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FINANCIAL INCLUSION AND RURAL DEVELOPMENT IN NIGERIA

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Abstract

The failure of the formal banking sector to provide financial services in rural areas in the supply of credit to rural communities to engage in economic activities that may promote rural development is recurring on the development agenda as a persistent issue. In line with the above, it becomes necessary to carry out a study on the impact of financial inclusion on rural development in Nigeria. The study employed Johansen cointegration, Error Correction Model (ECM), and Granger causality test methods of analyses on data collected from the Central Bank of Nigeria and World Bank database from 1981 to 2022 to ascertain both the long and short-run relationships among the variables. The result revealed that both the short and long-run relationships confirmed the significant impact of financial inclusion on rural development in Nigeria. The ECM value of -0.45 is statistically significant and indicates a satisfactory speed of adjustment, indicating that 45 percent of the errors are corrected in each period. The study concludes that a low level of financial deepening and the small number of rural bank branches in Nigeria are retarding the promotion of financial inclusion which invariably stunts rural development. The study recommended the need for the government to introduce inclusive policies to broaden financing channels suitable for implementation in rural areas. Overall, the study provides an indispensable road map for future researchers and scholars, especially in the field of development finance.

Keywords: Financial inclusion; financial services; rural development; rural dwellers; agriculture

JEL Classification code - F10, F13

INTRODUCTION

Basically, the rural dwellers' predicaments in terms of time intervals between the planting and harvesting, the unpredictability agricultural production and sale which is endangered by the direction of the weather and commodity markets' abnormality are restricting economic activities of the rural areas. Therefore, the way out of these problems is easy accessibility to financial services that can promote effective rural financial inclusion which will create enablement environment for meaningful long-term investments, risks taking and spread, and create steady consumption lines. This is corroborated by Sarma, (2011) that financial inclusion offers incremental and complementary solutions to the promotion of inclusive development.

However, an effective, sustainable and broadly available rural financial system remains a hesitant bottleneck and major development challenge in most of the developing countries (Adegboyega, 2019). In spite of the critical role credit plays in rural development, it has been one of the vital factors that have not been given appropriate attention. This was also compounded by shallow rural financial system that has restraint majority of the rural people having easy access to credits (Adegboyega, 2019).

Typically, easy accessibility to financing promotes development within a community in terms of trade openings, which make rural agents to tap existing prospects and bargaining influence. This is corroborated by Ajide (2012; 2014) and Ajisafe & Ajide, 2014) that financial development enhances overall economic growth and development. Also, Osikena and Ugur, 2016) stated further that a well-developed and efficient financial sector serves as a transformative process in the development of economic sector with the highest potential to offer productive jobs that bring worthy employment prospects.

In the same vein, Corrado and Corrado (2017) explained further that financial inclusion acts as an important tool that sustains the development which can make people to derive economic opportunities. In fact, easy accessibility to finance by the vulnerable people and the poor will enable them to undertake economic activities that can accelerate growth.

Unfortunately, de Soto (2000) explained that agents in the rural sectors of most developing economies are not aware of many prospects for investing, risk-taking and risk spreading that would be available through better financial amalgamation into larger and inclusive financial markets. At the same time, the introduction of new financial services and openings for trade may make rural financial providers to loose domination rents or market share resulting from increased external rivalry (Rajan and Zingales 2003; Platteau 1997), or the anxiety for the downfall of local informal insurance apparatuses (Scott 1976).

In Nigeria various levels of government have integrated financial inclusion approach into their developmental schemes, most especially to fasten rural development process. The major reason for this is that most of the rural areas are highly populated with the active poor whose major occupation is farming and depended on farm outputs for their subsistence. This makes agriculture to account for a significant portion of Nigeria's GDP as a key activity for the country's economy after oil Nwankwo, Ikeh, Ejiofor and Ifeanyieze (2024). Also, Ajide, (2013) argued that financial inclusion of rural areas as an authentic developmental policy can be used to improve the socio-economic conditions of the rural population; and to reduce the frequently affirmed urban reliance of the rural areas. Mbutor and Uba (2013) observed further that with the improvement in the magnitude of financial inclusion in Nigeria presently; the country is still coming behind among other nations based on the indicators of inclusion.

For instance, many rural communities in Nigeria are bedeviled with some limitations in term of financial services accessibility, underserved or unserved financial markets. This is emphasized further by Adegboyega (2017) that rural development initiatives in Nigeria suffer due to lack of financial intermediation as the supply side barriers pose bigger impediments in the process of financial inclusion.

Normally, most financial institutions do avoid or refuse to offer sustainable financial services in rural areas and often selective when allocating credits to rural dwellers for no economic reasons. Thus, the rural dwellers are left with no option than patronizing the informal or semi-formal financial institutions as well as unconventional providers like traders or input suppliers (Ezeanyeji, Usifoh, Obi and Ejefobih, 2020).

For the fact that these informal institutions have frail institutional and managerial aptitude; and operating in remoteness from the formal financial system has led them to charge high interest rates (Richter, 2011). These singularities have added to the rise of poverty level

in rural areas. People living in rural areas need access to financial services at a cheaper cost so as to be able to acquire agriculture inputs, obtain veterinary services, maintain infrastructure, and to pay wages of labour involved in planting and harvesting. Also, they should be able to save the incomes from the farms produce during the high season and manage their resources during the low season, paying for the transportation of goods, invest in education, shelter, health and deal with disasters (Kama & Adigun, 2013).

Also, one of the biggest obstacles to financial inclusion in rural areas is illiteracy (Yasir et al., 2022 & Kumar, Pillai, Kumar and Tabash (2023)). Illiteracy rates are inversely connected with the inclusiveness of financial services and products levels (Elzahi, 2022). According to Desai, Bhatt and Raval (2023) illiteracy is a significant obstacle to financial inclusion in rural areas. Majority of rural dwellers are illiterates and this is a great barrier to the inclusiveness of financial services and products in rural areas (Hassan, 2022; Hassouba, 2023 & Mossie, 2023). Liew (2020); Morgan and Long (2020); Chowdhury and Chowdhury (2023) & Hossain, Ibrahim and Uddin (2023) observed further that people who lack literacy find it difficult to manage their finances, get financial services, and comprehend financial goods. Accordingly, the World Bank's Global Findex database observed that education levels play a crucial role in the use of formal financial services. In addition, data from sub-Saharan Africa indicates that adults with a tertiary or higher education are over four times more likely to have access to formal bank accounts compared to those with only a primary or lower level of education (UNDP, 2016).

Generally, illiteracy levels are highest among rural women and these are expanding the gender gap in financial inclusion and also deterring the benefits women can derive from economic opportunities, financial services and labour markets. In addition, inflexible taxation regimes can also contribute to gender inequality, such as indirect tax on certain financial transactions or consumables tend to affect low-income earners more, and women especially, because they spend a higher proportion of their income on these items (Kazibwe, 2022).

Nevertheless, due to the low-level of education in rural areas, point-of-sale (POS) and automated teller machines (ATM) are still required to boost the inclusiveness of financial services and products and reduce poverty. Iriobe, Williams, Ayodele and Taofeek (2021) identified these tools as financial technologies that boost the inclusiveness of financial services and products and reduce poverty.

Though, there is limited empirical work exploring the detailed relationships between financial inclusion and rural development but taking the cognizance of financial inclusion as a genuine tool in promoting rural development, therefore, there is need to examine the impact of financial inclusion on rural development in Nigeria. The rest of the paper is as follows. Section two is literature review, while section three deals with the methodology, section four is analysis and section five contain conclusion and recommendations.

Section Two

LITERATURE REVIEW

Theoretical Review

This study is anchored on the Harrod (1928, 1948) and Domar (1946) growth theory with the assumptions that investment has two effects, the aggregate demand side which makes business to spend more, and the aggregate supply side whereby more investment increases capital stock and produces more business. This is expressed in production function as:

$$Y = f(L,K,T) \quad (1)$$

Where Y is output, L is labour, K is capital and T is land. In this case output is related to labour while capital is the crucial factor in the process of economic growth. The model assumed that for steady growth to take place there should be adjustment of supply and demand for capital. In fact they stressed on the dual role of capital accumulation. Firstly, new investment generates income (through multiplier effect); and secondly, it increases productive capacity (through productivity effect) of the economy by expanding its capital stock. The assumption behind this model is that, for a steady state of growth, aggregate demand must grow at the same rate as an economy's output capacity grows. That is, capital accumulation can emanate from activities of the banks (financial intermediaries) in form of credit provision, savings mobilization, insurance, training etc. which serves as a useful tool for increasing the productive capacity of the enterprise (farm and non-farm activities). To support these views, Bencivenga and Smith (1991) explained that development of efficient financial intermediation that promotes effective financial inclusion contributes to economic growth of rural areas by channeling savings to high productive activities and reduction of risks that may endangered their productive capacity. The implication of this model to this study is that, there is need for easy accessibility to financial services that can promote effective rural financial inclusion which will create enablement environment for meaningful long-term investments, risks taking and spread, and create steady consumption lines. Despite all these, rural financing has experienced many difficulties as a result of repressive political intrusions which have divergent opinion on the liberalization of financial market. This has led to subjugation and distortion in rural financing of developing economies. This informs the arguments of Gurley and Shaw (1960); McKinnon (1973); Adams, Graham, and Von Pischke (1984); and Gonzalez-Vega (1984) which were based on the premise that introduction of financially exploitive policies discouraged the entry of new financial intermediaries to assist rural people in financing their trade while asymmetric information and enforcement problems also led to incorrigible market disasters. These predicaments have confused the financial authorities in developing countries on whether to promote or curb productive-effective financial intermediation which may promote financial inclusion in the rural areas. Even though, financial dealings are seen as the bedrock of many contractual and organizational commitments in the rural economy. Beside, rural financial market promotes economic growth through effective financial intermediation (Adegboyega, 2017) but presence of markets limitations hinder growth. This explains the reasons for the limited number of rural commercial bank branches and other financial intermediaries into underprivileged and undeserved societies (Adegboyega, 2017). All these attributes are thwarting the promotion of financial inclusion in rural developing economies, Nigeria inclusive.

Conceptual Review

Generally, financial inclusion is described as the process of ensuring easy access to financial services by the active poor at an affordable cost (Rangarajan Committee, 2008). Also, Leeladhar (2006) described it as the delivery of banking services at an affordable cost to the large segments of underprivileged and small income section of the society. According to Kumar and Mohanty (2011), financial inclusion is the provision of cheap, accessible, and relevant financial services to individuals and enterprises. In their own view, Sarma and Pais (2011) described financial inclusion as the process of providing a wide range of necessary financial services to all members of society at a reasonable cost, at the right place, at the right time, and without discrimination.

Even though in developing countries, financial services are developing at a faster pace, a large number of the poor still lacking accessibility to financial services require to make their living. Also, in spite of the high request for financial services in rural areas, majority of financial institutions are unwilling to oblige in rural areas due to perilous nature of agricultural production.

Moreover, not all contributions in terms of rural bank deposits are used for the development of rural sector, hence, this study investigates whether contributions of rural dwellers in financial institutions in Nigeria serve as crowd-in effect or crowd-out effect on the living standard of people residing in the rural areas.

Empirical Review

Majority of empirical evidences in this area of study have proved that financial inclusion has positive impact on economic development. For instance, Sarma and Pais (2011), Egbatunde (2012), Ihugba, Bankonge and Ebomuche (2013), & Munyanyi (2014) toll on this line but they are limited in scope. Nwankwo and Nwankwo (2014) study observed that the sustainability of financial inclusion to rural dwellers in Nigeria remains the mainstream for economic growth. In another perspective, Onaolapo (2015) study results showed that financial inclusion has a little effect on economic growth in Nigeria. Also, Gomathy (2015) study results showed that the households of Thiruvallur District in India do not have access to banking services and they find it more difficult to save and make future financial planning. In addition, Kumari (2017) study revealed that rural poor of Kolkata could not have access to financial services irrespective of the economic development of the region Furthermore, Gretta (2017) study findings showed that financial inclusion promotes growth in the MENA and BRICS region. In their own study, Harley, Adegoke and Adegbola (2017) observed that financial inclusion has no significant effect in the rural areas of developing countries. In contrast, Kim, Yu and Hassan (2018) study results showed that financial inclusion had a positive effect on the economic growth in Organization of Islamic Cooperation countries. In the same vein, Liu, He and Turvey (2019) study found that financial inclusion is critical to rural transformation. Finally, Tega et al. (2023) study results show that higher unemployment rate is negatively associated with financial inclusion which can deter rural development.

In this area of study, there is limited empirical evidences that examined the relationship between financial inclusion and rural development. This study departs from previous studies by focusing more into an in-depth on relatively new developments in this fast growing field of empirical and theoretical research. In addition, some variables not include in previous studies were examined in this study. For example, rural development (AGRICL_GDP) is proxy by agricultural loan to GDP ratio, while rural bank branches to total bank branches ratio (RBB_TBB), rural bank deposits to total bank deposits (RBD_TBD), and rural population growth rate (RPGR) formed part of financial inclusion metric. This study fills this gap as part of the contribution to knowledge.

METHODOLOGY

The secondary data used in the analysis of this study were sourced from Central Bank of Nigeria (CBN) statistical bulletin and World Bank data base from 1981 to 2022. In order to determine both the long and short run relationships among the variables, the study made use of Johansen cointegration, Error Correction Model (ECM) and Granger causality test methods of analyses. Since it is evident from the literature that financial inclusion (FI) offers incremental and complementary solutions to the promotion of inclusive rural development. Therefore, rural development (AGRICL_GDP) is proxy by agricultural loan to GDP ratio because agriculture contributed large percentage to rural GDP and contributed more to rural employment. As for FI, it is determined by agricultural loan to total bank loan ratio (AGRICL_TL), financial deepening (FD), rural bank branches to total bank branches ratio (RBB_TBB), rural bank deposits to total bank deposits (RBD_TBD), rural bank loan to total bank loan ratio (RBL_TBL) and rural population growth rate (RPGR).

Model Specification

The model of this study is based on our theoretical review of the standard Harrod-Domar (H-D) growth model which is built around the neoclassical aggregate production function and focuses on the proximate causes of growth by repeating equation (1) above as follows:

Y = f(K, L, T), (1)

where Y is real output, K is capital, L is the labour input, and Tis technology. The aggregate production function is assumed to be well-behave and H-D assigned a crucial role to capital accumulation in the process of growth. Then, the assumption of the model is that capital accumulation can emanate from activities of the financial intermediaries in form of credit provision, savings mobilization, insurance etc. which serves as a useful tool for increasing the productive capacity of the enterprise. Also, deducing from the Bencivenga and Smith (1991) explanation that development of efficient financial intermediation promotes financial inclusion (FI) which contributes to economic growth of rural area, then, the study substitutes the K, L and T with FI. Thus equation (1) can be rewritten as:

Y = f(FI) (2)

Based on the literature reviewed and the proxy used for rural development because agriculture contributed a greater percentage to GDP and also dominated rural activities, the study substitutes Y with AGRICL_GDP. Thus, the following equation is model as:

AGRICL_GDP = f(FI) (3)

Thus, the linear expression of the above model is expanded and can be re-written in line with our study variables as follows:

AGRICL_GDP = AGR_TL, FD, RBB_TBB, RBD_TBD, RBL_TBL, RPGR (4)

Estimation Techniques

The estimating techniques adopted for this study are cointegration, error correction model and granger causality test. According to Engle and Granger methodology:

$$X_t = \mu + \theta(t - \frac{T}{2}) + aX_{t-1} + E_t \quad (5)$$

Where: X_t is the time series, and under the null hypothesis; $a = 1$ and $\theta = 0$, T represents the number of observations. The Augmented Dickey-Fuller (ADF) test is used to determine the stationarity of the time series by applying OLS to estimate the coefficients of the following relation:

$$\Delta X_t = \mu + \theta_t + X_{t-1} + \sum_1^n \lambda_1 \Delta X_{t-1} + \mu_t \quad (6)$$

n is chosen to eliminate the autocorrelation. If a unit root exists, then $y = a - 1$ would not be statistically different from zero. The test can be conducted by comparing the *t*-value on the coefficient of X_{t-1} with critical values. The Granger representation indicates that if X_t and λ_t are integrated; they will have an error correlation representation as follow:

$$a(L)\Delta\gamma_i = a_0 - \lambda(y_t - a_i X_t) + b(L)\Delta\lambda_t + c(L)E_t \quad (7)$$

Where *a(L), b(L)* and *c(L*) are stable and invertible polynomials, respectively. Such models provide a more attractive way of presenting and modeling cointegrating series. The error correction models combine the long run ($y_t - aX_t$) and the short run dynamics. The second step of Engle and Granger methodology consists to estimate the following regression:

$$\Delta y_t = a + \sum a^{\tau} \Delta y^{\tau}{}_{t-1} \sum \beta_j \Delta X_{t-1} + bEC_{t-1} \quad (8)$$

Where *a* denotes the first difference and the *EC* represents the error term. Therefore, equation (4) can be rewritten in a log-linear econometric format thus:

$$\begin{aligned} Ln\ AGRICL\_GDP_t = {} & \alpha + \alpha\ AGR\_TL_1 ln_t + \alpha_2 ln\ FD_t + \alpha_3 ln\ RBB\_TBB_t \\ & + \alpha_4 ln\ RBD\_TBD_t + \alpha_5 ln\ RBL\_TBL_t \\ & + \alpha_6 ln\ RPGR_t + \varepsilon_t \end{aligned} \quad (9)$$

Furthermore, the Error Correction Model (ECM) can be stated as follows:

$$\begin{aligned} \Delta AGRICL\_GDP_{1-t} = {} & \sum_{i=1}^{n} \alpha_0 \Delta AGRICL\_GDP_{1-t} + \sum_{i=1}^{n} \alpha_1 \Delta\ AGR\_TL_{1-t} \\ & + \sum_{i=1}^{n} \alpha_2 \Delta FD_{1-t} + \sum_{i=1}^{n} \alpha_3 RBB\_TBB_{1-t} \\ & + \sum_{i=1}^{n} \alpha_4 \Delta\ RBD\_TBD_{1-t} + \sum_{i=1}^{n} \alpha_5 \Delta RBL\_TBL_{1-t} \\ & + \sum_{i=1}^{n} \alpha_6 \Delta RPGR_{1-} + ECM_{t-1} + \varepsilon_{it} \end{aligned} \quad (10)$$

where Δ is the difference operator; n, is the numbers of lags, $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ are short run coefficients to be estimated, ECM_{t-i} represents the error correction term derived from the long run co integration relationship and ε_{it} the serially uncorrelated error terms in equation.

Section Four

4. RESULTS AND DISCISSION

4.1: Descriptive Statistics

The standard deviations reveal that RBB_TBB (9.88) fluctuate the most and in contrast, RPGR (0.36) fluctuate the least. Also, the results show that AGRIC_GDP, AGRICL_TL, FD, RBB_TBB and RPGR are normally distributed because their probability values are higher than the Jacque Bera chi-square at the 5% level of significance but RBD_TBD and RBL_TBL are not normally distributed. The positive Kurtosis indicates too few cases at the tail of the distribution. The Skewness coefficient indicates normal curves for all the variables with the values ranging between -3 and +3.

Table 1: Descriptive Statistics

	AGRIC_GDP	AGRICL_TL	FD	RBB_TBB	RBD_TBD	RBL_TBL	RPGR
Mean	29.85381	6.623095	15.62357	24.30952	3.871519	2.556190	1.340476
Median	30.69000	6.715000	12.90000	24.50000	1.760000	1.045000	1.220000
Maximum	47.10000	14.04000	24.90000	41.00000	21.55000	14.41000	1.840000
Minimum	19.99000	1.220000	8.460000	12.00000	0.000200	0.160000	0.750000
Std. Dev.	6.653329	3.986693	5.450919	9.883438	5.741717	3.581740	0.325291
Skewness	0.234876	0.329677	0.485199	0.052337	2.238493	2.254601	0.009370
Kurtosis	2.435793	1.781752	1.545082	1.448984	6.951404	7.323166	1.629968
Jarque-Bera	0.943246	3.358036	5.352302	4.229062	62.39975	68.28969	3.285344
Probability	0.623989	0.186557	0.068828	0.120690	0.000000	0.000000	0.193462
Observations	42	42	42	42	42	42	42

Author' Computation, 2024

4.2: Correlation Matrix Test

The results in table 2 below indicates that all the variables under consideration are positively correlated with AGRIC_GDP except FD. This shows that shallow financial market is affecting financial development which can aid financial inclusion in the promotion of rural development in Nigeria. The values of the correlation coefficients of most of the variables which were less than 0.8 in absolute terms reflect an absence of a multicollinearity problem among the variables of the study.

Table 2: Correlation Matrix Results

	AGRIC_GDP	AGRIC_TL	FD	RBB_TBB	RBD_TBD	RBL_TBL	RPGR
AGRIC_GDP	1						
AGRIC_TL	0.448939	1					
FD	-0.651192	-0.761132	1				
RBB_TBB	0.553469	0.869036	-0.849123	1			
RBD_TBD	0.152928	0.607274	-0.427527	0.62696	1		
RBL_TBL	0.022028	0.489496	-0.302631	0.50903	0.916610	1	
RPGR	0.460943	0.796248	-0.844273	0.84636	0.456491	0.352350	1

Author' Computation, 2024

4.3 Unit Root Test

In table 3 below the results of unit root test indicate that all the variables are of order I(1) series. Therefore, there is justification to conduct cointegration and Granger causality tests among the variables of the study.

Table 3: Unit Root Test

Variables	ADF Test Statistic	Critical Value of ADF	Order of integration	Remarks
AGRIC_GDP	-6.912913*	-3.610453	I(1)	Difference Stationary
AGRICL_TL	-6.168713*	-3.605593	I(1)	Difference Stationary
FD	-5.874874*	-3.605593	I(1)	Difference Stationary
RBB_TBB	-8.806757*	-3.605593	I(1)	Difference Stationary
RBD_TBD	-3,307913**	-3.632900	I(1)	Difference Stationary
RBL_TBL	-4.755764*	-3.615588	1(I)	Difference Stationary
RPGR	-6.571716*	-3.605593	1(I)	Difference Stationary

Author' Computation, 2024

4.4 Lag Length Selection Criteria for Cointegration

In table 4 below the appropriate lag length considered for the series and to compute the cointegration test for long run relationship is lag 2 based on the minimum values of AIC criterion.

Table 4: Lag Length Criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-113.5008	NA	28.37712	6.179529	6.478117	6.286660
1	-109.3424	6.610792*	24.18147	6.017560	6.358803	6.139995
2	-107.2290	3.251463	22.89796*	5.960460*	6.344358*	6.098199*

* indicates lag order selected by the criterion
Author' Computation, 2024

4.5 Johansen cointegration results

The results of Johansen's multivariate cointegration test in tables 5(a) and (b) below show that both the Trace and maximum Eigen value statistics exceeded the critical values at 5% significant level. More so, Eigenvalues are greater than zero and significant. So, the null hypothesis which states that there is no cointegration has to be rejected in three equations which is an evident of a long-run relationship among the variables under the study. It is also assumed that there is a long-run relationship between the rural development (AGRIC_GDP) and financial inclusion which is proxy by AGRICL_TL, FD, RBB_TBB, RBD_TBD, RBL_TBL and RPGR. In addition, normalized co-integrating test was carried out to determine the long relationship.

Table 5a: Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.692939	164.6819	125.6154	0.0000
At most 1 *	0.630286	117.4536	95.75366	0.0007
At most 2 *	0.575309	77.65252	69.81889	0.0104

Author' Computation, 2024

Table 5b: Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.692939	47.22834	46.23142	0.0390
At most 1	0.630286	39.80105	40.07757	0.0537
At most 2 *	.0.575309	34.25576	33.87687	0.0451

Source: Author's Compilation, 2024

4.6: Normalized co-integrating test

In table 6 below the normalized co-integration test result which is in its implicit form is rewritten in explicit form (equation 11) by changing the signs. The result in equation (11) shows that there is a positive and significant relationship between rural development and financial inclusion in the long run. All the variables under consideration except AGRICL_TL and RBL_TBL have negative signs, which imply that a 1% increase in FD, RBB_TBB, RBD_TBD and RPGR reduces rural development by 1.52%, 0.29%, 0.70%, 28.92% respectively. This

shows that there is low in-depth of rural financial market coupled with few rural bank branches to coordinate few deposits in the rural areas in Nigeria. This is corroborated by Adegboyega (2019) that the reduction in formal financial infrastructure has the potential to increase the use of cash for economic activities. Also, the large decrease in rural development caused by rural population growth rate reflected that increment in population is not significant and productive, may be as a result of high unemployment rate in rural areas. This is affirmed by Tega et al. (2023) study that rural unemployment rate is negatively associated with financial inclusion and this can retard development of the rural areas. While 1% increase in AGRICL_TL and RBL_TBL leads to an increase in AGRIC_GDP by about 2.98% and 0.76% respectively. These indicate that both the agricultural loans and rural loans are more effective in rural development. This is also in line with Adegboyega (2020) & Nwankwo, Ikeh, Ejiofor and Ifeanyieze (2024) studies' results. In order to absolve the short-run fluctuations caused by the existence of a long-run relationship, an Error Correction Mechanism (ECM) test was carried out.

Table 6: Normalized Cointegrating Coefficients (standard error in parentheses)

AGRIC_GDP	AGRICL_TL	FD	RBB_TBB	RBD_TBD	RBL_TBL	RPGR
1.000000	-2.97783	1.524965	0.294750	0.700993	-0.759875	28.91542
	(0.55497)	(0.38430)	(0.30082)	(0.49799)	(0.71846)	(6.72633)

AGRIC_GDP = 2.97783AGRICL_TL -1.524965FD -0.294750RBB_TBB
-0.700993RBD_TBD 0.759875RBL_TBL -28.91542RPGR (11)

Source: Author's Compilation, 2024

4.7 Error Correction Model

The results of Error Correction Model (ECM) of -0.450535 show that the system corrects itself back to equilibrium at the rate of 45.05% speed of adjustment after one year period. Also, since the value of R2 of 0.634532 is lesser than Durbin Watson (DW) value of 1.955952. It is evident that the ECM is not spurious model and suggests that the model has no serious autocorrelation problems. More so, it shows that financial inclusion variables accounted for up to 63.45% variations in rural development. This concludes that financial inclusion has positive impact and significant effect on rural development in Nigeria.

Table 7: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM	-0.450535	0.194176	2.320246	0.0271
R2	0.634532	F-statistic	7.688963	
Durbin Watson Statistics	1.955952	Prob(F-statistic)	0.000022	

Source: Author's Compilation, 2024

4.8: Post-Estimation Diagnostic Tests

In order to confirm whether the utilized variables are jointly significant in explaining the effect of financial inclusion on rural development in Nigeria the study conducted the Auto-correlation, Heteroscedasticity, Normality and Ramsey stability tests. The results confirm that the model is free from auto-correlation, homoscedastic and the variables are normally distributed. Also, Ramsey RESET specification test reflected that the model does not suffer from the problem of omitted variables and linearity assumption at 5% level of significance. So the model is stable for policy implication.

Table 8: Serial Correlation LM, Homoscedasticity Jarque-Bera and Ramsey Tests Results

Test	F-Statistic	t-Statistic	Obs.*R-Square	Prob. Value
Breusch-Godfrey Serial Correlation LM Test	1.055839	-	2.647091	0.3609
Heteroskedasticity Test Breusch-Pagan-Godfrey	1.032077	-	7.371104	0.4292
Jarque-Bera	2.722389	-		0.2563
Ramsey Stability Test	0.003440	0.058649	-	0.9536

Source: Author's Computation, 2024

4.9 Granger Causality Tests

The study considers the output of Granger Causality by using lag 2 and 40 degree of freedom and F-tabulated value of 2.65 at 5% level of significance in table 9 below. It is observed from the pair-wise relationship between AGRICL_TL and AGRIC_GDP that the F-statistics is 4.24. The estimate shows that 4.24 is greater than 2.65 hence, the rejection that AGRICL_TL does not granger cause AGRIC_GDP. Then, there is one-way causation between AGRICL_TL and AGRIC_GDP, it indicates that agricultural loan aids rural development. Also, RBB_TBB granger cause AGRIC_GDP because the F-statistics is 4.17and greater than 2.65 and there is one-way causation. It indicates that rural bank branches activities promote rural development. In addition, RPGR granger cause AGRIC_GDP because 11.11F-statistics is greater than 2.65 and it is in only one-way direction. It implies that rural population growth rate contributes to rural development. It may be as a result of increase in the number of people engaging in farm activities. In the same vein, RBD_TBD granger cause RPGR because F-statistics of 4.17is greater than 2.65 and there is one-way causation. It shows that rural bank deposit promotes rural population growth rate. Furthermore, RBL_TBL granger cause RPGR because F-statistic of 5.88 is greater than 2.65 and there is one way causation. It also shows that rural bank loan promotes rural population growth rate.

Table 9: Pairwise Granger Causality Tests

Null Hypothesis:	Obs.	F-Statistic	Prob. .
AGRICL_TL does not Granger Cause AGRIC_GDP	40	4.24270	0.0224
AGRIC_GDP does not Granger Cause AGRICL_TL		0.29339	0.7476
RBB_TBB does not Granger Cause AGRIC_GDP	40	4.17085	0.0237
AGRIC_GDP does not Granger Cause RBB_TBB		0.11906	0.8881
RPGR does not Granger Cause AGRIC_GDP	40	11.1090	0.0002
AGRIC_GDP does not Granger Cause RPGR		0.80151	0.4567
RPGR does not Granger Cause RBD_TBD	40	1.95392	0.1569
RBD_TBD does not Granger Cause RPGR		7.24161	0.0023
RPGR does not Granger Cause RBL_TBL	40	1.69770	0.1978
RBL_TBL does not Granger Cause RPGR		5.88086	0.0063

Source: Author's Compilation, 2024

4.10: The CUSUM test

In figure 1 below the graphical result of Cumulative Sum Chart (CUSUM) stability test supporting the stability of the model at the 5% level because the blue line is within the critical red lines. The graph suggests that the parameters of the model did not suffer structural instability over the studied period. By implication, ECM model is stable.

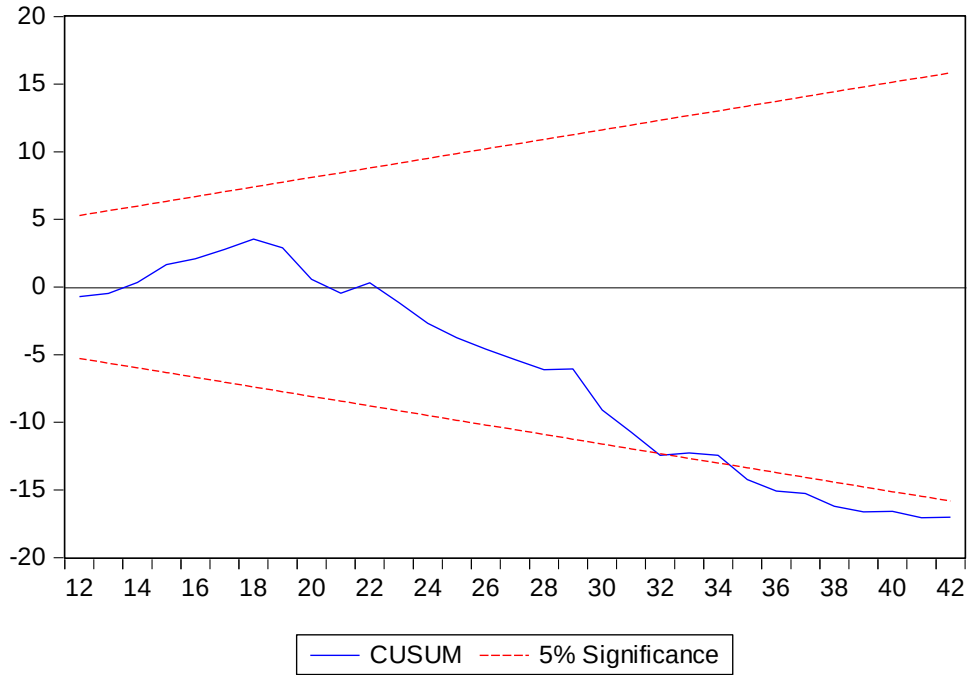

Figure 1. The CUSUM test

Source: Author's Computation, 2024

5 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Lack of broadly based rural financial system remains a hesitant bottleneck and major development challenge in Nigeria and have plunged the nation into a highly cash-based economy. Hence this study investigates the impact of financial inclusion on rural development in Nigeria. The results of the study show that 1% increase in FD, RBB_TBB, RBD_TBD and RPGR reduces rural development by 1.52%, 0.29%, 0.70%, 28.92% respectively. Indicating that there is low in-depth of rural financial market coupled with few rural bank branches to coordinate few deposits in the rural areas in Nigeria. Also, the ECM results show that the system corrects itself back to equilibrium at the rate of 45.05% speed of adjustment after one year period. The study concludes that low level of financial deepening and small number of rural bank branches in Nigeria are retarding the promotion of financial inclusion which invariably stunting rural development. The findings of this study would be more valuable to policymakers who have to prioritize among multiple policy reforms to fast track the growth of rural micro-financing. Also, the findings from the research necessarily provided information on the financial inclusion effects of rural development, which is currently lacking in Nigeria. Finally, it provided an indispensable road map to future researchers and scholars especially in the area of development finance.

5.2 Recommendations

- There is need for government policy that promotes high priority in rural development agenda in terms of provision rural infrastructure especially electricity, communications, road and inland networks which may attract the presence of financial institutions in the rural areas.
- the low educational level in rural areas, point-of-sale (POS) and automated teller machines (ATM) are required to boost the inclusiveness of financial services and products

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