Given that all the variables in the two models are integrated of order one, we apply the Johansen co-integration test to examine the long run co-integrating properties of the models. The results of the application of the Johansen co-integration test are as presented in Tables 7 and 8. The tests assume a linear deterministic trend and lag interval of 1 to 2. For model 1, the co-integration test confirms the existence of one co-integrating equation at the 5% level of significance for both the trace and maximum eigenvalue statistic. On the other hand, the co-integration test for model 2 indicates the existence of three co-integrating equations at the 5% level of significance also for both the trace and maximum eigenvalue test statistic. Therefore, these results confirm that for TDL-Deposit rates model, there is only one long run equilibrium relationship between TDL and the specified deposit rates of DMBs in Nigeria and with respect to the TSFD-Deposit rates model (Model 2), the test indicates the existence of three long run equilibrium relationships at 5% level of significance.

Table 7: Johansen Co-integration Test Results (Model 1)

Sample (adjusted): 1984 2012
Included Observations: 29 after adjustments
Trend assumption: Linear deterministic trend
Series: Log((TDL) Log(SMSR) Log(SVR) Log(TMSR) Log(VMSR)
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test (Trace)

Hypothesized N0.of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.725949	78.81430	69.81889	0.0080
At most 1	0.489006	41.27549	47.85613	0.1801
At most 2	0.336844	21.80499	29.79707	0.3095
At most 3	0.287211	9.893366	15.49471	0.2890
At most 4	0.002577	0.074828	3.841466	0.7844

Trace test indicates 1cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) P-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eignenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob**
None*	0.725949	37.53881	33.87687	0.0174
At most 1	0.489006	19.47050	27.58434	0.3790
At most 2	0.336844	11.91162	21.13162	0.5564
At most 3	0.287211	9.818538	14.26460	0.2241
At most 4	0.002577	0.074828	3.841466	0.7844

Max-eigenvalue test indicates 1cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) P-values

Source: Author's Computation

Table 8: Johansen Co-integration Test Results (Model 2)

Sample (adjusted): 1984 2012
Included Observations: 29 after adjustments
Trend assumption: Linear deterministic trend
Series: Log((TSFD) Log(SMSR) Log(SVR) Log(TMSR) Log(VMSR)
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test (Trace)

Hypothesized N0.of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.784457	108.2083	69.81889	0.0000
At most 1*	0.617789	63.70496	47.85613	0.0008
At most 2 *	0.573400	35.81323	29.79707	0.0090
At most 3	0.317956	11.10786	15.49471	0.2050
At most 4	0.000368	0.010685	3.841466	0.9174

Trace test indicates 3 cointegratingeqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) P-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eignenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob**
None*	0.784457	44.50332	33.87687	0.0019
At most 1*	0.617789	27.89173	27.58434	0.0457
At most 2 *	0.573400	24.70537	21.13162	0.0150
At most 3	0.317956	11.09718	14.26460	0.1494
At most 4	0.000368	0.010685	3.841466	0.9174

Max-eigenvalue test indicates 3 cointegratingeqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) P-values

Source: Author's Computation

4.5 Error Correction Mechanism (ECM)

Having established the existence of long run relationships among the variables in our models and the fact that all the variables are integrated of order one, we proceed to apply the error correction mechanism to investigate the dynamic behavior of each of the models in response to short run shocks. Tables 9 and 10 contain the results of the parsimonious ECM tests for the two models. The results of the parsimonious ECM test in Table 9 (model 1) indicate that (i) six months deposit rates (SMSR) has a negative and insignificant impact on total deposit liabilities TDL) of DMBs in Nigeria (ii) normal savings rate (SVR) also has a negative and insignificant impact on TDL (iii) three months savings rate (TMSR) though positive has no significant relationship with TDL and (iv) twelve months deposit rates (VMSR) show a positive and non-significant impact on TDL. Thus, the empirical results demonstrate that all the categories of deposit rates have no significant relationship with total deposit liabilities of DMBs in Nigeria. The adjusted R^2 of the model is 44.33% indicating that approximately 44.33% of the total variation in TDL is explained by the exogenous variables. The F-statistic with a p-value of 0.031743 is significant meaning that the model is a good fit just as the D-W statistic value of 2.033622 indicates the absence of any auto-correlation in the model. The error correction term is significant and appropriately signed with a coefficient of -0.514328 showing that the speed of adjustment of the model back to its long run equilibrium is approximately 51.43% per annum in response to any shocks. The parsimonious ECM results for model 2 relating to the relationship between deposit rates and the time, savings and foreign currency deposits (TSFD) component of total deposit liabilities of DMBs in Nigeria are as presented in Table 10 and include the following. (a) SMSR has a positive but insignificant impact on TSFD of DMBs in Nigeria. (b) Normal savings rate (SVR) is negative and has no significant impact on TSFD. (c) TMSR is positive and has significant relationship with TSFD and (d) VMSR has a negative and insignificant impact on TSFD. Thus, as in model 1, deposit rates appear not to have any significant impact on time, savings and foreign currency deposits component of total deposit liabilities of DMBs in Nigeria.

Table 9: Parsimonious Error Correction Results (Model 1)

Dependent Variable: D(Log(TDL) Method: Least Squares Sample (adjusted): 1985 2012 Included Observations: 28 after adjustment endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.177078	0.230870	0.767004	0.4550
D(Log(TDL(-1)))	-0.231264	0.283880	-0.814655	0.4280
D(Log(TDL(-2)))	0.281771	0.354053	0.795842	0.4385
D(Log(TDL(-3)))	0.180520	0.253178	0.713017	0.4868
D(Log(SMSR))	-4.003727	2.175307	-1.840534	0.0856
D(Log(SMSR(-2)))	1.167831	2.083096	0.560623	0.5833
D(Log(SVR))	-1.975577	0.950110	-2.079314	0.0552
D(Log(SVR(-2)))	1.378049	1.041366	1.323309	0.2055
D(Log(TMSR))	5.333321	2.564528	2.079650	0.0551
D(Log(TMSR(-2)))	-2.397289	2.477889	-0.967472	0.3486
D(Log(VMSR))	0.038878	1.772967	0.021928	0.9828
D(Log(VMSR(-3)))	-0.740359	0.585579	-1.264320	0.2254
ECM01(-1)	-0.514328	0.192596	-2.670503	0.0175
R-squared	0.690695	Mean Dependent Var	0.240248	
Adjusted R-squared	0.443251	S.D. dependent Var	0.821874	
S.E of regression	0.613246	Akaike info criterion	2.164316	
Sum squared resid	5.641060	Schwarz criterion	2.782839	
Log likelihood	-17.30042	Hannan-Quinn criter	2.353405	
F-statistic	2.791320	Durbin-Watson Stat	2.033622	
Prob(F-statistic)	0.031743			

Source: Author's Computation

Table 10: Parsimonious Error Correction Results (Model 2)

Dependent Variable: D(Log(TSFD)				
Method: Least Squares				
Sample (adjusted): 1985 2012				
Included Observations: 28 after adjustment endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.190961	0.059968	3.184365	0.0066
D(Log(TSFD(-1)))	0.492674	0.179622	2.742841	0.0159
D(Log(TSFD(-3)))	-0.268500	0.186411	-1.440362	0.1718
D(Log(SMSR))	0.066680	0.431822	0.154415	0.8795
D(Log(SMSR(-1)))	1.273922	0.462308	2.755569	0.0155
D(Log(SMSR(-2)))	0.735948	0.454852	1.617995	0.1280
D(Log(SVR))	-0.017731	0.159527	-0.111149	0.9131
D(Log(SVR(-1)))	0.264568	0.143197	1.847581	0.0859
D(Log(SVR(-2)))	-0.393715	0.137306	-2.867431	0.0124
D(Log(TMSR))	0.450906	0.420341	1.072715	0.3015
D(Log(TMSR(-1)))	-1.537408	0.528662	-2.908110	0.0115
D(Log(VMSR))	-0.420506	0.407943	-1.030796	0.3201
D(Log(VMSR(-2)))	-0.749533	0.416529	-1.799473	0.0935
ECM02(-1)	-0.037206	0.057208	-0.650368	0.5260
R-squared	0.709087	Mean Dependent Var	0.241255	
Adjusted R-squared	0.438954	S.D. dependent Var	0.132567	
S.E of regression	0.099297	Akaike info criterion	-1.474559	
Sum squared resid	0.138037	Schwarz criterion	-0.808457	
Log likelihood	34.64383	Hannan-Quinn criter-	1.270925	
F-statistic	2.624953	Durbin-Watson Stat	2.033655	
Prob(F-statistic)	0.042335			

Source: Author's Computation

The adjusted R^2 of model 2 (Table 10) is 43.9 % approximately showing that 43.9 % of the variation in TSFD is explained by the independent variables. In addition, the F-statistic is 2.624953 with a p-value of 0.042335 indicating that the model is a good fit. The D-W statistic value is 2.033655 suggesting the absence of auto-correlation in the model. The error correction term of the model is appropriately signed but insignificant and shows a speed of adjustment back to equilibrium of only 3.72 % per annum in response to short run shocks.

4.6 Granger Causality Test

The Pairwise Granger causality test was employed to examine the direction of causality, if any, between deposit rates and the two categories of deposits as specified in models 1 and 2. The results of the Granger test conducted with an optimal lag of 2 are presented in Table 11.

Table 11: Pairwise Granger Causality Test Results

Pairwise Granger Causality Tests Sample: 1981 2012 Lags : 2			
Null hypothesis:	Obs	F-Statistic	Probability
TDL does not Granger Cause SMSR SMSR does not Granger Cause TDL	30	1.39102 0.36441	0.2674 0.6982
TSFD does not Granger Cause SMSR SMSR does not Granger Cause TSFD	30	1.25493 0.89132	0.3024 0.4227
TDL does not Granger Cause SVR SVR does not Granger Cause TDL	30	0.21219 0.80732	0.8103 0.4573
TSFD does not Granger Cause SVR SVR does not Granger Cause TSFD	30	0.24450 0.61362	0.7849 0.5493
TMSR does not Granger Cause TDL TDL does not Granger Cause TMSR	30	0.28572 1.28923	0.7539 0.2932
VMSR does not Granger Cause TDL TDL does not Granger Cause VMSR	30	0.72819 1.30526	0.4927 0.2889
TSFD does not Granger Cause TMSR TMSR does not Granger Cause TSFD	30	1.13962 0.73109	0.3360 0.4914
VMSR does not Granger Cause TSFD TSFD does not Granger Cause VMSR	30	1.12268 1.17995	0.3413 0.3238

Source: Author's Computation

From the results, we find no evidence of any granger causality relationship between all categories of deposit rates and total deposit liabilities of DMBs in Nigeria. The same results are reported for time, savings and foreign currency deposits of DMBs in Nigeria.

4.7 Discussion of Findings

The empirical findings of this study demonstrate that deposit rates in Nigeria have no significant impact on deposits of DMBs whether in terms of total deposit liabilities or in terms of time, savings and foreign currency deposits component of total deposit liabilities. These findings are in sharp contrast to theoretical postulations as well as the McKinnon-Shaw thesis of positive and significant relationship between interest rates and deposits. However, these results are in agreement with the findings of earlier works of such scholars as in Mwega, Ngola and Mwangi (1999), Onwumere and Okore (2012), Obute, Asor and Itodo (2012), as well as Acha and Acha (2011),Uremadu (2007) and Gaire (2011) who variously found no significant relationship between interest rates and savings mobilization. The non-significance or negative significance may well be due to the fact that interest rates in Nigeria as well as in many of the developing countries are very low and may even be negative real interest rates when adjusted for inflation in these countries. It could also be that other factors like income and foreign exchange rates, other than interest rates, are actually the dominant determinants of savings behavior in these countries, Nigeria inclusive.

5.0 Conclusion and Recommendations

This paper set out to investigate the nature of the relationship between deposit rates (disaggregated into various categories of deposit rates charged by DMBs in Nigeria) and deposit mobilization in Nigeria within the period 1981 and 2012 using annual data collected from the Statistical Bulletin published by the CBN. The empirical results succinctly demonstrate no significant relationship between all categories of deposit rates and total deposit liabilities of DMBs in Nigeria. The same results were also obtained with respect to the impact of deposit rateson time, savings and foreign currency deposits. In addition, the paper found no granger causality relationship between deposit rates and deposit liabilities. It is therefore recommended that a policy of interest rate liberalization alone may not be enough to induce higher levels of fund mobilization. The government should pursue programmes aimed at boosting investment and growing the economy to increase incomes that would release further savings for sustainable growth.

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