

An Analysis of Financial Inclusion and Economic Growth in Nigeria; an ARDL Approach

Kenechukwu J. Nwisiényi¹, Onyeka A. Obi²

^{1,2}*School of Financial Studies, Department of Banking and Finance, Federal Polytechnic Oko Anambra State, Nigeria*

Abstract: The study investigated the relationship between financial inclusion and the Nigerian economic growth using an annual time series data for the periods 2004 to 2018. The Auto Regressive Distributive Lag bounds test for cointegration and Error Correction model was applied to examine the long run relationship of the variables. The result showed that there is cointegration amongst the variables. The Number of ATMs per 100,000 adults was found to be positively and significantly correlated with economic growth while borrowers from commercial banks per 1000 adults and lending interest rates were significantly negative to economic growth. The study found depositors with banks per 1000 adults to be insignificant. The study recommends, amongst other things, that effective campaign or awareness should be made to increase financial literacy and/or awareness. Again, transaction costs and financial obligations attached to using financial services or products should be reviewed downwards to accommodate the proportion of the population that is poor.

Keywords: Financial Inclusion, Economic Growth, Financial Access, Financial Exclusion, Cashless Policy.

I. INTRODUCTION

The importance of financial inclusion cannot be over-emphasized. This is evident in the global efforts to perpetuate financial access and indeed financial deepening amongst economically active adults especially in the rural areas. [27] said that the issue of access to financial services for the rural dwellers in every country in terms of development, poverty reduction, decent work and economic empowerment has received growing attention from scholars and policy makers as it concerns financial inclusion. Its potency in encouraging economic growth is undeniable as it is portrayed in global policy spheres [22]. [8] noted that a well-suited financial inclusion for low-income earners promote enormous capital accumulation, credit creation and investment boom. Its far reaching economic and social implications are very obvious and has become a critical area of concern for every policymaker. The adoption of several policies and measures globally aimed at growing financial inclusion as a means of promoting world economic prosperity, gives credence to the afore-mentioned.

However, despite this global realization and efforts, fostering effective financial inclusion has remained a global challenge. A great percentage of the world's population still does not have access to basic financial services and therefore are excluded from formal financial system thereby constraining global capacity for inclusive growth [2]. [8] added that the

worst-case scenarios are found in developing economies where some countries have as much as 70% financial exclusion levels. These are often poor or underserved populations who lead complex financial lives and typically rely on a mix of informal and formal financial services, with neither fully meeting their diverse financial needs [24].

Nigeria is not an exception. According to [11], as at 2018, Nigeria has the highest proportion of financially excluded adults among selected countries in Africa at 37%. 51% of Nigerian adults are formally not included. This composition is made up of 15% adults that are informally served and 37% adults that are financially excluded. In the bid to foster financial inclusion, Nigeria in 2012, came up with the National Financial Inclusion Strategy to increase Nigerians included in formal markets from 30% to 70% by the year 2020. Embedded in this strategy are the financial inclusion indicators which are parameters used in measuring financial inclusion. These indicators are separated in 3 dimensions; Access, Usage and Quality indicators.

Many empirical studies on the relationship between financial inclusion and the Nigerian economic growth abound. However, the disparity in the results only call for more research. The study seeks to investigate the relationship between financial inclusion and the Nigerian economic growth. The variables used in the study will be in line with the performance indicators as outlined in the 2012 Financial Inclusion Strategy by the CBN.

II. THEORETICAL FRAMEWORK

A. Theories of Financial Inclusion

According to [3], four distinct areas have been identified as driving force of economic growth; availability of reliable low cost means of payment to all, improving resource distribution through the role of financial intermediation, enabling the financing of risky but more productive investments and innovations within the economy by curtailing liquidity risk through risk management by the financial system and finally, reducing the effects of asymmetric information through the provision of information on possible investment and availability of capital within the system by the financial sector.

The 1969 Solow growth model (capital accumulation channel) and the 1912 Schumpeterian growth model (technological change channel) present avenues through which savings and

investment inputs are changed into a larger output in the economy [3]. From the view of aggregate production function, the financial effects as mentioned above contribute immensely to this.

The financial sector plays a significant role in increasing production function through effective monitoring and management of investment projects. The Solow model captures only the short-run and medium-run effects of improvements in financial development. It does not explain technological progress or long-run economic growth. According to [28], the limitation of the Solow growth model led to the Schumpeterian model of growth. Schumpeter posited that a well-developed financial sector is absolutely necessary, if entrepreneurs are to successfully engage in a process of ingenuity. New projects require financing because the upfront investment cannot always be covered by the entrepreneurs themselves. Without a financial sector to channel funds from, innovation would be nearly impossible and there would be little permanent economic growth. It is on this premise that financial inclusion becomes very necessary for economic growth, because it provides innovative financial products to encourage low income earners to save more [28].

B. Concept of Financial Inclusion

Indeed, the essence of implementing financial inclusion is embedded in its concept. It is the process of ensuring access to appropriate financial products and services needed by all sections of the society especially the vulnerable low-income groups at an affordable cost in a fair and transparent manner, by regulated mainstream financial institutions. It is important also to note that access to financial services as indicated involves timeliness.

[8] defined financial inclusion as a process or situation which allows for ease of access to or availability of and usage of formal financial services by members of the economy. It extends its definition to not having any form of difficulty in opening bank account, being able to afford access to credit and consistently having a convenient use of financial system products and facilities without difficulty.

According to the special report of [36], financial inclusion covers both access to (supply of) and use of (demand for) financial services. It is a measure of the proportion of the individuals and firms that use financial services provided by a formal institution.

Financial inclusion is a way of discouraging savings, loans and holding of money in the informal sector outside the financial system. Financial inclusion is the whole system, programmes and plan that ensure that more people who have access to formal financial services but did not use them, and those who did not have access to formal financial services are brought into the formal financial systems to ensure their continuous and consistent use of formal financial services over a very long period of time [1].

[19], in the context of overall economic inclusion, stated that

financial inclusion would lead to increased economic activities and employment opportunities for rural households thereby improving the financial status and standard of living of the poor and the vulnerable class of the society. This has a multiplier effect on the economy as it would lead to higher disposable income for the rural households which will in turn lead to more savings and a robust deposit base for banks and other financial institutions.

C. Global Overview of Financial Inclusion

According to [26], global access to financial system still remains a critical developmental challenge amidst the progress that have been recorded so far. According to [38] the population of unbanked adults globally, dropped from 2.5 billion in 2011 to 2 billion in 2014 to 1.7 billion in 2017. Globally, 69 percent of adults which represents 3.8 billion adults are now financially included. This is an increase from 62 percent in 2014 and 51 percent in 2011 [39]. The global result is a representation of a huge disparity among different regions.

In the Sub-Saharan Africa, 43% of the adult population has been recorded to own a bank account. Mobile money drove financial inclusion in this region since 2014 where 20% or more of the adults make use of mobile money account. The share of adults with mobile money account has doubled to 21% in contrast to the percentage with accounts in financial institutions. Saving semi-formally is much more common than saving formally as people turn to their friends when they need loan [20]. According to [16], Rwanda and South Africa stand out for the most enabling environment for financial inclusion among the Sub-Saharan African countries and took 11th position globally.

In the East Asia and the Pacific, Singapore, Malaysia, and Thailand have financial account penetration of over 75% while others range between 22% and 34%. This implies that at least two-thirds of their population do not have a bank account [21].

Account ownership rose from 58% in 2014 to 65% in 2017 in Europe and Central Africa [39].

According to [25], a study carried out in 2019 revealed Columbia and Peru to have received the highest financial inclusion scores among the Latin American and Caribbean countries surveyed. On the scale of 0 – 100, Columbia scored 82 points while Peru had 80 points. The lowest was Venezuela. As at 2017, 55% of adults, owned a transaction account in this region [40]. According to [16], Columbia, Peru and Uruguay are the Latin American and Caribbean countries (amongst other regions) that have the most conducive environment globally for financial inclusion.

The Middle East and North Africa (MENA) region recorded 54% of their adults that owns account as at 2017 [40]. This is a rise from 32% as at 2014. These regions contain some of the world's most underbanked populations but technology is fronting the drive for change [15].

In South Asia, 69% of adults own a bank account in 2017. This is a rise from 46% in 2014 [40]. According to [16], India and the Philippines are the South Asian countries (amongst other regions) that have the most conducive environment globally for financial inclusion.

D. Financial Inclusion in Nigeria

According to [8], several reforms were witnessed in the Nigerian financial services sector since 2005 in pursuit of financial inclusion;

- *The Nigerian Financial System Strategy 2020 (FSS 2020)*: Launched by the CBN in 2007, this strategy was meant to develop the Nigerian financial sector into a growth catalyst that will enable Nigeria be one of the 20 largest economies in 2020. The initiatives of the framework also directly addressed financial inclusion.
- *The 2005 Microfinance Policy*: The CBN, through this policy, harnessed the third sector institutions like market associations, cooperatives, non-governmental organisations etc for the inclusion of the large and many users of the informal sector where the bulk of the unbanked exist.
- *Framework for Non-Interest Financial Institutions*: The main objective of this framework was to bring the population that shunned conventional financial services because of their aversion to interest and interest-based products into the banking sector. It was launched in 2011 by the CBN.
- *The Cashless Policy*: Introduced in 2012, this policy, amongst other benefits, further aided in the campaign, deployment and activation of E-channels like ATMs, Point of Sales (POS) and internet banking. Commercial banks were instructed by the CBN to encourage their customers to embrace formal financial services through this platform. This will increase financial access and ultimately financial inclusion.
- *Improved Payment Systems*: In this bid, the CBN introduced the national switch platform to capture all electronic payments within the economy; the automated cheque payment system (2003); and the Nigeria Uniform Bank Account Number (NUBAN) (2010). These in turn increased activity in the nation's payments system, reduced money outside the banking system and enhanced financial inclusion [6] [8]. Financial Inclusion will have been achieved when all economic group have equal access, from the perspective of payment flows and broader banking services [9].
- *Mobile Money*: The CBN licensed 14 mobile money operators (M.M.Os) in 2011 and by 2013 has licensed up to 26 M.M.Os to promote mobile money operations. M.M.Os was seen to have great potentials of serving millions of population that are unbanked in the rural and urban communities as many Nigerians owned a mobile

phone. Kenya's success in mobile money operations gives credence to this. M-PESA (mobile money) was launched in Kenya. According to [23], 48.76% of Kenya's GDP is processed over M-PESA while 93% of Kenya's population use M-PESA. Again, 1.7 billion transactions have been processed over M-PESA between July 2016 and July 2017.

In 2012, the CBN introduced the Financial Inclusion Strategy which was aimed at further reducing the exclusion rate to 20% by 2020. This strategy incorporated the 3 dimensions of financial inclusion indicators as recommended by the Global Partnership for Financial Inclusion (GPII) and subsequently endorsed by the G20 leaders in 2012;

- *Access Indicators*: This implies access to financial service. It reflects the depth of outreach of financial services, such as the penetration of bank branches or point of sale (POS) devices in rural areas.
- *Usage Indicators*: This implies usage of financial services. It measures how clients use financial services, such as the regularity and duration of the financial product/service over time (e.g. average savings balances, number of transactions per account, number of electronic payments made).
- *Quality Indicators*: This implies the quality of the products and the service delivery. It measures whether financial products and services match clients' needs, the range of options available to customers, and clients' awareness and understanding of financial products. In other words, it incorporates affordability, appropriateness, financial literacy and consumer protection.

Finally, other policies introduced by the CBN to foster financial inclusion are the promotion of financial literacy campaign, streamlining of transaction charges etc. All these initiatives since 2005 saw financial inclusion rise from 23.6% in 2008 to 48.6% in 2014 to 63.2% in 2018 [14] [11].

E. Empirical Review

[32] investigated the relationship between financial inclusion and economic growth with particular reference to microfinance for the period 1992 to 2013. Employing the Johansen Cointegration test, the study revealed that the activities of microfinance as one of the financial inclusion strategies significantly contribute to economic growth.

[3] investigated the impact of financial inclusion on economic growth in Nigeria. Using the Ordinary least square regression model, the result showed that financial inclusion is a significant determinant of the total factor of production, as well as capital per worker, which invariably determines the final level of output in the economy

[31] in a 33-year annual study, which employed the Johansen cointegration and the VECM, evaluated the effects of financial inclusion in the context of banking habits of rural population on the Nigerian economy. Findings established

that in the long run, rural dwellers' deposit and loan with rural branches of commercial banks have influence on the performance of Nigeria economy. However, results demonstrated that rural populace deposit and loan with rural branches of commercial banks have no effect on the performance of the Nigeria economy in the short run.

[4] investigated the impact of financial inclusion on economic growth using a panel of 25 Sub-Saharan African countries, each observed over six years from 2009 - 2014. The study tested whether an increase in the level of financial inclusion, controlling for gross savings and gross primary school enrolment leads to economic growth. The findings based on a two-way random effect estimation revealed that Gross savings lead to economic growth, but gross primary school enrolment has an unexpected negative impact.

[13] adopting the auto-regressive distribution lag model, examined the effects of financial inclusion on economic growth in Nigeria from 2000 to 2018. The study indicated that loan to small and medium enterprise (LSME), rural bank deposit (RBD) and inflation (INF) has a significant effect on economic growth in Nigeria.

[5] examined the relationship between financial inclusion and economic growth of Rwanda using annual data from 2004 to 2016. The study used Auto Regressive Distributive Lag model and it revealed that there is long-run relationship between financial inclusion and economic growth of Rwanda.

[30] investigated the effect of financial inclusion on economic growth and development in Nigeria over the period 1986-2015 using the Ordinary Least Squares technique. The study showed that credit delivery to the private sector has not significantly supported economic growth in Nigeria. Also, that financial inclusion has promoted poverty alleviation in Nigeria through rural credit delivery.

[29] examined the effects of financial inclusion on the Nigerian economy from 1990 to 2015. The study employed the Ordinary least squares (OLS) regression technique and adopted the analytical method of data analysis. The major findings were that Deposit Money Banks' financial intermediation activities, financial deepening, financial accessibility and institutional infrastructures all have positive significant effect on economy growth (Real GDP) while there was no relationship between financial inclusion and poverty eradication in Nigeria.

[37] examined the impact of financial inclusion on the economic growth of Nigeria for the period 2003 – 2015 using Ordinary Least Square Technique (OLS) and multiple regression analysis. The results show that Deposits of rural branches of commercial banks and ATM transactions exert a positive and significant impact on economic growth in Nigeria while loans of rural branches of commercial banks exert a negative and insignificant impact on economic growth of Nigeria for the period under study.

III. DATA AND METHODOLOGY

A. Data

The study investigated the relationship between financial inclusion and economic growth in Nigeria. The study, which employed an annual time series data from 2004 to 2018, used Gross Domestic Product (GDP), Number of ATMs per 100,000 adults (representing the access indicators), Depositors with Banks per 1000 adults, Borrowers from Commercial Banks per 1000 adults (representing the usage indicators) and Lending Interest Rates (representing the quality indicators). The data mentioned are secondary and were sourced from the Central Bank of Nigeria (CBN) statistical bulletin and World Bank data, all of 2012 and 2019.

IV. METHODOLOGY

The following model, with recourse to the study, is specified in log form thus;

$$\log gdp = \beta_0 + \beta_1 \log atms + \beta_2 \log deposits + \beta_3 \log borrowers + \beta_4 \log lir + \varepsilon_t \quad (1)$$

Where gdp = Gross Domestic Product (dependent variable)

logatms = Number of ATMs per 100,000 adults (in log form)

logdeposits = Depositors with Banks per 1000 adults (in log form)

logborrowers = Borrowers from Commercial Banks per 1000 adults (in log form)

loglir = Lending Interest Rates (in log form)

β_0 = the intercept term

$\beta_1 - \beta_4$ = coefficients of the variables

ε_t = Error term.

B. Unit Root Test

In considering the properties of time series, it is imperative that a unit root test be conducted in order to prevent spurious regression results. This test is to establish whether the variables are integrated of order I(0) or I(1) or both. It is conventional that a unit root test is first performed in an econometric analysis [35]. For this purpose, the study employed the Phillip-Perron Unit Root test. The outcome of this test, will inform the appropriate cointegration test to use.

The Phillip-Perron (PP) Unit root test was proposed by [34]. They propose an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented DF test equation;

$$\Delta y_t = \alpha y_{t-1} + x_t \delta + \varepsilon_t \quad (2)$$

where $\alpha = \rho - 1$, x_t = optional exogenous regressors which may consist of constant or a constant and trend, δ = parameter to be estimated and ε_t = white noise. It modifies the t-ratio of the α coefficient in equation (2) so that serial correlation does not affect the asymptotic distribution of the test statistic. The PP test is based on the statistic:

$$z_{\alpha} = t_{\alpha} \left(\frac{\gamma_0}{f_0} \right)^{\frac{1}{2}} - \frac{T(f_0 - \gamma_0)(se(\hat{\alpha}))}{2f_0^{1/2}s} \quad (3)$$

Where $\hat{\alpha}$ is the estimate, t_{α} the t-ratio of α , $se(\hat{\alpha})$ is the coefficient standard error and s is the standard error of the test regression. γ_0 is calculated as $(T - k)s^2/T$. Where k is the number of regressors. f_0 is an estimator of the residual spectrum at frequency zero.

C. The Autoregressive Distributive Lag (ARDL) and Error Correction Models

The ARDL model approach to cointegration is used to establish the existence of cointegration or long-run relationship among variables. It's been preferred the most because of its ability to specify both the short run and the long-run parameters simultaneously. According to [33], the approach is most appropriate for variables with mixed order of integration; I(0) and I(1). The study adopted this approach to estimate the short run and long run parameters of equation (1) and thus the model was specified as follows;

$$\begin{aligned} \Delta \log gdp_t = & \beta_0 \sum_{t=1}^q \beta_{1t} \Delta \log gdp_{t-1} + \sum_{t=1}^q \beta_{2t} \Delta \log atms_{t-1} + \\ & \sum_{t=1}^q \beta_{3t} \Delta \log deposits_{t-1} + \sum_{t=1}^q \beta_{4t} \Delta \log borrowers_{t-1} + \\ & \sum_{t=1}^q \beta_{5t} \Delta \log lir_{t-1} + \beta_6 \log gdp_{t-1} + \beta_7 \log atms_{t-1} + \\ & \beta_8 \log deposits_{t-1} + \beta_9 \log borrowers_{t-1} + \beta_{10} \log lir_{t-1} + \varepsilon_t \end{aligned} \quad (4)$$

Where Δ = first difference operator, q = optimal lag length and ε_t = error term. The left-hand side in equation (4) represents the GDP while in the right-hand side, $\beta_1 - \beta_5$ expressions with summation sign represent the short run dynamics and the $\beta_6 - \beta_{10}$ expressions represent the long run relationship of the model.

The ARDL bounds test for cointegration is based on the Wald-test (F-statistic). Two critical values are given by [33] for cointegration test; the lower bound I(0) and the upper bound I(1). The null hypothesis of no cointegration and the alternative hypothesis of cointegration amongst variables are denoted as follows;

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0 \text{ (there is no cointegration)} \quad (5)$$

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0 \text{ (there is cointegration)} \quad (6)$$

The test criteria will be to accept H_0 if F-statistic < I(0) and reject H_0 if F-statistic > I(1). However, if the F-statistic falls between I(0) and I(1), then the test is deemed inconclusive.

The Error Correction Model (ECM) was introduced by [12]. It will be used to test for speed of adjustment and how the variables converge towards equilibrium in the long run. So once cointegration is established, the ARDL long run model can be estimated as follows;

$$\begin{aligned} \log gdp_t = & \beta_0 + \beta_1 \log gdp_{t-1} + \beta_2 \log atms_{t-1} + \\ & \beta_3 \log deposits_{t-1} + \beta_4 \log borrowers_{t-1} + \beta_5 \log lir_{t-1} + \varepsilon_t \end{aligned} \quad (7)$$

The error correction version of the ARDL model is as follows;

$$\begin{aligned} \Delta \log gdp_t = & \beta_0 \sum_{t=1}^q \beta_{1t} \Delta \log gdp_{t-1} + \sum_{t=1}^q \beta_{2t} \Delta \log atms_{t-1} + \\ & \sum_{t=1}^q \beta_{3t} \Delta \log deposits_{t-1} + \sum_{t=1}^q \beta_{4t} \Delta \log borrowers_{t-1} + \\ & \sum_{t=1}^q \beta_{5t} \Delta \log lir_{t-1} + \lambda EC_{t-1} + \varepsilon_t \end{aligned} \quad (8)$$

Where λ = the speed of adjustment and EC_{t-1} is the error correction term which is derived from the residuals obtained from equation (7).

For diagnostics, the study will check for structural stability, serial correlation and problems of heteroscedasticity. To check for directional causality amongst the variables, the Pairwise Granger causality test will be employed. The model for the causality test is as follows;

$$\Delta x_t = \sum_{i=1}^n \beta_i \Delta x_{t-i} + \sum_{i=1}^n \delta_i \Delta y_{t-1} + u_{1t} \quad (9)$$

$$\Delta y_t = \sum_{i=1}^n \alpha_i \Delta y_{t-1} + \sum_{i=1}^n \lambda_i \Delta x_{t-1} + u_{2t} \quad (10)$$

The null hypothesis in Eq (9) is $\delta_i = 0$ which means Δx does not granger cause Δy . Similarly, the null hypothesis in Eq (10) is $\lambda_i = 0$ which means Δy does not granger cause Δx . The rejection or non-rejection of the null hypothesis will be based on the p-value where null hypothesis is rejected if p-value < 0.05.

IV. ANALYSIS AND RESULTS

The analysis for the study was run with Stata 15. As required, the variables were tested for stationarity using the Phillip-Perron unit root test. Table 1 below shows the result of the PP unit root test.

Table I: Phillip-Perron Unit Root Test

Variables	Tstatistic	I(d)	Variables	Tstatistic	I(d)
Loggdp	-35.056	I(0)	Δ loggdp	-0.613	I(d)
Logatms	-9.859	I(0)	Δ logatms	-2.406	I(d)
logdeposits	-1.198	I(d)	Δ logdeposits	-4.001	I(1)
logborrowers	-0.091	I(d)	Δ logborrowers	-3.224	I(1)
Loglir	-5.050	I(0)	Δ loglir	-6.374	I(1)

Source: Authors' computation using Stata 15

The test reveals that at levels, loggdp, logatms and loglir are stationary and others are not while, at first difference, logdeposits, logborrowers and loglir are stationary and others are not. Therefore, it is then appropriate to apply the ARDL approach in testing for cointegration since there is a mixture of stationary and non-stationary variables.

Equation (4) was applied for the ARDL cointegration test. The ARDL model of 1,0,0,0 was automatically selected using the Akaike Information Criterion. The calculated Wald F-statistic = 27.432 and is greater than the lower and upper bound critical values of all the significance levels (1%, 5% and 10%) as is evidenced in the table 2 below;

Table II: Ardl Bounds Test

Test Statistic	1% Critical Value Bounds		5% Critical Value Bounds		10% Critical Value Bounds	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F-Statistic = 27.432 K = 4	3.74	5.06	2.86	4.01	2.45	3.52
k: # of non-deterministic regressors in long-run relationship						

Source: Authors' computation using Stata 15

As the table 2 above reveals, the null hypothesis of no cointegration is rejected implying that a long run cointegration relationship exists among the variables.

Table III: Ardl Long Run, Short Run And ECM

D.loggdp	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ADJ loggdp L1.	-		-		-	
	.000939 8	.000370 9	2.5 3	0.05 2	.001893 3	.000013 7
LR logatms logdeposits logborrowers loglir	.002504 1	.000885 4	2.8 3	0.03 7	.000228 -	.004780 2
	.000431 3	.001051 2	0.4 1	0.69 9	.002270 8	.003133 4
	.001404 6	.000621 8	2.2 6	0.07 3	.003003 1	.000193 9
	-	.001466 1	-	0.05 4	-	.000085 5
	.003683 1		2.5 1		.007451 7	
SR _cons	.007651 5	.002818 7	2.7 1	0.04 2	.000405 8	.014897 3

Source: Authors' computation using Stata 15

Table 3 above shows the long run and short run parameters of the ARDL model. According to the result, logatms, logborrowers and loglir are statistically significant at 5%, 10% and 10% level of significance respectively in the long run while logdeposits is not significant.

The coefficient of the number of ATMs per 100,000 adults (logatms) is 0.0025 and it suggests a positive relationship with economic growth. This implies that a 1% increase in the number of ATMs per 100,000 adults brings about a 0.25% increase in economic growth on average ceteris paribus at the 5% significance level. This finding is in line with [31] and [37] that found a positive relationship between ATM transactions and economic growth. According to [37], it is not surprising as ATM, being an inclusion strategy, enhances economic activities.

Borrowers from commercial banks per 1000 adults (logborrowers) suggests a negative relationship with

economic growth as it is negatively significant at 10% significance level with a coefficient of -0.0014. This implies that a 1% increase in the number of borrowers from commercial banks per 1000 adults brings about a 0.14% decrease in economic growth on average ceteris paribus at the 10% significance level. This finding goes against the economic theoretical expectations that the more loans are granted to borrowers, the more it enhances the economy. This could be attributed to misallocation of these borrowed funds for other purposes when they are meant for business expansion and increase in productivity etc. This finding corroborates with [37]. It however, negates the findings of [18] which revealed a positive relationship between bank loans and economic growth.

Lending interest rates (loglir) also suggests a negative relationship with economic growth as it is negatively significant at 10% significance level with a coefficient of -0.0037. This implies that a 1% increase in the lending interest rates brings about a 0.37% decrease in economic growth on average ceteris paribus at the 10% significance level. This is expected as high interest rates make it difficult for credit to be accessed.

Depositors with banks per 1000 adults (logdeposits) is positive with a coefficient of .0004313 but statistically insignificant implying that no correlation exists between the number of depositors per 1000 adults and economic growth.

The error correction term (ECT) or the adjustment term measures the speed at which prior deviations from the equilibrium are corrected in the current period. From the results in table 3, the ECT is as expected; significantly negative at 10% significance level with the estimated coefficient of -0.0009398. This indicates that 0.094% of the dis-equilibrium due to the previous year's shocks is adjusted back to the long run equilibrium in the current year.

The diagnostic/fitness and stability tests employed for this model are summarized in the table 4 below;

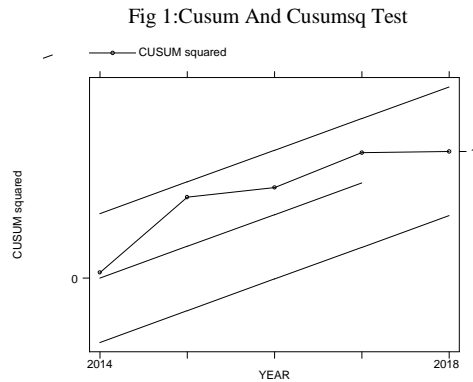
Table IV: Diagnostics And Stability Tests

Diagnostic Test	P-value (P)	Sig (s)	Null Hypothesis	Decision Criteria	Result
Breusch-Godfrey Serial Correlation LM Test	0.1715	0.05	No Serial Correlation	Reject H0 if P<S	No Serial Correlation
White Test for Heteroskedasticity	0.3575	0.05	No Heteroskedasticity	Reject H0 if P<S	No Heteroskedasticity
Jarque-Bera Normality Test	0.9161	0.05	Normally Distributed	Reject H0 if P<S	Normally Distributed
CUSUMSQ					Model is stable

Source: Authors' computation using Stata 15.

The model's residuals are normally distributed as it is also free from serial correlation and heteroskedasticity. The Square

of Cumulative Sum of Recursive Residuals (CUSUMSQ) test for structural stability as shown in Fig. 1 below indicates the model is stable as the line falls between the 5% boundary.



Source: Author’s computation using Stata 15

The Pairwise granger causality test result is provided in table 5 below. Causality implies that past values of one variable has a predictive ability in determining the present values of another variable.

Table V: Pairwise Granger Causality Test

Null Hypothesis	Obs	Prob> chi2	Decision
logatms does not Granger-cause loggdp loggdp does not Granger-cause logatms	13	0.3858 0.9656	Accept Null Accept Null
logdeposits does not Granger-cause loggdp loggdp does not Granger-cause logdeposits	11	0.9059 0.0094	Accept Null Reject Null
logborrowers does not Granger-cause loggdp loggdp does not Granger-cause logborrowers	10	0.5854 0.0042	Accept Null Reject Null
loglir does not Granger-cause loggdp loggdp does not Granger-cause loglir	14	0.7845 0.6967	Accept Null Accept Null
logborrowers does not Granger-cause logdeposits logdeposits does not Granger-cause logborrowers	10	0.0247 0.0115	Reject Null Reject Null
loglir does not Granger-cause logdeposits logdeposits does not Granger-cause loglir	11	0.0026 0.6097	Reject Null Accept Null
loglir does not Granger-cause logborrowers logborrowers does not Granger-cause loglir	10	0.2765 0.3421	Accept Null Accept Null
logdeposits does not Granger-cause logatms logatms does not Granger-cause logdeposits	11	0.0574 0.0603	Accept Null Accept Null
logborrowers does not Granger-cause logatms logatms does not Granger-cause logborrowers	10	0.4415 0.0332	Accept Null Reject Null
loglir does not Granger-cause logatms logatms does not Granger-cause loglir	13	0.1431 0.8008	Accept Null Accept Null

Source: Authors’ computation using Stata 15.

The results show no directional causality between GDP and number of ATMs per 100,000 adults; GDP and lending interest rates; lending interest rates and borrowers from

commercial banks per 1000 adults; depositors with banks per 1000 adults and number of ATMs per 100,000 adults; lending interest rates and number of ATMs per 100,000 adults.

There is a uni-directional causality running from GDP to depositors with banks per 1000 adults; GDP to borrowers from commercial banks per 1000 adults; lending interest rates to depositors with banks per 1000 adults; number of ATMs per 100,000 adults to borrowers from commercial banks per 1000 adults.

A bi-directional causality runs between depositors with banks per 1000 adults and borrowers from commercial banks per 1000 adults.

V. CONCLUSION

The study investigated the relationship between financial inclusion and economic growth in Nigeria between 2004 to 2018. The ARDL bounds test indicated the presence of cointegration among the variables. The study showed a positive and statistically significant relationship between economic growth and number of ATMs per 100,000 adults with a coefficient of 0.0025. Borrowers from commercial banks per 1000 adults and lending interest rates have a significantly negative relationship with economic growth with coefficients of -0.0014 and -0.0037 respectively. However, depositors with banks per 1000 adults posed no correlation with economic growth.

VI. RECOMMENDATION

Based on the above, this paper recommends thus;

- More stress-free and less cumbersome channels of accessing credit should be provided by financial authorities.
- Financial institutions should mount checks in order to make sure that credit borrowed are used for productive purposes.
- Effective campaign or awareness should be made to increase financial literacy and/or awareness.
- Transaction costs, financial obligations and other requirements/expectations which pose as bottlenecks to using financial services or products should be reviewed downwards to accommodate the proportion of the population that are poor.
- Cashless policy should be integrated with shopping malls, small, medium and large-scale business outfits etc. This will provide subtle but steady suasion for individuals to adopt any e-channel available to do transactions.
- Finally, this paper recommends that further research be carried out on financial inclusion and economic growth in Nigeria.

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