

## Financial Liberalisation and Domestic Savings in Nigeria

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**Abstract:** The study used an Autoregressive Distributed Lagged (ARDL) estimation technique, built on the McKinnon complementary hypothesis framework to investigate the impact of financial liberalisation on Nigeria's domestic savings, 1970-2009. The results revealed that given domestic savings, immediate past financial liberalisation, lagged one, displayed a minimal positive effect, though significant did not last long as it turned to a significant negative effect in the long run. The trend in shifting effects is attributed majorly to inconsistency or lack of continuity in the implementation of financial liberalisation reforms and the unhealthy state of the financial sector. Financial liberalisation did not bring about positive real interest rate to encourage savings. Credit to the private sector however had a strong positive effect on the level of domestic savings in the long and short run. The study therefore concluded that interest on deposit induced by liberalisation was not the major determining factor that propelled depositors to save or increase savings but lack of investment alternatives outside financial assets. Further, lack of effective competition among banks inhibited the impact of interest deregulation on savings.

**Key words:** Financial liberalisation, bounds testing, autoregressive distributed lag, savings, real interest rate

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### INTRODUCTION

Financial systems have long been recognised to play an important role in economic development. The benefit derivable from a healthy and developed financial system relates to savings mobilisation and efficient financial intermediation roles. In terms of financial intermediation between savers (lenders) and borrowers such benefits include reduction of transaction and search costs. Financial institutions create liquidity in the economy by borrowing short-term and lending long-term. They reduce information cost, provide risk management services and reduce risk involved in financial transactions. These financial intermediaries bring the benefits of asset diversification to the economy. They mobilise savings from atomised individuals for investment thereby solving the problem of indivisibility in financial transactions. Finally, mobilised savings are invested in the most productive ventures irrespective of the source.

Based on these expectations, developed and developing countries, Nigeria inclusive have implemented financial liberalisation under different financial structures and macroeconomic conditions. Prior to the introduction of Structural Adjustment Programme (SAP) in Nigeria in 1986, the Nigerian financial sector was characterised by rigid exchange and interest rate controls, mandatory sectoral allocation of bank credit and quantitative ceiling in bank credits to the private sector, all of which engendered distortions and inefficiencies that resulted in

low direct investment. Funds were inadequate, the Nigerian currency was overvalued and the monetary and credit aggregates moved rather sluggishly and the economy was found engulfed in a general lull.

With the introduction of SAP, financial liberalisation measures were adopted which included interest rate deregulation and exchange rate liberalisation (Ogwuma, 1993; Ojo, 1993). Financial liberalisation generally, involves the elimination of credit controls, deregulating interest rates, removal of entry barriers into the financial services industry, development of capital markets, increased prudential regulation and supervision and liberalisation of international capital flows. These reforms are expected to increase competitive efficiency within the financial market in at least three ways: improved allocation, higher operational and dynamic efficiency as the reform measures generate an improved range of financial products and services adaptable to changing consumer needs. Stulz (1999) and Mishkin (2001) assert that financial liberalisation promotes transparency and accountability, reducing adverse selection and moral hazard while alleviating liquidity-related problems in financial markets.

Criticism of the financial liberalisation theory has been premised on the assumption that markets if left alone will work efficiently. Another important critique has been launched on one of the critical assumptions of the theory that for the financial liberalisation and growth link to work, savings would increase following an increase in interest

rate induced by liberalisation which spurs credit to private sector and invariably economic growth. However, there is no unanimous agreement on this issue. The relationship is complex not only because there are short and long-term effects involved but because financial liberalisation is a process with many dimensions.

Although, financial liberalisation reform can increase efficiency by channelling resources into productive use, its impact on the quantity of savings is ambiguous. To this end therefore, this study seeks to answer the following questions:

- Has financial liberalisation spurred savings in Nigeria?
- Did the economy fare better or worse before and after liberalisation?

One of the major challenges in the study of the impact of financial liberalisation on macroeconomic variables is with respect to measures of liberalisation. Existing empirical studies (Oshikoya, 1992; Ogun, 1998; Allen and Ndikumana, 2000; Okpara, 2010) have not adequately measured the gradual institutional changes that financial liberalisation entails as most of them simply use a dummy of zero (0) for no liberalisation and one (1) to indicate the presence of liberalisation. Other studies such as Allen and Ndikumana (2000) and Aziakpono (2004) used the ratio of liquid liabilities to GDP as a measure of financial intermediation which does not give any indication of the specific financial liberalisation policies embarked upon by the countries under consideration. Further, Oshikoya (1992), Seck and El-Nil (1993) and Matsheka (1998) used real interest rate as a measure of financial liberalisation, a variable that captures only one component of financial liberalisation-interest rate deregulation. Financial liberalisation does not consist solely of interest rate deregulation but involves other policies. Thus, studies that rely only on the real interest rate will suffer from the problem of omitted variable bias. Fowowe (2008) avoided this problem by constructing an index to capture financial liberalisation process using five indicators of liberalisation: bank denationalisation and restructuring, interest rate liberalisation, prudential regulation, direct credit abolition and free entry into banking. However, his index captures only financial liberalisation in the money market, given that equity/capital market and the foreign exchange market liberalisation which are components of financial liberalisation in most countries including Nigeria are left out. This study extends the research horizon on the impact of financial liberalisation on domestic savings in Nigeria by including liberalisation in the stock and

exchange markets as components of the degree of liberalisation and seeks to contribute to the debate in the literature (Appendix 1). The study covers 1970-2009. Empirical works on the relationship between financial liberalisation and savings have remained inconclusive. On the one hand are those who argue that higher interest rate brought about by liberalisation would stimulate savings which in turn would lead to higher level of investment and economic growth (Fry, 1978, 1995; Levine, 2001; Bekaert *et al.*, 2004; Fowowe, 2008; Okpara, 2010). On the other hand are those who conclude that financial liberalisation does not necessarily lead to higher savings and investment (Bandiera *et al.*, 2002; Eichengreen and Leblang, 2003; Emmanuel, 2006). Fry (1995) reports that across a sample of 14 Asian countries, savings and interest rate are positively related. Thus if financial liberalisation induces a rise in interest rate then savings should increase. Financial liberalisation which leads to large capital inflow can also have short-term implications for savings and growth. Bandiera *et al.* (2002) argue that the impact of financial liberalisation on savings comes through the related changes in the availability and cost of credit, expected income growth and increased wealth due to higher property value.

Eichengreen and Leblang (2003) contend that the effect on growth is negative. Similarly recent empirical evidence show that though financial liberalisation results in higher interest rates and financial deepening, it does not necessarily lead to higher savings and investment (Emmanuel, 2006; Okpara, 2010). However, Awan *et al.* (2010) in their study of financial liberalisation and domestic savings behaviour in Pakistan from 1973-2007, observe that the real interest rate, financial liberalisation and economic growth positively impact savings. Jappelli and Pagano (1994) previously arrive at similar conclusion by using a panel data of OECD countries for 1960-1987. Investigating the role of capital market imperfections on aggregate savings and growth their analytical framework is built on the Overlapping Generations Model within the context of which it is shown that liquidity constraints on households (but not firms) can raise the savings rate; strengthen the effect of growth on savings; increase the growth rate if productivity growth is endogenous and may increase welfare. The authors find empirical support for their propositions that financial deregulation in the 1980's contributed to the decline in national savings and growth rate in the OECD countries and thus the concern about the growth and welfare implications of further liberalisation within European Union (EU).

Focusing on financial liberalisation, Kar and Pentecost (2001) find that in Turkish economy from

1980-1995, money and capital are complementary suggesting that higher real interest rates will raise the demand for money and lead to higher levels of investment. It is also noted that government investment complements private sector investment, thus avoiding crowding out the latter as a result of a rise in the former. The policy implication they explain is that further financial liberalisation in Turkey will enhance investment and lead to at least if only temporarily, a higher rate of economic growth.

Ashfaq and Lubna (1998) in a similar study on Pakistan using time series data from 1959-1960 and 1994-1995 find a strong support for McKinnon's hypothesis. The coefficients of saving ratio in the money demand function and of the real money balance in the savings function are positive and statistically significant. This result holds true when money demand and savings functions are estimated in static long run formulations (Cointegration Regression) as well as in the dynamic formulation (Error Correction Model). They conclude that the financial liberalisation policies undertaken in Pakistan were likely to result in financial deepening. An increase in real interest rate would lead to the accumulation of money balance (savings = financial assets) which would improve the availability of loanable funds for investment.

Awan *et al.* (2010) analyse the long and short run relationship among the real rate of interest on deposits, financial liberalisation, economic growth, terms of trade, real remittances and domestic savings behaviour in Pakistan using time series data for 1973-2007. The result shows that the real interest rate, financial liberalisation and economic growth positively affected domestic savings in Pakistan in the long run. The coefficient of liberalisation dummy is also positive and statistically significant suggesting a need for increased liberalisation and deregulation of interest rate for mobilisation of savings. Conversely, the terms of trade and real remittances by Pakistani emigrants show a negative relationship with domestic savings also supporting the complementarity hypothesis of McKinnon (1973) and Shaw (1973).

Using a Vector Error-Correction model, Balamoune-Lutz (2006) explores the short run dynamics and long run linkages between financial liberalisation reform and the mobilisation of domestic savings in Morocco 1960-1999. In the short run, financial depth (volume of intermediation) is shown to have a positive influence on private savings while increases in real interest rates have a negative impact. The effectiveness of financial intermediation does not seem to have a direct effect on savings but has a significant influence on the volume of intermediation. In the long run, savings

have a stable relationship with financial liberalisation but the influence of interest rates remains negative implying that the income effect dominates in the long run as well.

Motivated by the controversy over the role of financial liberalisation on domestic savings, Odhiambo (2006) examines the impact of financial liberalisation on domestic savings in South Africa from 1987-2000. The study utilizes two proxies of financial liberalisation; real deposit rate and financial depth (M2/GDP). The empirical result reveals a distinct positive relationship between domestic savings and financial depth in South Africa. However, the empirical result fails to support the interest rate elasticity to savings. Premised on this, the study concludes that although financial liberation may not significantly influence the domestic savings in South Africa through its effect on interest rates, it affects the form in which savings take place via its financial deepening impact.

## MATERIALS AND METHODS

**Data source:** The study relied on historical quantitative data which are available in secondary form sourced majorly from the Central Bank of Nigeria (CBN) Annual Statistical Bulletins from 1970-2009. Also, data on real interest rate for Nigeria were derived from the official website of the World Bank Database (CBN, 2009).

**Model specification:** The low interest rate policy pursued by many developing countries in the past was in accordance with Keynesian and neoclassical theories that predicted that this practice would promote investment and economic growth. Implicit in this policy was the assumption that the cost of capital and not the availability of loanable funds is the binding constraint for capital formation. McKinnon (1973) and Shaw (1973) argue that the pursuance of such policies (i.e., low and administered interest rates, selective credit control and concessional credit practices) have led to widespread financial repression in developing countries. The repressed financial market discourages savings, retard the efficient allocation of resources, increase the segmentation of financial markets and create financial disintermediation of the banking system.

In particular, the policies of imposing ceilings to priority sectors at low interest rates, impede financial deepening and hence weaken an important set of impulses that would otherwise have foster economic development. The vital message of the McKinnon and Shaw thesis is that a low or negative real rate of interest discourages savings and hence reduces the availability of loanable

funds, constrains investment which in turn lowers the rate of economic growth. On the contrary, an increase in the real interest rate may induce savers to save more which will enable more investment to take place. This suggests a basic complementarity between the accumulation of money balances (financial assets) and physical capital accumulation. The complementarity hypothesis rests on two key assumptions:

- All economic agents are restricted to self-finance
- Due to indivisibility, investment requires the a priori accumulation of money balances. Hence, the more attractive the process of money balances accumulation, the greater will be the inducement to invest

The complementarity hypothesis of McKinnon provides a useful formulation through which the success of financial liberalisation policy can be gauged. The complementarity hypothesis is examined using the dual model. First, the demand for Real Money Balances (M/P) depends positively upon real income,  $Y$ ; the real rate of interest on deposit,  $d-\pi^*$  ( $d$  = deposit rates,  $\pi^*$  = expected rate of inflation) and the real average return on physical capital,  $C$ .

$$\begin{aligned} M/P &= \psi(Y, d-\pi^*, C) \\ \psi_Y &> 0, \psi_{d-\pi^*} < 0, \psi_C > 0 \end{aligned} \quad (1)$$

The positive association between the average real return on physical capital and the demand for money balances represents the complementarity between capital and money as given by the functional relationship above (time scripts are omitted for simplicity). The equation suggests that the demand for money is given not only by the transaction and speculative motives of holding cash but also by the need to finance real capital formation in countries where institutional credit or alternative finance is constrained. There is also the need to hedge against inflation in such a way as to preserve the real value of money balances.

Complementarity works in both directions: money supply has a first order impact in determining investment hence complementarity can be accomplished by specifying an investment function given by:

$$\begin{aligned} i/y &= f(C, d-\pi^*) \\ f_C &> 0, f_{d-\pi^*} < 0 \end{aligned} \quad (2)$$

The investment to income ratio  $I/Y$  must be positively related to the real rate of return on money balances. This is because if a rise in the real return on bank deposits  $d-\pi^*$

raises the demand for real money and the latter balances are complementary to investment, it must also lead to a rise in the investment ratio. The complementarity hypothesis specifically requires that  $\psi_C > 0$  and  $f_{d-\pi^*} < 0$ .

McKinnon's model is however restrictive in that there is no role of intermediation by financial institutions from savings (money includes current and time savings) to the creation of credit. This is very unlikely even in underdeveloped financial markets. Since, the indirect effect of real deposit rates on investment is due not only to self-finance but also to the credit creation from money where the real supply of credit increases *pari-passu* with money demand (Fry, 1980).

Moreover, the level of credit may contain two types of information about the process of financial intermediation. First, changes in credit may reflect the ability of financial intermediaries to make loans perhaps due to changes in monetary policy. In this case, firms which are unable to obtain funds in the capital market may become credit constrained leading to lower levels of investment. Second, changes in credit may reflect shocks to the intermediation system itself. In practice, financial liberalisation in many developing countries initiates various forms of deregulations in financial markets, the creation of financial innovations or changes in the solvency of borrowers or lenders which has implications for economic activity that may be transmitted through changes in the quantity of credit (Moore, 2009). In this respect, the availability of credit to business will affect the investment ratio independently of the self-finance motive of holding money, hence the credit variable is specified in the investment Eq. 2. By specifying credit along with the real rates of deposits in the investment equation, the two channels of funding sources could be identified: one is self-finance portrayed by the effect of real deposit rates and the other channel is through credit intermediation by financial institutions.

From an empirical perspective since it is impossible to compute a sensible measure of the real return on physical capital  $C$ , McKinnon (1973) suggests that it could be replaced by the investment to income ratio  $I/Y$ , likely to vary directly with the average real return on physical capital (Pentecost and Moore, 2006), the models now become:

$$m/p = \psi(y, i/y, d-\pi^*) \quad \psi_{i/y} > 0 \quad (3)$$

$$i/y = f(d-\pi^*, dc) \quad (4)$$

Where:

$m/p$  =  $\ln(M/P)$

$i/y$  =  $\ln(I/Y)$

$y$  =  $\ln Y$

$dc$  = The ratio of domestic credit to private sector to GDP

Equation 3 and 4 form the basis for empirical estimation.

**Augmenting the investment model:** In the seminal research of McKinnon (1973)'s complementarity hypothesis, government fiscal action has limited role in affecting aggregate capital accumulation directly, since the public policy is limited to the control of the real return on holding money (i.e., real interest rate:  $d-pe$ ). Further, restrictions apply to the specified assumptions about investment in small self-financing domestic enterprises. The models described are also derived from the assumptions of a closed economy, even though empirical materials are usually drawn from small open economies and so their rates of capital formation are unlikely to be determined solely by tiny self-financing units. Virtually, many developing countries are highly dependent on foreign trade and are open to corporate investment from abroad. Hence, a rise in investment may not always be due to a rise in the savings ratio when foreign trade or foreign capital flow is brought into the picture.

McKinnon (1973) also fails to take account of the effect of financial development and the different income levels across countries (as these are treated as constant). We augment the long run investment models with several factors, likely to contribute to the share of financing domestic capital formation by relaxing the assumptions or restrictions. First, we consider financial development which entails financial innovations and deregulates some restrictions in the capital market, widening the scope for alternative investment opportunities and also remove barriers to foreign banks. This is likely to impact on the transmission mechanism between deposit rates and investment. As a proxy variable, this study explicitly includes the financial liberalisation index which captures the degree of liberalisation in the financial markets of: equity/capital, exchange and money markets and the progression changes involved over time. The Augmented Investment Model is now given by:

$$i/y = f(d-pe, dc, v) \quad f_v > 0 \quad (5)$$

Where  $v$  is the vector of additional explanatory variable: financial liberalisation index. Equation 5 thus, replaces Eq. 4. Working with Eq. 6 and 7:

$$m/p = \psi(y, i/y, d-pe) \quad (6)$$

$$i/y = f(d-pe, dc, v) \quad (7)$$

Substitution for  $i/y$  in Eq. 6:

$$m/p = \psi(y, f(d-pe, dc, v), d-pe) \quad (8)$$

Implicitly, Eq. 8 becomes:

$$m/p = \psi(y, dc, d-\pi^e, v) \quad (9)$$

$$\psi_y > 0, \psi_{dc} > 0, \psi_{v} > 0, \psi_{d-\pi^e} > 0$$

Where:

- $m/p$  = The accumulated real money balances proxied by the ratio of Total Financial Savings to Gross Domestic Product (SAV/GDP)
- $y$  = The real income proxied by the Real Gross Domestic Product (RGDP)
- $dc$  = The ratio of Domestic Credit to Private Sector to Gross Domestic Product (CrPVT/GDP)
- $d-\pi^e$  = Real Rate of Interest (RINTr)
- $v$  = Vector of additional explanatory variable; the Financial Liberalisation Index (FinLB)

Equation 9 is the functional form for empirical estimation of this study. Substituting the proxies and expressing in mathematical log form:

$$L(SAV/GDP) = \alpha_0 + \alpha_1 L(GDP) + \alpha_2 L(CrPVT/GDP) + \alpha_3 RINTr + \alpha_4 FinLB + \mu_t \quad (10)$$

Where:

- $\mu_t$  = The error term
- $L$  = The logarithmic/log indicator for growth rate (it is not included for real interest rate because of the presence of negativity and financial liberalisation index) and  $\alpha_0$ - $\alpha_4$  are the parameters coefficients,  $\alpha_0, \alpha_1 \dots \alpha_4 > 0$

Equation 10 is therefore, the basic equation derived from the complementarity hypothesis-theory for the study.

**Estimation technique:** This study employs the bounds test approach proposed by Pesaran *et al.* (2001) based on Unrestricted Error Correction Model. Compared to other cointegration procedures such as Engle and Granger (1987) and Johansen and Juselius (1990), the bounds test approach appears to have gained popularity in recent times for a number of reasons. First, the endogeneity problems and inability to test hypotheses on the limited coefficients in the long run associated with the Engle-Granger Method are avoided that is it has superior statistical properties in small samples as it is relatively more efficient in small sample data sizes found mostly in studies on developing countries. Second, the long run and short run parameters of the model are estimated simultaneously. Third, all the variables are assumed to be endogenous. Fourth, the econometric methodology is relieved of the burden of establishing the order of

integration among the variables and of pre-testing of unit roots. Lastly whereas all the other methods require that the variables in a time series regression are integrated of order one, I(1), only that of Pesaran *et al.* (2001) could be used regardless of whether the underlying variables are I(0), I(1) or fractionally integrated. To apply the bounds procedure, it is important to ensure that the variables under consideration are not integrated at an order higher than one. In the presence of I(2) variables, the critical value provided by Pesaran *et al.* (2001) are no longer valid.

The augmented ARDL is given by the following (Pesaran and Pesaran, 1997; Pesaran and Shin, 1995):

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 X_{t-1} + \sum_{i=1}^k \beta_{1i} \Delta Y_{t-i} + \sum_{i=1}^k \beta_{2i} \Delta X_{t-i} + \varepsilon_t \quad (11)$$

The ARDL representation of Eq. 10 is therefore formulated as follows:

$$\begin{aligned} \Delta L(\text{SAV} / \text{GDP})_t = & \alpha_0 + \sum_{i=1}^{k_1} \alpha_{1i} \Delta L(\text{SAV} / \text{GDP})_{t-i} + \\ & \sum_{i=1}^{k_2} \alpha_{2i} \Delta \text{LGDP}_{t-i} + \sum_{i=1}^{k_3} \alpha_{3i} \Delta L(\text{CrPVT} / \text{GDP})_{t-i} + \\ & \sum_{i=1}^{k_4} \alpha_{4i} \Delta \text{RINT}_{t-i} + \sum_{i=1}^{k_5} \alpha_{5i} \Delta \text{FinLB}_{t-i} + \lambda_1 L(\text{SAV} / \text{GDP})_{t-1} + \\ & \lambda_2 \text{LGDP}_{t-1} + \lambda_3 L(\text{CrPVT} / \text{GDP})_{t-1} + \lambda_4 \text{RINT}_{t-1} + \lambda_5 \text{FinLB}_{t-1} + \varepsilon_t \end{aligned} \quad (10)$$

Where:

- $\alpha_1 - \alpha_5$  = Error correction or short run dynamic
- $\lambda_s$  = Long run relationship
- $\varepsilon_t$  = Error correction term or white noise
- $\alpha_0$  = Intercept or drift
- $L_s$  = Log indicators
- $\Delta s$  = First differences
- $ks$  = Respective specific optimum lag orders of the variables entering the ARDL-ECM

The other variables are as previously defined. The financial liberalisation index/ measure is majorly regarded as a policy variable thus we consider it to be exogenous variable in the study. The implementation of the ARDL approach estimation is as follows. First, researchers have to estimate the optimum lags of each variable by imposing a maximum lag of three this choice is on the basis of the short time frame and number of variables as recommended by Narayan (2005) and then choose the combination of lags that minimises the Schwarz Information Criterion (SIC) (There are other model selection criteria such as Akaike Information Criteria (AIC), Hannan-Quinn Information Criterion (HQC) and adjusted R-squared.

However, the SIC is often preferred as it gives the heaviest penalties for loss of degree of freedom). The full information estimate of each of the optimum model is the basis of further analysis. At this optimum lag combination, researchers test whether the lagged (one) variables-long run parameters are jointly significant that is if the null hypothesis of no cointegration, against the alternative hypothesis of the existence of a long run cointegrated relationship using F-test such as:

$$\begin{aligned} H_0: \lambda_1 = \lambda_2 = \dots \lambda_n &= 0 \\ H_1: \lambda_1 = \lambda_2 = \dots \lambda_n &\neq 0 \end{aligned}$$

The bounds test is a Wald test (or F-test) in which the joint significance of the coefficients for lagged variables is tested with F-statistics calculated under the null. The asymptotic distribution of critical values is obtained for cases in which all regressors are purely I(1) as well as when the regressors are purely I(0) or mutually cointegrated. The F-test has a non-standard distribution which depends upon: whether variables included in the ARDL model are I(1) or I(0) the number of regressors whether the ARDL contains an intercept and/or a trend and the sample size (Narayan, 2005). The F-statistic has two sets of critical values (Pesaran *et al.*, 2001). One set assumes that all variables are of order I(0) and the other set assumes that they are all of order I(1).

If the calculated F-statistics falls above the upper bound critical value (corresponding to all I(1) variables) of F-tabulated developed by Pesaran, then the null of no cointegration can be rejected. This implies that cointegration or long run relationship exists. If the computed F-statistics falls below the lower bound critical value then the null hypothesis of no cointegration cannot be rejected. This implies that all variables are I(0), the variables are deemed not to be cointegrated. If it lies between the two bounds, the result seems inconclusive. And an alternative test required. (Pesaran *et al.*, 2001; Narayan, 2005; Zakir *et al.*, 2010).

Next, researchers create a lagged Error Correction Model (ECM<sub>t-1</sub>) out of the fitted values of the lagged long run variables (the  $\lambda$  terms) and replace the individual lagged terms with the ECM<sub>t-1</sub>. If when the equation is re-estimated at the SIC-minimised lags, the coefficient on the ECM<sub>t-1</sub> is negative and significant, researchers can say that there is a long run relationship among the variables. If cointegration is established, researchers can form long run coefficient estimates from equation 1 by normalising the estimates for  $\lambda_2 - \lambda_5$  on the estimate for  $\lambda_1$ . In the third step, once cointegration is established, the conditional ARDL ( $k_1 - k_5$ ) long run model for the dependent variable(s) can be estimated. This involves employing the optimal lag

orders of the ARDL ( $k_1$ - $k_5$ ) Model in the five variables using SIC. In the fourth and final step, researchers obtain the short run dynamic parameters by estimating an error correction model associated with the long run estimated ( $ECM_{t-1}$ ).

To check for the common problems encountered in regression model such as spurious regression, unit root test will be implemented to ensure variables do not exceed  $I(0)$  or  $I(1)$ , collinearity test for multi-collinearity and a test for stability (CUSUM and CUSUMSQ) diagnosis test will be carried out as the estimation of the equation unfolds.

**Unit root test:** While, the bounds test for cointegration does not depend on the pre-testing of the order of integration to satisfy the curiosity and quell the anxiety of spurious result from regression, obtainable from regressing non-stationary series and also to scrutinise the integrating level of the variables which is to ensure that the variables are not of order  $I(2)$ . As noted by Ouattara (2004) in the presence of  $I(2)$  variables, the computed F-statistics provided by Pesaran *et al.* (2001) are not valid because the bounds test is based on the assumption that the variables are  $I(0)$  or  $I(1)$ . Therefore, the implementation of unit root tests in the ARDL procedure might still be necessary in order to ensure that none of the variables is integrated of order 2 or beyond but fall within the computed F-statistics range provided by Pesaran *et al.* (2001). And also determining the optimal lag length of the variables based on the SIC lag length an alternative to the Akaike Information Criterion (AIC) and imposes a larger penalty for additional coefficients. It is therefore proper for us to conduct a comprehensive standard test like the DF-GLS and Ng-Perron.

A number of empirical works extensively apply the Augmented Dickey-Fuller (ADF) and/or Phillip Perron (PP) test(s) to find the order of integration on variable. However due to their poor power properties, both

tests are not reliable for small sample data set. These tests (ADF and PP) seem to over reject the null hypothesis when it's true and accept it when it is false. The newly proposed test such as the Dickey-Fuller Generalised Least Square (DF-GLS) de-trend test developed by Elliott *et al.* (1996) and Ng-Perron test following Ng and Perron (2001) seem to solve this problem by Zakir *et al.* (2010).

## RESULTS AND DISCUSSION

The results of the DF-GLS and Ng-Perron Unit Root test for checking stationarity of the data, selection of the optimal lag based on the SIC (and imposing a maximum lag of 3) and the determined order of integration are shown in Table 1 and 2, respectively.

The result from DF-GLS shows that all the variables are stationary at first difference  $I(1)$  as their absolute DF-GLS t-statistics values exceed the critical values at 1, 5 and 10%. However, only the real interest rate variable (RINTr) was stationary at level  $I(0)$ , the remaining variables were non-stationary at level but became stationary after taking their first difference that is  $I(1)$ . Similar conclusion can be drawn from the Ng-Perron Unit Root test for stationarity, order of integration and optimal lag length based on the SIC.

Like the DF-GLS, the Ng-Perron Unit Root test verifies that all the five variable are integrated of order one  $\{I(1)\}$  and also the real interest rate being the sole variable stationary at  $I(0)$ . Divergence in the two tests is evident in their estimated maximum lag lengths 3 and 2 for DF-GLS and Ng-Perron, respectively. Thus researchers impose a maximum lag length of 3 in determining the combination of optimal lag length on each variable that minimises the SIC. This conforms to the automatic lag selected by the software analytical package.

**Cointegration test bounds testing procedure:** Test of cointegration shows that the computed F-statistics of

Table 1: DF-GLS unit root test (Optimal lag length selection: SIC)

Variables	Lag length	DF-GLS t-statistic	1%	5%	10%	
At level (with intercept, no trend)						
L(SAV/GDP)	1	-1.059173	-2.627238	-1.949856	-1.611469	
L(CrPVT/GDP)	0	0.628132	-2.625606	-1.949609	-1.611593	
LGDP	0	2.250670	-2.625606	-1.949609	-1.611593	
RINTr	0	-3.809840***	-2.625606	-1.949609	-1.611593	
FinLB	0	-0.502907	-2.625606	-1.949609	-1.611593	
Variables	Lag length	DF-GLS t-statistics	1%	5%	10%	Order of integration
At first difference (with intercept, no trend)						
L(SAV/GDP)	0	-3.956053***	-2.627238	-1.949856	-1.611469	I(1)
L(CrPVT/GDP)	0	-4.258340***	-2.627238	-1.949856	-1.611459	I(1)
LGDP	0	-5.358386***	-2.627238	-1.949856	-1.611469	I(1)
RINTr	3	-1.253165***	-2.632688	-1.950687	-1.611059	I(0) and I(1)
FinLB	1	-6.613282***	-2.628961	-1.950117	-1.611339	I(1)

Researchers computation; \*\*\*Indicates critical values 1%

Table 2: Ng-perron unit root test (Optimal lag length selection: SIC)

Variables	Lag length	Mza	Mzt	MsB	Mpt	
At Level (with intercept, no trend)						
L(SAV/GDP)	1	-8.04493	-1.579830	0.19638	4.47976	
Ng-Perron critical values at 5% sig.		-8.10000	-1.980000	0.23300	3.17000	
L(CrPVT/GDP)	0	3.64737	0.981850	0.26900	13.98370	
Ng-Perron critical values at 5% sig.		-8.10000	-1.980000	0.23300	3.17000	
LGDP	0	3.23198	3.288170	1.01738	103.20700	
Ng-Perron critical values at 5% sig.		-8.10000	-1.980000	0.23300	3.17000	
RINTr	0	-11.24200*	-2.181520*	0.19405	2.89173	
Ng-Perron critical values at 5% sig.		-8.10000	-1.980000	0.23300	3.17000	
FinLB	2	0.74430	0.717280	0.96369	61.76680	
Ng-Perron critical values at 5% sig.		-8.10000	-1.980000	0.23300	3.17000	
Variables	Lag length	Mza	Mzt	MsB	Mpt	Order of integration
At first difference (with intercept, no trend)						
L(SAV/GDP)	0	-16.90430*	-2.600640*	0.153850	2.52244	I(1)
Ng-Perron critical values at 5% sig.		-8.10000*	-1.980000*	0.233000	3.17000	
L(CrPVT/GDP)	0	-17.20190*	-2.781950*	0.161720	1.96496	I(1)
Ng-Perron critical values at 5% sig.		-8.10000*	-1.980000*	0.233000	3.17000	
LGDP	0	-18.22110*	-2.978980*	0.163490	1.48658	I(1)
Ng-Perron critical values at 5% sig.		-8.10000*	-1.980000*	0.233000	3.17000	
RINTr	2	-54.85960*	-5.237330*	0.075470	0.44662	I(0) and I(1)
Ng-Perron critical values at 5% sig.		-8.10000*	-1.980000*	0.233000	3.17000	
FinLB	1	-34.81910*	-4.172130*	0.119382	0.70464	I(1)
Ng-Perron critical values at 5% sig.		-8.10000*	-1.980000*	0.233000	3.17000	

Researchers computation; \*Indicates significant at 1%

Table 3: Estimated long run coefficients using the ARDL approach ARDL (1, 1, 0, 1, 1) selected based on Schwarz Bayesian criterion

Regressors	Coefficient	SE	t-ratio	p-values
Const	-0.20399200	0.29352100	-0.6950	0.49165
LRGDP	0.01730490	0.03871200	0.4470	0.65762
LCrPVT/GDP	0.92344300***	0.09648260	9.5711	<0.00001
RINTr	-0.00459464**	0.00213909	-2.1479	0.03872
FinLB	-0.05541890***	0.01834480	-3.0210	0.00469

Statistical significance at \*, \*\*5 and \*\*\*10% levels, respectively; dependent variable is LSAV/GDP, observations 1970-2009 (T = 40); R<sup>2</sup>: 0.857224; Adjusted R<sup>2</sup>: 0.840907; Durbin-Watson: 1.093863; Schwarz criterion: -19.86177

5.2025 exceeds the lower and upper bounds critical values of 2.86 and 4.01 at the 5% significance level, respectively, using the Narayan (2005) critical values bounds testing for cointegration analysis (Appendix 2). Therefore, the null hypothesis of no cointegration is rejected. This implies that savings and its determinants; economic growth, credit to the private sector, real interest rate and financial liberalisation are cointegrated. Researchers therefore proceed to analyse the short and long run dynamics.

Table 3 shows the long run results of the growth rate of domestic savings as a ratio of the Gross Domestic Product (GDP). It shows that the growth rate of credit to private sector, real interest rate and financial liberalisation do affect the domestic savings. The coefficient of growth rate of credit to private sector is positive ( $\approx 0.923$ ) and highly significant. That is a 1% change in the financial credit to private sector per GDP (otherwise known as financial deepening or widening) leads to a 0.92% increase in savings per GDP. This is in conformity with the a priori expectation of a positive relationship. However, the curiosity on the large parameter value (0.92) can be quelled on the intuition that relates to the tie between the savings and credit variables. That is when commercial

banks honour credit demands of investors (who in many cases are existing customers), the credit loan /advances are paid into the accounts of the customer (investors) and are re-recorded as components of aggregate deposits of banks which still sums to savings given substantial lag. The coefficients of Real Interest Rate (RINTr) and Financial liberalisation (FinLB) were also significant at 5 and 1%, respectively.

However, their values were very small and indicate negative effects (-0.00459464 and -0.0554189, respectively) on the level of domestic savings; suggesting that financial liberalization did not bring about a positive growth effect on domestic savings in the long run. This finding is consistent with Okpara (2010) and Balamoune-Lutz (2006) findings leading to the conclusion that McKinnon's complementary hypothesis seems not to be valid in the long run as in the case of Nigeria. The appropriateness of the explanatory variable is backed by the goodness of fit-R<sup>2</sup> and the adjusted R<sup>2</sup>. The curiosity aroused by the low DW value is settled on the fact that if there are lagged dependent variables on the right hand side of the regression or its parent's source, the DW test is no longer valid (Johnson and Dinardo, 1997).



Table 4: Estimated short run coefficients using ARDL approach ARDL (1, 1, 0, 1, 1) selected based on Schwarz Bayesian criterion

Regressors	Coefficient	SE	t-ratio	p-values
Const	-0.01373160	0.02327620	-0.5899	0.55996
$\Delta$ LSAV/GDP <sub>t-1</sub>	0.19817000*	0.10879500	1.8215	0.07923
$\Delta$ LRGDP <sub>t</sub>	0.03267760	0.05491680	0.5950	0.55660
$\Delta$ LRGDP <sub>t-1</sub>	-0.01102610	0.05577770	-0.1977	0.84472
$\Delta$ LCrPVT/GDP <sub>t</sub>	0.69735700***	0.10696400	6.5196	<0.00001
$\Delta$ RINTR <sub>t</sub>	-0.00106554	0.00171678	-0.6207	0.53984
$\Delta$ RINTR <sub>t-1</sub>	-0.00121752	0.00141350	-0.8613	0.39636
$\Delta$ FinLB <sub>t</sub>	-0.01692200	0.02819690	-0.6001	0.55324
$\Delta$ FinLB <sub>t-1</sub>	0.08966280***	0.02648170	3.3858	0.00212
ECML t-1	-0.49732500***	0.12530200	-3.9690	0.00046

Statistical significance at \*, \*\*5 and \*\*\*10% levels, respectively; dependent variable is  $\Delta$ LSAV/GDP, observations 1972-2009 (T = 38); R<sup>2</sup>: 0.784494; Adjusted R<sup>2</sup>: 0.715225; Durbin's h: 2.77200500; Schwarz criterion: -33.82434

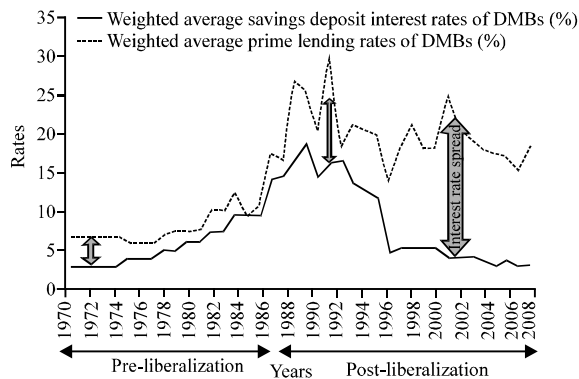


Fig. 1: Interest rate spread, 1970-2009

The negative effect of the real interest rate on domestic financial savings can be attributed to the high volatility of real interest rate which in most cases have been negative also the wide spread between the lending and deposit rate of DMBs, expected to narrow given the inducement of competition from liberalisation however is not realised as most DMBs exploit the spread as a tool of furthering profit and survival in the banking business (Fig. 1 on Interest Rate Spread). The fact that the values of the coefficients of the effect of real interest rate and financial libation on savings are marginal but negative suggest that before financial liberalisation reforms can bring about positive effects on savings in the long-run, there is the need for a more vibrant and healthy financial system and above all, consistency in the implementation of financial liberalisation policy over time.

The Error Correction Model (ECM) or the short run dynamics of the ARDL (as sometimes called) as shown in Table 4 demonstrates that the lagged ECM<sub>t-1</sub> is negative and highly significant at 1%. Its coefficient -0.497325 implies a fairly high speed of adjustment to equilibrium after a shock. Approximately, 50% of disequilibria from previous period shocks are adjusted for in the long run equilibrium in the current period. The significant negative coefficient of the ECM<sub>t-1</sub>, further buttresses the existence of long run relationship. The result of the short run shows

that the change in the credit to private sector has a significantly high positive effect on domestic financial savings in the short run. The coefficient of Credit to Private Sector 0.69735 implies that given one shot increase in the credit to private sector, ceteris paribus brings about approximately 0.70% increase in savings in the short run; suggesting a significant positive relationship between private sector credit and domestic savings.

Previous changes in financial liberalisation (lagged one) unlike the long run result shown in Table 3, seem to have a minor positive effect on changes in financial savings in the short run just as Balamoune-Lutz (2006) reported. Its value 0.0896628 empirically reveals that a 1% increase in the Financial Liberalisation Index (FinLB) leads to approximately 0.09% increase in ASAV/GDP and is statistically significant at 1% significant level. This switch in effects from positive in the short run to negative in the long run is evident in the manner of inconsistency in the implementation of reforms.

Frequent policy switching, goes a long way in hindering the conditioning of the financial system to a particular reform(s) and does not provide ample time for the various reforms to materialise (and its benefit ripped), before the implementation of another (which in most cases is a reverse of the previous). Past financial savings also had an impact on the current changes in savings in the short run by 0.19%, significant only at 10% level of significance. In the short run, current changes in real interest rate and financial liberalisation ( $\Delta$ RINTR<sub>t</sub> and  $\Delta$ FinLB<sub>t</sub>) show very low, negative insignificant values.

The reliability and explanatory power of the short run dynamic estimate is often depicted by its goodness of fit R<sup>2</sup> at 78.4%, further supported by a high adjusted R<sup>2</sup> of 0.715225. This implies that the explanatory variables in the short run model account for approximately 78% variation. According to Pesaran and Shin (1995), the stability of the estimated coefficient of the ECM should also be graphically investigated. The Cumulative Sum (CUSUM)

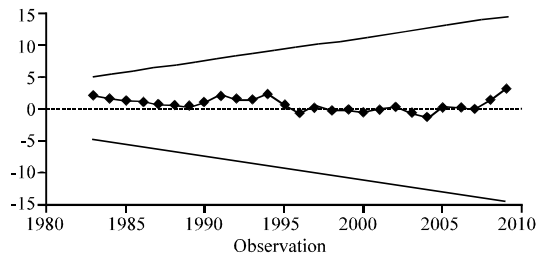


Fig. 2: CUSUM plot with 95% confidence band

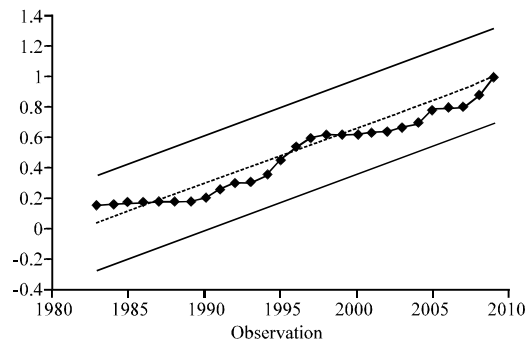


Fig. 3: CUSUMSQ plot with 95% confidence band

and the Cumulative Sum of Square (CUSUMSQ) of the recursive residual are shown in Fig. 2 and 3. The plots of the CUSUM and CUSUMSQ statistics indicate stability in the coefficient over the sample periods.

## CONCLUSION

This study has looked at the impact of financial liberalisation on domestic financial savings of the Nigerian economy from 1970-2009. Researchers investigated the possibility of a long or/and short run relationship among the variables in the study using the Autoregressive Distributed Lagged (ARDL) analysis, built on the McKinnon Complementary Hypothesis (a dual model of the demand for real money balance and investment model). Researchers used the ARDL-bound test approach and the results reveal that given the total domestic savings, immediate past financial liberalisation (that is financial liberalisation lag one) displayed a minimal positive effect though significant, this effect did not last long as it turns to a significant negative effect in the long run. The trend in shifting effects (positive in the short run to negative in the long run) is attributed majorly to inconsistency or (lack of continuity) in the implementation of financial liberalisation reforms and the unhealthy state of the financial sector. Financial liberalisation did not bring about positive real interest rate which is supposed to encourage savings.

Therefore, the study concludes that interest on deposit has not been a major factor that propelled depositors to save or increase savings, instead consumer credit incentives to account owners in banks and lack of investment alternatives outside financial assets. Observably, increases in current savings in the short and long run, increased the credit to private sector which did not translate to economic growth in the immediate short run but significantly positive in the long run, especially when the immediate lag is considered. A battery of explanations has been advanced for the obvious failure of financial liberalisation programmes to address the problems of Nigeria's financial system. The recurrent rationalisation is the incompleteness of the reforms. This study argues that the persistent poor financial performance is due to lack of progress on some of the financial liberalisation reform measures. Earlier and similarly, Nzotta and Okereke (2009) and Soyibo (1996) opine that improper pace and sequencing in the initial reform years led to the crisis and eventual collapse of the financial system, necessitating several policy reversals in Nigeria. The crisis made policy consistency and credibility critical issues. It is obvious that Nigeria's difficulty in sustaining a consistent policy stance was partly attributable to unstable general economic and political conditions.

This study therefore ascribes the failure of financial liberalisation in Nigeria largely to the political and institutional setting of reforms. The argument for this position is that the abrupt financial liberalisation led to the development of opportunities for speculative rent seeking that replaced traditional forms of rent seeking based on political patronage. Therefore in addition to stable macroeconomic conditions and adequate regulatory and supervisory arrangement, it is important that more sophisticated and solvent banking institutions with positive net worth in competitive financial markets are present. The absence of such conditions only leaves interest rate deregulation ineffective if competition (which narrows interest rate spread) is not sharp in the financial system regardless of the bank consolidation. However in the absence of such the Central Bank may manage interest rate in the interim, moving to market determined rate within the long run. The Central Bank can induce competition among the Deposit Money Banks (DMBs) when deregulation is implemented by indirectly reducing the spread by increasing deposit rate, thereby inducing further savings, credit availability and economic growth.

## APPENDICES

**Appendix 1: Index of financial liberalisation:** The financial liberalisation index used to capture the degree of

liberalisation in this study is computed intuitively from the Principal Component Analysis (PCA) idea. It is useful for reducing the dimension of the information set and extracting the major relations from it. This method has been used in the financial liberalisation literature to obtain an index which measures the different phases of the deregulatory and institutional building process. Researchers added two other indicators to the five indicators used by Fowowe (2008) namely: bank denationalisation and restructuring, interest rate liberalisation, prudential regulation, direct credit abolition and free entry into banking. However, his index captures only financial liberalisation in the money market, given that equity/capital market and the foreign exchange market liberalisation which are components of financial liberalisation in most countries including Nigeria are left out. This study extends the research horizon on the impact of financial liberalisation on domestic savings in Nigeria by including liberalisation in the stock and exchange markets as components of the degree of liberalisation.

Researchers then allocate to each of the seven component variables a value of 0 for no liberalisation and 1 for liberalisation depending on the progress made for each specific liberalisation policy component. This gives a matrix of seven dummy variables and the index for financial liberalisation is the addition of component variables for each year, thus reflecting the intensity/degree of liberalisation.

## Appendix 2:

Unrestricted intercept and no trend

Dependent variable	Critical value	F-statistic = 5.55	
		Lower bound I(0)	Upper bound I(1)
$F_{LSAV/GDP}$			
(LSAV/GDP)	1%	3.74	5.06
LRGDP, LCRPVT/	5%	2.86	4.01
GDP, RINT, FinLIB)	10%	2.45	3.52

Asymptotic critical value bounds are obtained from Table CI (iii) case III: unrestricted intercept and no trend for  $k = 4$  (Pesaran *et al.*, 2001)

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