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DOES FINANCIAL DEEPENING ENHANCE ECONOMIC GROWTH? EVIDENCE FROM NIGERIA USING ARDL MODEL AND POOLED ADDITIVE PREDICTOR

Amaefula C. G
Department of Mathematics and Statistics, Federal University Otuoke, Bayelsa State, Nigeria. *E-mail: wordwithflame@gmail.com*

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ABSTRACT

The study examines whether financial deepening enhances economic growth. The data sets on gross domestic product (GDP), money supply (M_2) and credit to private sector (CPS) used, covered the period of 1981 to 2016. Regression model analysis and the autoregressive distributed lag (ARDL) model estimates revealed that the financial deepening indicators have no effect on economic growth but their pooled additive effect on economic growth is positive and it is significant under 1% level. The ARDL result showed no evidence of short-run relationship between financial deepening and economic growth but the long-run equilibrium relationship is only significant at 10% level. The result also showed that the system is getting adjusted towards long-run equilibrium at the speed of approximately $\frac{1}{500}\%$. This specifies a slow speed of adjustment towards equilibrium. Hence, the government should make more practical policies in financial sector reforms that can boost positive effect of financial deepening on economic growth both in the short-run and long-run.

1. Introduction

Since the Nigerian economy slipped into recession in 2016, with the latest growth figures showing the economy contracted 2.06% between April and June, which resulted in a general slowdown in economic activity, a lot of questions have risen from different quarters as to, how proactive is the financial deepening to our gross domestic product? This of course, has necessitated a re-evaluation of how positive have our financial deepening indicators influenced the proxy measure of Nigerian economic growth.

The two consecutive quarters of declining growth that necessitated the declaration of economic recession in

Nigeria is an indication that financial sector reforms have failed to be impressive and financial institutions have no friendly service windows in terms of rendering financial services to the teaming population. Also, private sector do not have access to credit facility, investors are not encouraged to invest as a result of high interest rate, banks branches is biased in citing its location more to the urban areas than the rural areas. All this and many more are because financial deepening has not been given much emphasis in recent past.

Diverse theories in literature have been used to access the level of impact of financial sector deepening, whether certain component of the financial sector such as the banks or stock markets has any significant relationship in the growth process of an economy.

This present study examines the nature of relationship between financial deepening and economic growth, focusing on whether there is long-run, short-run relationship or both. A peculiar aspect of the study is to examine the pooled additive effect of two measures of financial deepening on economic growth.

The rest of the paper is organised as follows; section (2) presents some related literature review, section (3) deals with the materials and method, section (4) deals with the data analysis, results and discussion and section (5) present the conclusion.

2. Theoretical and Empirical Literature Review

Few decades ago, the relationship between financial deepening and economic growth has been on two parallel theoretical concepts namely the “supply leading hypothesis” (King and Levine (1993), Neusser & Kugler, 1998) and “demand following hypothesis” (Patrick, 1966; Ireland, 1994). Supply leading hypothesis suggest that financial deepening spurs growth. The hypothesis contends that the development of financial market can create and expand liquidity, mobilize savings and promote the growth of an economy. The demand following hypothesis suggests that any early efforts to deepen the financial system might lead to a waste of resources. It is argued that financial deepening is merely an outcome of growth in the real sector of the economy which could be allocated to more useful purposes in the early stages of growth. Previous studies that support this hypothesis include Gurley and Shaw (1955), Goldsmith (1969) and Jung (1986). In addition, Patrick (1966) suggests a third hypothesis known as the “stage of development hypothesis” which posits that the supply-leading financial development can induce real investment in the early stages of economic development.

A good number of empirical studies have been done on the level of relationship between financial deepening and economic growth. Chong(1999), Huang and Luo(2000) and Lee(2005) have studied the relationship between financial deepening and economic growth in Taiwan using error-correction model and their studies showed that financial deepening has a direct effect on economic growth in Taiwan. Hasan *et al*, (2009) study uses panel data of Chinese provinces to examine the effects of financial deepening and political institutions on growth rates. Their results showed that the depth of capital market has a significant influence on growth while the bank lending has insignificant effect. Suleiman and Aamer (2007) examined the relationship between financial development and economic growth in Egypt, using VAR model with data spanning from 1960-2001. The results of their study suggest that there is a mutual relationship between financial development and economic growth in Egypt. Chang and Lee (2007) used the ordinary least squares estimator (OLS) to examine the relationship between two variables. Their results showed that financial development does not influence economic growth.

Anwur et al. (2011) used a data period from 1973 to 2007 to study the relationship between financial development on economic growth. Their result indicated that there is a significant and long-run stable relationship between financial development on economic growth. In addition, their results show that uni-directional causality exists in the external debt to exports ratio and the private sector credit to GDP ratio for Pakistan. Unalmis (2002) investigated the direction of causality between financial development and economic growth in Turkey using Granger non-causality in the context of VEC model. The study showd that in the long run, there exists bidirectional causality between financial deepening and economic growth. Abu-Bader and Abu-Qarn (2008) studied causality between credit depth and growth in six MENA countries, including Israel, for the period of 1960–2004. They concluded that there is a weak causal link running from economic growth to credit depth in Israel, the most developed MENA economy, but not vice versa.

Hassan et.al (2011) focused more on the low- and middle-income countries from 1980 to 2007. Their study included 168 countries, which are classified by geographic regions, and uses the panel estimation techniques (i.e. the VAR models). The study came up with two important findings. These include; a strong long-run linkage between financial development and economic growth, and two-directional causality exist between financial development and economic growth among the Sub-Saharan African countries, the East Asian countries, and the Pacific countries. This study emphasized the need for the adoption of long-run policy measures among the developing countries. Shittu (2012) examined the impact of financial intermediation on economic growth in Nigeria with time series data from 1970 to 2010. Employing co integration test and error correction model, he found that financial intermediation has a significant impact on economic growth in Nigeria. Dal Colle (2011) investigated causality between financial development and growth in the context of financial liberalization for a mixed sample of developing and developed countries, including South Korea and Chile. She finds no signs of causality for South Korea and a bidirectional link in case of Chile.

Nwanna and Chinwudu (2016) examined financial deepening and economic growth in Nigeria from 1985 to 2014. It focused on the impact of stock market and bank deepening variables such as money supply, market capitalization, private sector credit and financial savings have on economic growth of Nigeria. Adopting Ordinary Least Square their result revealed that both bank based and stock market financial deepening proxies has significant and positive effect on economic growth and that the banking sector and stock market in Nigeria has an important role in the process of economic growth. Ardıc and Damar (2007) studied the effects of financial sector deepening on economic growth using a province-level data set for 1996-2001 in Turkey. Their results indicated a strong negative relationship between financial deepening—both public and private—and economic growth. Torruam *et al*(2013) investigated the relationship between financial deepening and economic growth in Nigeria for a period of the period 1990-2011 using Cointegration and Causality Analysis. The result indicated four (4) cointegrating relations between the variables; the Granger-causality suggests that there is unidirectional causality running from economic growth to financial deepening in Nigeria. The study concludes that financial deepening has an impact on economic growth in Nigeria.

Johannes et al. (2011) adopted Johansen cointegration for the case of Cameroon for the period 1970-2005 and established positive relationships between financial development and economic growth in the long run and short run at 5% level of significance. The result agreed that financial sector development cause economic growth in the long run and the short run. Karimo and Ogbonna (2017) examined the direction of causality between financial deepening and economic growth in Nigeria for the period 1970–2013 adopting the Toda–Yamamoto augmented Granger causality test and results showed that financial deepening granger cause growth and not growth leading financial deepening.

3. Material and Method

This section provides information on source of data collection, variable measurement and definition, , model specifications, estimation and diagnostic test.

3.1. Source of Data Collection

The data sets on yearly real gross domestic product (GDP), money supply(M_2) and credit to private sector (CPS) were obtained from National Bureau of Statistics (published in CBN statistical bulletin, 2016). The data sets cover the period of 1981 to 2016.

3.2. Variable Measurement and Definition

One of the most commonly used proxy to measure economic growth is the real GDP hence, this paper used real GDP to measure economic growth and financial deepening is measured using two financial deepening indicators; money supply (M_2) and credit to private sector (CPS) (monetary value in billions of naira). And the variables are defined using first difference of natural logarithm of present and previous values of each variable multiplied by 100 and are presented as follows; $\nabla Lgdp_t = \left(\log GDP_t - \log GDP_{t-1}\right)\times 100$, $\nabla Lm_{2,t} = \left(\log M_{2,t} - \log M_{2,t-1}\right)\times 100$ and $\nabla Lcps_t = \left(\log CPS_t - \log CPS_{t-1}\right)\times 100$.

3.3 Model Specification

The linear multiple regression model will be used in the preliminary (initial) study of the relationship between financial deepening and economic growth and then, autoregressive distributed lag (ARDL) model.

3.3.1 Linear multiple Regression model specification

The initial evaluation study of the relationship between financial deepening and economic growth in Nigeria, the following regression equation is adopted;

$$\nabla Lgdp_t = c_0 + c_1 \nabla Lm_{2,t} + \nabla Lcps_t + e_{t1} \quad (1)$$

where c_0, c_1 and c_2 are parameter coefficients . The error term e_{t1} are assumed to be *independently and identically distributed* (iid) normal random variables each with mean zero and a common variance σ^2.

3.3.2 ARDL model specification

The ARDL models are linear time series models in which both the explained and the explanatory variables are related not only contemporaneously, but across lagged values as well. It offers the leverage of testing for long-run relationship that is robust irrespective of whether variables of interest are I(0), I(1), or mutually co-integrated The unrestricted model with no trend is of the form;

$$\Delta Lgdp_t = c_0 + \sum_{i=1}^{p} \alpha_i \Delta Lgdp_{t-1} + \sum_{j=1}^{k} \beta_j \Delta Lm_{2t-1} + \sum_{j=1}^{k} \delta_j \Delta Lcps_{t-1} + \theta_0 Lgdp_{t-1} + \theta_1 Lm_{2,t-1} + \theta_1 Lcps_{t-1} + \varepsilon_t \quad (2)$$

where ε_t is the usual innovation, c_0 is the constant term, $\alpha_i, \beta_j, \delta_j, \theta_0, \theta_1$ and θ_2 are respectively coefficients associated with differenced log of lagged GDP, differenced log of lagged regressors (M_2 and CPS), for $j = 1,2,\cdots,k$. Note that the regressor variables, are the financial indicators considered in this paper, such as; money supply (M_2) and credit to private sector (CPS). The hypothesis $H_0 : \theta_0 = \theta_1 = \theta_2 = 0$ is used to check whether all the variables have long-run relationship by comparing the F-statistic with the Pearson critical value at 5% level. If the F-statistic is more than upper bound value, we reject H_0. Alternatively, if the Chi-Square probability value is significant at 5% level, the variables have long-run relationship. Following Pesaran et.al (2001) the appropriate co-integrating relationship EC_t for equation (2) above is written as

$$EC_t = GDP_t - \sum_{j=1} \frac{\theta_j}{\theta_0} x_{j,t} \quad (3)$$

With $H_0 : \theta_1 = \theta_j = 0, \ \forall \mathrm{j}$

Where $x_{j,t}$ represent the level series of the predictor variables. The error correction term denoted by EC_t is the co-integrating relationship when GDP_t and $x_{j,t}$'s are cointegrated. This can also be obtained using the

regression equation of the form;

$$EC_t = GDP_t - \left(c_0 + \sum_{j=1}^{k} \theta_j x_{j,t} \right) \quad (4)$$

With $H_0 : \theta_1 = \theta_j = 0, \forall \mathrm{j}$

Hence,

$$\Delta Lgdp_t = c_0 + \sum_{i=1}^{p} \alpha_i \Delta Lgdp_{t-1} + \sum_{j=1}^{k} \beta_j \Delta Lm_{2t-1} + \sum_{j=1}^{k} \delta_j \Delta Lcps_{t-1} + c_1 EC_{t-1} \quad (5)$$

The coefficient c_1 in equation (5) measures the speed of adjustment, it is expected to be negative and significant.

3.4 Linear Regression model with Pooled Additive Predictor

The essence of pooled additive predictor variable is informative on the sum effect of two or more predictor variables on the predicted. It represents a combine effect of many predictors on the predicted. Before presenting the Linear Regression model with Pooled Additive Predictor specification, it is good to note that if two or more variables are nonstationary respectively, their pooled additive variable is also nonstationary. If the variables are individually stationary, their pooled additive variable is also stationary. The formal representation is as follows

If M_2 and CPS are integrated order one I(1) respectively then, $(m_2 + cps)$ is also integrated order one I(1). And if Δm_2 and Δcps are integrated order zero I(0) respectively, then, $(\Delta m_2 + \Delta cps)$ or $\Delta(m_2 + cps)$ is also integrated order zero I(0). Hence, Linear Regression model with Pooled Additive Predictor becomes

$$\Delta gdp_t = c_0 + \mathrm{c}_1 \Delta (m_2 + cps)_t + e_{t2} \quad (6)$$

where c_o the is the intercept and c_1 is the coefficient of the pooled additive predictors and the error term e_{t2} are assumed to be *independently and identically distributed* (iid) normal random variables each with mean zero and a common variance σ^2. If the pooled additive variables (PAV) = $(m_2 + cps)_t$, then, equation (6) becomes

$$\Delta gdp_t = c_0 + \mathrm{c}_1 \Delta PAV_t + e_{t2} \quad (7)$$

3.5 Augmented Dickey Fuller (ADF) Unit Root Test

ADF unit root test is carried out to test the order of integration of the variables under study. Augmented Dickey-Fuller(ADF) by Dickey and Fuller (1979) test and is of the form

$$\nabla y_t = \alpha + \alpha_1 t + \beta y_{t-1} + \sum_{i=1}^{k} \xi_i \nabla y_{t-i} + a_t \quad (8.1)$$

$$\nabla y_t = \alpha + \beta y_{t-1} + \sum_{i=1}^{k} \xi_i \nabla y_{t-i} + a_t \quad (8.2)$$

$$\nabla y_t = \beta y_{t-1} + \sum_{i=1}^{k} \xi_i \nabla y_{t-i} + a_t \quad (8.3)$$

where k is the number of lag variables. In (8.1) there is intercept term, the drift term and the deterministic trend. The non deterministic trend term removes the trend term as seen in (8.2) And (8.3) removes both the constant and deterministic trend term in the above regression. ADF unit root test null hypothesis $H_0 : \beta = 0$ and alternative $H_a : \beta < 0$. If the ADF test statistic is greater than 1%, 5% and 10% critical values, the null hypothesis of a unit root test is accepted.

3.5 Method of Estimation

The regression models are estimated using least squares (LS) and Autoregressive distributed lag models (ARDLs) are standard least squares regressions that include lags of both the dependent variable and explanatory variables as regressors and can be estimated using Standard least squares Although ARDL models

have been used in econometrics for decades, the model has gained popularity in recent years as a method of examining co-integrating relationships between variables through the work of Pesaran and Shin (1998) and Pesaran at al (2001).

3.6 Model Diagnostic test

The model diagnostic test here includes stability test using CUSUM test, serial correlation test, heteroscedasticity test and Wald test for coefficient restriction.

4. Data Analysis, Results and Discussion

This section presents the result of linear multiple regression model of equation (1), the results of the bounds and diagnostic test, result of the specified ARDL model, short-run and long-run test results.

4.1 ADF Unit Root Test

For the purpose of regression in Equation (1) and equation (6), the ADF unit root test is carried out to test the order of integration of the variables under study. And the result is presented below;

Table 1. Analysis of order of integration using ADF unit root test

Variable	Deterministic Term	Lags	Test Value	1% level 5%level 10%level	Prob.	Remark
GDP	C,T	0	0.599400	-4.243644 -3.544284 -3.204699	0.9992	I(1)
Δgdp	C,T	0	-5.565329	-4.252879 -3.548490 -3.207094	0.0003	I(0)
CPS	C,T	8	2.315130	-4.339330 -3.587527 -3.229230	1.0000	I(1)
Δcps	C,T	7	-7.573273	-4.339330 -3.587527 -3.229230	0.0000	I(0)
M_2	C,T	3	1.147209	-4.273277 -3.557759 -3.212361	0.9999	I(1)
Δm_2	C,T	9	-3.471527	-4.374307 -3.603202 -3.238054	0.0646	I(0) under 10% level
$(GDP + M_2)$	C,T	0	2.506087	-4.243644 -3.544284 -3.204699	1.0000	I(1)
$\Delta(gdp + m_2)$	C,T	0	-3.961648	-4.252879 -3.548490 -3.207094	0.0200	I(0) under 5% and 10% levels

The ADF unit root test results in Table 1 indicates that the GDP, CPS and M_2 are integrated order one I(1) and can be considered integrated order zero at the first difference.

4.1 Estimates of the preliminary regression analysis

The result of the linear multiple regression model of equation (1) is given below;

$$\begin{aligned} &\nabla \mathrm{Lgdp}_t = 0.1193 + 0.6204\nabla Lm_{2,t} - 0.2214\nabla Lcps_t + e_{t1} \\ &t-value \quad [1.7773] \quad [1.6868] \qquad [-0.729] \\ &p-value(0.0850) \quad (0.1014) \qquad (0.3892) \\ &R^2 = 0.0835, \ \mathrm{DW\,statistic} = 1.9656 \end{aligned} \tag{8}$$

The result in equation (8) reveals that changes in the natural logarithm of predictors (M_2 and CPS) variables have positive and negative effects on the response variable (GDP) respectively, but none is significant. Since

the variables were differenced, equation (8) explains their short-run relationship. The value of DW statistic indicates no serial correlation in the residuals. And about 8.4% variation in GDP is explained by the regressors. It is good to note that the effect of CPS on GDP is not expected to be negative should CPS enhance economic growth.

4.2 The Result of the Bound test

The bound test is used to check if there is evidence of long-run relationship amongst the variables.

Table 2. Bound test Analysis;

No. of Lags	*Information Criterion* **AIC**	**Schwarz Criterion (SC)**	**Adjusted R-Square**	*Diagnostic Test* **CUSUM Test**	**Wald test** (for long-run relation)
6	-0.7462	0.0554	0.4327	Stable at 5%	0.1356
5	-0.79663	-0.0960	0.4614	Stable at 5%	0.0013***
4	-0.53494	0.0664	0.2992	Stable at 5%	0.0359**
3	-0.48541	0.018438	0.21995	Stable at 5%	0.1383
2	-0.5128	-0.10467	0.2025	Not stable	0.2653
1	-0.3256	-0.0113	-0.0252	Stable at 5%	0.2551

Symbols (***) denote significant at 1% and (**) denotes significant at 5%,

The result of bound test in Table2 above indicates that both AIC and SC have lowest values when the standard ARDL model has 5 lags. The Adjusted R^2 value is also maximum at lag 5, hence, all the information criteria prefer the standard ARDL model with lag 5 which shows strong evidence of co-integrating relationship amongst the three variables under study and it is significant at 1% level (Wald test for long-run relation = 0.0013). The result of the ARDL model as chosen by the information criteria is presented in Table3 below.

Table 3. Result of ARDL model of Equation(4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.260682	0.126605	2.059023	0.0552
Δ LOG(GDP(-1))	0.090393	0.227988	0.396480	0.6967
Δ LOG(M2(-1))	-0.073172	0.440465	-0.166125	0.8700
Δ LOG(M2(-2))	0.096535	0.458655	0.210473	0.8358
Δ LOG(M2(-3))	-0.083839	0.498269	-0.168261	0.8684
Δ LOG(M2(-4))	0.836099	0.503932	1.659149	0.1154
Δ LOG(M2(-5))	0.185989	0.502701	0.369979	0.7160
Δ LOG(CPS(-1))	-0.265458	0.355132	-0.747490	0.4650
Δ LOG(CPS(-2))	0.133517	0.319100	0.418419	0.6809
Δ LOG(CPS(-3))	-0.156517	0.357390	-0.437944	0.6669
Δ LOG(CPS(-4))	-0.433323	0.303509	-1.427711	0.1715
Δ LOG(CPS(-5))	-0.418712	0.311095	-1.345928	0.1960
ECT(-1)	-1.73E-05	9.66E-06	-1.796067	0.0903
R-squared	0.520320			
Adjusted R-squared	0.181722			
F-statistic	1.536691	Durbin-Watson stat		2.096181
Prob(F-statistic)	0.203396			

The result in Table 3, shows the value of Durbin Watson is approximately 2, indicating no serial correlation. R^2 indicates that about 52% of the variation in the explained variable has been accounted by the explanatory variables. If we state the null hypothesis that the coefficients of short-run effects of the ARDL model of equation (5) are all equal to zero, that is, they are not significant, then we cannot reject H_0, since the p-value of the F-test is not significant. The error correction term (ECT) indicates the speed of adjustment and it is negative as expected and significant at 10% level. The result indicates that the system is getting adjusted towards long-run equilibrium at the speed of approximately $\frac{1}{500}\%$. Since the significant level is low, the speed of adjustment must be slow.

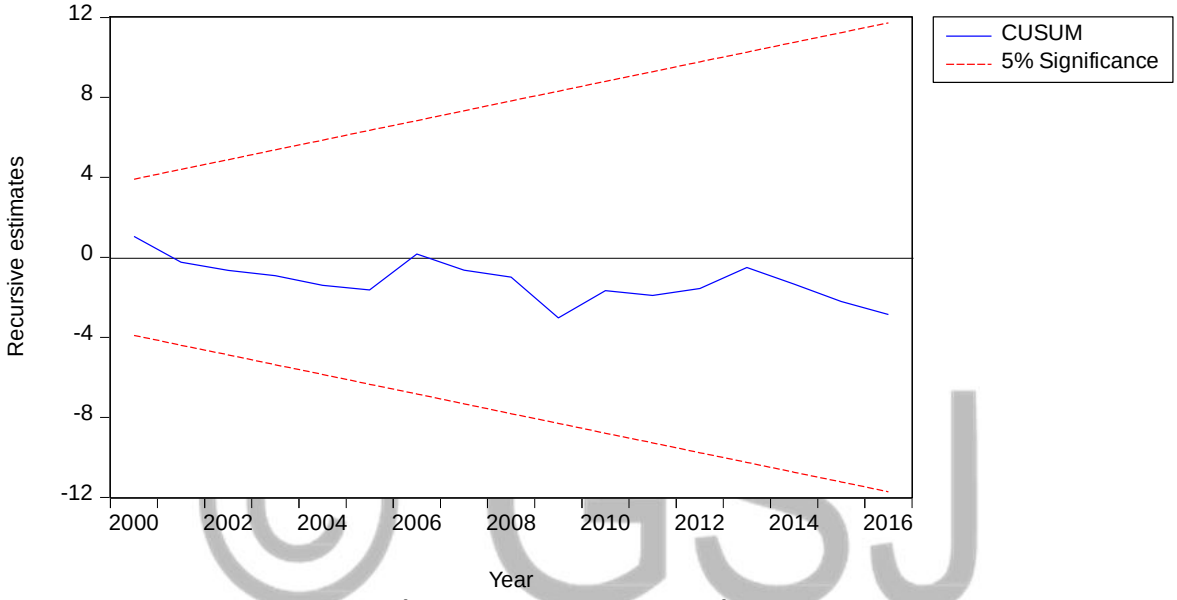

Fig 1. Plot of recursive estimates (Stability Diagnostic test) using CUSUM

The plot of recursive estimates in Fig.1, using CUSUM test indicates that the parameters are stable at 5% significant level.

Table 4. Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.663576	Prob. F(5,12)	0.6581
Obs*R-squared	6.498055	Prob. Chi-Square(5)	0.2607

The probability value of Chi-Square (0.2607) and F-statistic (0.6581) in Table34 re not significant; hence there is no serial correlation present in the model residuals.

Table5. Wald test for Coefficient Restrictions

Test Description	Null Hypothesis	F-statistic	Wald Test prob	$\chi^2 - stat$	Prob
Short-run relations	$H_0 : \beta_1 = \beta_2 = \cdots = \beta_5 = 0$	0.0292 $df\,(3,17)$	0.9930	0.0875 $df\,(3)$	0.9933
	$H_0 : \delta_1 = \delta_2 = \cdots = \delta_5 = 0$	1.3672 $df\,(3,17)$	0.2865	4.1017 $df\,(3)$	0.2507
Long-run relation	$H_0 : c_1 = 0$	3.2259 $df\,(1,17)$	0.0903	3.2258 $df\,(1)$	0.0725

The Wald test for coefficient restrictions in Table5 above shows that the Chi-Square probability values are not significant. This implies that there is no short-run relationship. The Chi-Square probability value for the long-run relationship is significant under 10% level hence, indicating long-run equilibrium relationship between the explained and the explanatory variables.

Table6. Regression estimate with pooled additive predictor

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1000.381	994.4732	1.005941	0.3218
Δ (PAV)	1.555787	0.465284	3.343735	0.0021
R-squared	0.253065	Mean dependent var		2896.991
Adjusted R-squared	0.230431	S.D. dependent var		5508.755
S.E. of regression	4832.560	Akaike info criterion		19.85959
Sum squared resid	7.71E+08	Schwarz criterion		19.94846
Log likelihood	-345.5427	Hannan-Quinn criter.		19.89027
F-statistic	11.18057	Durbin-Watson stat		1.890471
Prob(F-statistic)	0.002069			

The result in Table6 above reveals the pooled additive effect of financial deepening indicators on proxy of economic growth (GDP). The result shows that the pooled financial deepening indicators have positive effect on economic growth and it is significant under 1% level. R-squared indicates that 25.3% variation in GDP has been explained by changes in pooled additive financial deepening. Durbin-Watson value (1.89) is close to 2, indicating absence of serial correlation in the residual. The probability value of F-statistic is significant under 1% indicating the relationship between pooled predictor and GDP is linear. Hence equation (6) becomes $\Delta gdp_t = 1000.381 + 1.5558\Delta(PAV)_t + e_{t2}$.

Table7. Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.389099	Prob. F(2,31)	0.2644
Obs*R-squared	2.878690	Prob. Chi-Square(2)	0.2371

The result of Breusch-Godfrey Serial Correlation test indicates that the probability value of Chi-Square (0.2371) and F-statistic (0.2644) are not significant; hence there is no serial correlation present in the pooled predictor model residuals.

Table8. Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.344464	Prob. F(1,33)	0.2546
Obs*R-squared	1.370126	Prob. Chi-Square(1)	0.2418

The result of Breusch-Pagan-Godfrey heteroscedasticity test indicates that the probability value of Chi-Square

(0.2418) and F-statistic (0.2546) are not significant; hence there is no heteroscedasticity present in the pooled predictor model residuals. Hence, the model is fairly adequate.

4.2 Discussion of Results

In the discussion of results, the finding of this study is compared with previous empirical outcomes in literature. The result of the preliminary regression estimates indicates that financial deepening has no effect on economic growth in Nigeria. This result agrees with that of Chang and Lee (2007) who examined the relationship between the two variables and it is contrary with the finding of Torruam *et al*(2013) who concludes that financial deepening has an impact on economic growth in Nigeria. The result shows that there is no short-run relationship between financial deepening and economic growth. It also indicates the existence of long-run relationship between financial deepening and economic growth, this finding is in line with that of Anwur et al. (2011) whose result showed a significant and long-run stable relationship between financial development on economic growth in Pakistan and that of Hassan et.al (2011) among the Sub-Saharan African countries, the East Asian countries, and the Pacific countries.

The result estimates of equation (7) shows that the pooled additive financial deepening indicators have positive effect on economic growth and it is significant under 1% level. R-squared indicates that 25.3% variation in GDP has been explained by changes in pooled additive financial deepening. The implication of this finding is that the financial deepening indicators (M2 and CPS) have no effect respectively on economic growth, but there pooled additive effect is significant. The results in Table 7 and Table8 showed no evidence of serial correlation and heteroscedasticity in the model residuals, hence, the model is adequate.

Conclusion

The study examined whether financial deepening does enhance economic growth in Nigeria. The two consecutive quarters of declining growth and the declaration of economic recession in Nigeria in 2016 is an indication that financial sector reforms have not proactively enhanced economic growth. Preliminary regression analysis and the ARDL model estimates revealed the truth of our apriori conclusion. The results showed no evidence of short-run relationship between financial deepening and economic growth but, the long-run equilibrium relationship is only significant at 10% level. This indicates a slow speed of adjustment towards long-run equilibrium relationship. Nevertheless, the innovation of pooled additive effect study is found to be significant, meaningful and adds novelty and value in the application of regression model. Hence, pooled additive effect study becomes imperative in the study of sum effect of two or more predictor variables on the predicted.

Thus, it becomes imperative for the government to make practical policy in financial sector reforms that can enhance a positive effect of financial deepening indicators on economic growth both in the short-run and long-run.

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