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Research Paper

ARDL Empirical insights on financial intermediation and economic growth in Nigeria

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ABSTRACT

This paper investigates the financial intermediation and economic growth in Nigeria using the autoregressive distributed lag (ARDL) approach from 1985 to 2016 and finds a stable long-run relationship amongst the variables. The results also show that there is a statistically significant positive short-run and long-run relationship between financial intermediation and economic growth. The study therefore recommends that monetary and regulatory authorities should formulate policies aimed at improving financial intermediation process by expanding the scope of credits and deposits in financial institutions which in turn promote financial responsiveness that can positively stimulate growth of the economy.

Key words: Financial intermediation, financial system, economic growth.

INTRODUCTION

Banks and other financial services are essential to economic development through the financial services they provide. Their intermediation role is a catalyst for economic growth and development. The gross performance of the banking sector over time is a strong indication of financial stability in any nation. The extent to which a bank extends credit to the public for productive activities accelerates the pace of a nation's economic growth and its long-term sustainability.

Financial intermediation, as a process involves the transformation of mobilized deposits liabilities by financial intermediaries such as banks into bank assets or credits such as loans and overdraft. The attainment of a steady, viable and speedy economic development in any nation is essentially a function of the availability of monetary assets in the economy. Although not a sufficient condition, resource availability is certainly a necessary condition for output and employment growth. Indeed, there is ample evidence to show that countries that have enjoyed or are enjoying economic prosperity have been linked with an efficient mechanism for mobilizing financial resources and allocating same for productive investment.' Efficiently managed financial intermediation process contributes immensely to a vibrant financial system, higher levels of output, employment and income and through that enhances the living standards of the citizenry. This no doubt explains why special attention is being focused on financial intermediation by economic players in recent times.

The concept of financial intermediation could be defined as a productive activity in which an institutional unit incurs liabilities on its own account for the purpose of acquiring financial assets by engaging in financial transactions on the market; the role of financial intermediaries is to channel funds from lenders to borrowers by intermediating between them. Financial intermediation also refers to the normal flow of money into financial institutions in the form of deposits, which are then loaned out to earn income (Evans, 2007). Financial intermediation has attracted discussions at various sphere of financial studies that there appear to be a consensus in theoretical and empirical literatures that it has some underlying economic functions at both the macro-economic and micro-economic levels. Financial intermediation provides a range of portfolio options for savers with surplus funds and financial intermediaries as well. Financial intermediaries are able to augment their capacity to finance businesses and contribute positively to the economy in general through the process.

The economics of financial intermediation are structured and based on the fundamental roles of financial intermediaries. Besides pooling the resources of small

savers and efficiently allocating same to deficit economic units for productive investments, financial intermediaries provide safe-keeping modalities for real money balance in deposit accounts and facilitate transaction, exchange and specialization. They provide liquidity and operate the payment system of nations. Liquidity is defined as the readiness of an asset to be easily and cheaply converted to a means of payment; provision of liquidity is said to arise when financial intermediaries transform various financial assets into a means of payment through the use of debit/ATM cards and negotiable instruments such as cheques employed as payment device. From these roles of financial intermediaries endue by financial intermediation process, we may want to conclude that financial intermediation supplies recourses to brace the provision of liquidity to business firms and so acting, rejuvenates the entire economy.

An efficient financial system is one of the foundations for building sustained economic growth and an open, vibrant economic system. In the early neoclassical growth literature, financial services played a passive role of merely channeling household savings to investors. The success of the financial system throughout the world has been predicted on the initiation of financial sector policy and reforms such as the introduction of market-based procedures for monetary control, the promotion of competition in the financial sector, and the relaxation of restrictions on capital flows.

Financial Intermediation is a process whereby a financial intermediary such as bank mobilizes bank deposits and transforms deposit money into bank credits, usually loans and overdraft. It is simply the process of taking in money from depositors and then lending same out to borrowers for investment and other economic development purposes. The process allows financial institutions acting as intermediaries' channel funds from surplus economic units (individuals and firms having surplus savings) to deficit economic units (firms and businesses in need of funds to carry out desired business activities). Relatively, it involves the conversion of bank largest liabilities (deposit liabilities) to bank largest interest earning assets (bank credits which include majorly loans and overdrafts). Thus, the efficiency of the financial system of every nation could be said to hinge largely on financial intermediation process because it plays very vital and proactive roles in ensuring capital accumulation necessary for productive investments and development. As a matter of fact, the global financial system and the business of banking in particular flourishes on financial intermediaries' abilities to receive deposit at low interest rate and lend them at a pretty higher rate of interest to businesses.

Financial intermediaries are agents, or groups of agents, who are delegated by authority to invest in order to buy other securities. A first step in understanding intermediaries is to describe the features of the financial markets where they play an important role and highlight what allows them to provide beneficial services. It is important to understand the financial contracts written by intermediaries, how the contracts differ from those that do not involve an intermediary, and why these are optimal financial contracts.

Debt contracts are central to the understanding of intermediaries. The cost of monitoring and enforcing debt contracts issued directly to investors (widely held debt) is a reason that raising funds through an intermediary can be superior. Debt contracts include contracts issued to intermediaries by the borrowers that they find (these are bank loans) and the contracts issued by intermediaries when they borrow from investors (these are bank deposits). Portfolio diversification within financial intermediaries is the financial-engineering technology that facilitates a bank's transformation of loans that need costly monitoring and enforcement into bank deposits that do not (Diamond, 2006; Uremadu, 2012).

The financial intermediaries of the Nigeria economy are expected to be responsible for financial resource mobilization and intermediation between the various sectors of the economy. They are to redirect funds from the surplus sectors of the economy. The financial intermediaries are supposed to provide the funds used as capital inputs by producers in other sectors of the economy as well as, the final consumers. The impact of delivery of these financial services in these financial services in the form of capital to the producers and individuals is felt both in the short run and long run, therefore, the financial sector, especially the banking sector is very important in effective functioning of the real sector of the economy. The real sector of the economy forms the main driving force of the economy. It is the engine of economic growth and development.

Largely, the real sector depends on the banking sector for the provision of the required funds for investment purposes. Based on the assumption that banking sector plays an important role in financing the real sector, successive government in Nigeria have carried out reforms and institutional innovations in the banking sector with the aim of ensuring financial stability of the sector so as to influence the growth of the economy and also to ensure that banks play the critical roles of financial intermediation in Nigeria.

Situating this study in Nigeria is germane because despite series of reforms aimed at strengthening efficiency of financial intermediaries, inadequate funding of the real sector still persists evidenced by the decline in domestic credit to the private sector, coupled with the considerable liquidity mismatch in economy (CBN, 2017). Another problem is that of high concentration of loans to few sectors of the Nigeria economy to the detriment of other sectors. According to CBN (2007), there is a high concentration of loans to oil and gas and communication sector with credit exposure within the banking remaining predominantly short date (at less than 12 months) highlighting the bank

relative lack of long dated funding. Similarly, there is a significant mismatch between where credit is supplied by the sector and the main contributors to the GDP by the sector, for example, although agriculture is the largest contribution to the Nigeria`s GDP (34% of the total GDP in 2012), only 3% of bank credit exposure is to the agricultural sector in 2007 when compared to the communication sector which accounts for 4.4% of total real GDP in 2012 and 5.6% in 2014 was supplied with 31% of total real GDP in 2014 and 27% of total credit to the private sector in 2014 and from 2015 to 2017 the value increased (CBN, 2017). Therefore, the problem remains that the real sector is yet to be effectively linked to the financial intermediaries in the country and questions as what is the impact of financial intermediation to the Nigeria economy, does there exist a long relationship between financial intermediation and economic development in Nigeria?

THEORETICAL AND EMPIRICAL REVIEW

According to Shaw's financial deepening hypothesis theory, financial liberalization tends to raise ratios of private domestic savings to income. With real growth of financial institutions, there are many investors having access to borrowing. There arise incentives for saving with many players and borrowings become cheaper. The planning horizon of the savers shifts to distant future. Current consumption is reduced on account of expected increase in income. Savings also tend to rise in the Government sector. With financial deepening, savings from the foreign sector respond to financial liberalization. There is inflow of capital and easy access to foreign capital markets, which remove distortions in relative prices.

Liberalization permits the financial process of mobilizing and allocating savings to displace inflation and foreign aid. Liberalization enables superior allocation of savings through widening and diversifying financial markets wherein investment opportunities compete for savings flow. The savers are offered a wider menu of portfolio choice. The market is broadened in terms of scale, maturity and risk. Information is made more cheaply available.

Shaw (1973), with the development of the financial system, an alternate financial asset other than money becomes available as repositories of financial savings to be eventually used for investment in productive resources. The savings and investments could take place through accumulation of non-money assets. Thus, in contrast to McKinnon's hypothesis, cash balances are not required to be accumulated prior to investment and hence, there is no complementarily. The negative relationship between money demand and saving imply substitution of money to other non-monetary financial assets as the major repository of saving. Such a relationship implies some level of financial development leading to the emergence of alternate financial assets other than money and would not be consistent with self-financing condition. Financial intermediation is restricted due to financial repression and investors resort to informal credit market. Therefore, financial liberalization would lead to better integration of formal and informal credit markets, which will result in efficient transfer of funds between savers and investors. Economies of scale will result in reducing cost of financial intermediation, information costs and lowering risks due to diversification.

EMPIRICAL REVIEW

The focus of this section is to examine different empirical literatures written on the subject matter financial intermediation and economic growth in Nigeria and beyond. For studies on Nigeria, Agbada and Osuji (2013) examined the effect of financial intermediation on economic growth using ordinary least squares technique (OLS). Their findings showed that there exist positive relationships in the long- and short run. These findings support existing research outcomes and will be relevant to regulatory authorities in formulating policies that are capable of positively enhancing financial intermediation and output growth in the economy. Similarly, Nwaeze et al. (2010) conducted a study on the impact of financial intermediation on economic growth for the periods of 1992 to 2011 using an *ex-post facto* research design and showed that both total bank deposit and total bank credit exert a positive and significant impact on the economic growth.

In the same vein, Shittu (2009) examined the impact of financial intermediation on economic growth from 1970 to 2010 using the error correction model and Engle-Granger technique and established that financial intermediation has a significant impact. Onudugu et al. (2013) conducted a research on financial intermediation and private sector investment and findings indicate that although some progress is noted, with the need for an enabling environment conducive for investment growth and expansion of domestic capacity. Likewise, a study carried out by Adelakun (2011) empirically examined the relationship between financial development and economic growth and showed that there is a substantial positive effect of financial development on economic growth. The Granger causality test showed that financial development causes economic growth with evidence of causality from economic growth to the development of financial intermediaries. However, there are earlier studies on developed economies. Hao (2006) established the relationship between financial intermediation and economic growth, using a country-specific data from China.

The study focused on the post-1978 reform period, using provincial data (28 Provinces) over the period 1985 to 1999. The study employed the use of linear model, which expresses economic growth as a function lagged economic growth and financial development indicators (banks,

savings and loan-budget ratio), as well as, a set of traditional growth determinants (population growth, education and infrastructural development). The study uses the one-step parameter estimates for the Generalized Method of Moments (GMM) estimation and finds that financial intermediation has a causal effect and positive impact on growth through the channels of house-holds' savings mobilization and the substitution of loans for state budget appropriations. However, the study reveals that bank, as an indicator of financial development is significant but negatively related to growth. This was attributed to the inefficiency in loan distribution and the self-financing ability of the provincial governments.

Romeo-Avila (2007) also confirms the positive impact of finance on growth. He investigates the relationship between finance and growth, with emphasis on the effect of financial deregulation and banking law harmonization on economic growth in the European Union. The study establishes that financial intermediation impacts positively on economic growth through three channels. The study by Deidda (2006) is quite informative and unique. It is a micro-based study and uses the inter-temporal approach to explain the theoretical rationale of the impact of financial intermediation on economic growth. It assumes a transition from period 1 (financial autarky) to the period 2, which is the period when financial intermediation is attained. Although this study is theoretical in nature, the General Equilibrium Analysis was used and it concludes that the growth effect of costly financial development is ambiguous when regime switch is associated with the adoption of more capital intensive technology. There is no empirical work to this effect yet.

EMPIRICAL MODEL

A simplified theoretical framework of the McKinnon (1973) and Shaw (1973) hypothesis is that the creation of higher interest rates leads to increases in savings from depositors, increases in financial intermediation and improved efficiency of using saving (that is, generating credits). That is, with high interest rates, funds are pooled from savers which allow banks to channel such funds to the private sector in the form of credit. Hence, higher positive real interest rates are warranted to build up real money balances, increase financial intermediation and unification of financial markets, thereby, ensuring an efficient utilization of resources, particularly the scarce capital. The complementarily between money and capital accumulation will, therefore, continue to exist as long as the real positive interest rate does not exceed the real rate of return on investment (Odhiambo, 2010b). Gross domestic product is a function of the financial intermediation indicator as stated in Equation (1).

The Autoregressive Distributed Lag (ARDL) model would be used to analyze the short run relationship between the dependent variable and the independent variables. It is commonly applied to econometric models within which the data have a long run stochastic trend (co-integration). It gives us the perfect view of the short run behaviour of the variables and how they individually affect the dependent variable. The selected ARDL (k) model long run equation is given as:

$$Y_t = \delta_0 + \sum_{i=1}^{k} a_1 \mathrm{Xit} + \sum_{i=1}^{k} a_2 \mathrm{X2t} + \sum_{i=1}^{k} a_3 \mathrm{X3t} + \sum_{i=1}^{k} a_n \mathrm{Xnt} + v1t \qquad (5)$$

Xs ($X1t$, $X2$, $X3t$, …….. Xnt) are the explanatory or the long run forcing variables, while k is the number of optimum lag order.

The study shall conduct various diagnostic and stability test to ensure if the estimations are free of any econometric problem. The autocorrelation and heteroscedasticity tests are conducted. The study also conducts the Ramsey's RESET test to examine the functional form correctness. This is done in order to ensure the reliability and robustness of estimations. Skewness and kurtosis of the residuals are adopted to determine normality. Furthermore, Lagrange multiplier test and the regression of squared residuals on squared fitted values were used to investigate the serial correlation and heteroscedasticity respectively. Stability is also tested using the CUSUM and the CUSUMQ. In order to avoid spurious results, the ECM framework is used.
ARDL-ECM used in the present study has the following form as expressed in Equation (1):

$$\Delta GDP_t = \beta_0 + \Sigma\, \beta i \Delta TODyt_{-i} + \Sigma \gamma_j \Delta TOS_{1t-j} + \Sigma \delta_k \Delta CPS_{t-k} + \theta_0 y_{t-1} + \theta_1 x_{1t-1} + \theta_2\, x_{2t-1} + e_t \quad (4)$$

Sources of data

Secondary data was used in this study. It was sourced mainly from the publications of the Central Bank of Nigeria (CBN) such as CBN Statistical Bulletin, 2017. This date covered the period from 1985 to 2016.

RESULTS AND DISCUSSION

Unit root test

The use of time series data for estimating the parameters of economic relationship among variables is predicated upon some assumptions one of which is that such a data series is stationary. In this context, testing for stationarity or otherwise of the employed data sets becomes of essence in this analysis. Augmented Dickey-Fuller (ADF) was employed to test for the existence of unit roots in the data using trend and intercept.

Table 1: ADF unit root result test at level and first difference.

Test	Variables	At levels		First differences		Order	Remark
		T- statistic	Critical	T- statistic	Critical		
ADF	ΔGDP	-0.259218	-3.562882	-6.063573	-3.568379	1(1)	Stationary
	ΔTOD	-4.426798	-3.562882	-8.423203	-3.568379	1(0)	Stationary
	ΔTOS	-1.987607	-3.568379	-4.268445	-3.568379	1(1)	Stationary
	ΔCPS	-2.260971	-3.568379	-4.331570	-3.568379	1(1)	Stationary

Source: Authors' computation.

Table 2: ARDL Bounds test of co-integration.

Model	F-Statistics	Lower Bound	Upper Bound
GDP=f(TOD,TOS,CPS)	6.192155	3.25	4.49

5% level of significance **Source:** Authors' Computation

Table 3: Long run test.

Variable	Coefficient	T-statistic	Probability	Decision
C	1.064113	2.965829	0.0067	Reject H_o
LTOD(-1)	-0.017919	-0.939840	0.3567	Accept H_0
LTOS(-1)	0.195232	1.535341	0.1378	Accept H_0
LCPS(-1)	-0.087527	-0.596781	0.5562	Accept H_0
LGDP(-1)	-0.155772	-1.647069	0.1126	Accept H_0

Source: Authors' computation.

From the results shown in Table 1, our study sample is a mix of $I(0)$ and $I(1)$ series with both tests consistent with the results on Total deposit being $I(0)$ while the results on Gross domestic product, total saving and credit to private sector are divergent to 1(1). The results show that the series are integrated of different order; 1(1) and 1(0) Therefore, the variables are fit to be used for the analytical purpose for which they were gathered upon which the ARDL approach comes into play.

Bounds testing for co-integration

ARDL co-integration technique does not require pre-tests for unit roots unlike other techniques. Consequently, ARDL co-integration technique is preferable when dealing with variables that are integrated of different order, I(0), I(1) or combination of both and robust when there is a single long run relationship between the underlying variables in a small sample size. The long run relationship of the underlying variables is detected through the F-statistic (Wald test). In this approach, long run relationship of the series is said to be established when the F-statistic exceeds the critical value band.

ARDL Bounds test of co-integration

The ARDL bound test for co-integration indicate that the null hypotheses of no co-integration is rejected at 5% level of significance (Table 2), as there are unique co-integrating relationships among the variables in the models and that the long-run forces all variables in all relationships; its therefore seen that there is a long run relationship between the model within the year under review.

ARDL Long run result

In order to achieve the long-run relationship between the dependent and independent variables, the long-run analysis was investigated and the results are presented in Table 3. The results show that all total deposit and credit to private sector is negatively related to gross domestic product by -0.017 and -0.008, respectively. Specifically, the results showed that a 1% increase in TOP and CPS leads to about 0.017 and 0.008% decrease in gross domestic product in Nigeria at a 5% significance level for model, respectively.

Furthermore, a 1% increase in total savings leads to a

Table 4: ECM Results/ dependent variable GDP ARDL.

Variable	Coefficient	T-Statistic	P-value
LGDP(-1)	0.839098	6.904471	0.0000
LTOD	-0.009828	-0.395223	0.6960
LTOS	0.015132	0.092981	0.9267
LCPS	0.093140	0.477406	0.6372
ECM(-1)	-0.551451	8.638430	0.0039
Constant	0.951824	2.389906	0.0247
R-Squared	*Adj-R^2*	*F-statistics*	Number of observations
0.9978 ≈ 92%	0.992	2283.1	30

Source: Authors' computation.

Table 5: Diagnostics specification table.

Specifications	Ramsey Reset	Normality Test	(Heteroscedasticity)		(Autocorrelation)	
		Jarque Bera Normality	ARCH LM	Bruesch Pagan (Heteroscedasticity)	Bruesch Godfrey (Autocorrelation)	Durbin Watson
Stat	6.265289	7.51409	0.168613	1.0849	0.0467	2.15
P-value	0.0191	0.023	0.6845	0.3928	0.8386	

Source: Authors' computation

0.1952% increase in GDP at a 5% significance level. This is consistent with the *a priori* expectation which was based on the Shaw hypothesis. This confirms a statistically significant positive long-run relationship between financial savings and economic growth.

Short run test ARDL

Having established co-integration, we proceed to analyze the short-run dynamics using a log-level ARDL error correction representation approach and specify same as:

$$\Delta GDP_t = \beta_0 + \Sigma\, \beta i\, \Delta TODyt_{-i} + \Sigma\gamma_j \Delta TOS_{1t-j} + \Sigma\delta_k\, \Delta CPS_{t-k} + \theta_0 y_{t-1} + \theta_1 x_{1t-1} + \theta_2\, x_{2t-1} + e_t$$

Co-integrating coefficient (ECM (-1)) equals -0.5514; this shows that the speed of adjustment between the short-run and long-run equilibrium is approximately 55% annually (Table 4). This means that the system corrects its previous period disequilibrium at a speed of 55% annually with a negative sign, fractional and a statistically significant ECM (-1) as shown by the probability value of 0.00; the statistical significance of the co-integrating equation satisfies all conditions and the negative sign satisfies the other condition.

From the estimated result above the coefficient of the constant term is 0.9518 implying that when other variables are kept constant gross domestic products (GDP) increased by 0.9518 units. The coefficient of total saving (-1)) is 0.015132 implying that a unit change in total saving brought about 0.015% increase in GDP. Similarly, the coefficient of total deposit (-1) is -0.009824 implying that a unit change in total deposit brought about 0.009 units decrease in GDP and the coefficient of credit to private sector (-1)) is 0.09314 implying that a unit change in credit private sector brought about 0.09314 units increase in GDP, that is, economic growth, as at the year under review.

It was revealed that the R^2 is 99%. This is very high and it indicated that the independent variable is well explained by the independent variables. This also means that the model is highly relevant for the explanation of the variable. The remaining 1% was due to disturbance or error term, for example, economy meltdown, low-productivity and low profitability etc.

The overall level of significance shows that the entire influence is statistically significant given the value of the F-statistic of (2283) being greater than F-tab indicating that all the independent variables employed for the study are all significant to gross domestic product from the year under review.

Diagnostic tests results

In ARDL, it is functional to test for the necessary and confiding diagnostic and stability tests. For this purpose, series of diagnostic and stability tests were carried out (Table 5). The diagnostic tests examined serial correlation, heteroscedasticity, conditional heteroscedasticity, test and normality. This implies that the results from our analyses are robust and reliable for making inferences.

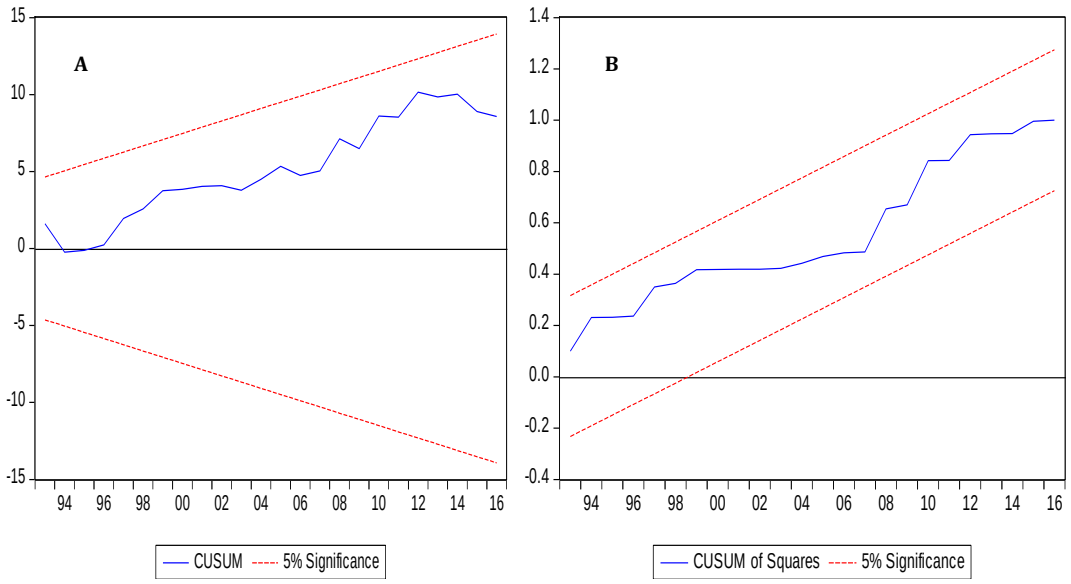

Figure 1: CUSUMS graph of stability.

The results reported in Table 5 indicate that there are no challenges of misspecification, heteroscedasticity, higher-order autocorrelation or normality in the model.

It is important to investigate whether the long run relationships are stable for the entire period of study. For this purpose, we examined the stability of the model parameters using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test procedures. CUSUM and CUSUMSQ are plotted against the break points. Parameter stability is indicated when the CUSUM and CUSUMSQ plots against time remain within the 5% significance level over the sample period, while parameters and the variance are unstable if these plots move outside the 5% critical lines.

The blue line is within the two red lines and the plot of the CUSUMS and the CUSUMSQ shows that the model is stable as the graph lies within the 5% significance level boundaries (Figure 1a and b).

CONCLUSION AND RECOMMENDATIONS

The study examines the long and short run relationship between financial intermediation and economic growth in Nigeria using annual time series data during 1985 to 2016 by employing the ARDL bounds testing approach to co-integration and the associated error correction model (ECM). As financial development indicators concerned, the result of the long run analysis indicates that total savings exert positive effect while credit to private sector and total deposit negatively affect GDP. The study, indeed, found positive influence of financial intermediation indicators on both nominal and real economic growth in the short and long run against the background; it has been established in this study that financial intermediation implemented in Nigeria primarily depends on policy instrument that can enhance its monetary institution that have not done enough in improving the financial landscape of Nigeria so as to enable various financial intermediation means as deposit, credit, and saving contribute effectively to Nigeria economic growth; this was echoed by the joint variation test. The study therefore recommends that all planners of the economy, monetary expertise and regulatory authorities in particular should combine efforts and formulate policies aimed at improving financial intermediation process by expanding the scope of credits and deposit in financial institutions; this will in turn promote financial responsiveness that can affect the growth of the economy. In addition, the government needs to ensure the existence of a vibrant and an efficient financial system that promote financial intermediation in the economy.

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