FINANCIAL INCLUSION AND POVERTY REDUCTION IN NIGERIA. AN AUTOREGRESSIVE DISTRIBUTED LAG MODEL APPROACH

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ABSTRACT
Financial inclusion is very important in mobilizing savings from the downtrodden and channeling same towards productive investment. If the downtrodden is financially included in financial services of a country, per capita income of the people would improve leading to poverty reduction in the economy. Thus, this study investigated the effect of financial inclusion on poverty reduction in Nigeria from 1990 to 2021. In order to achieve the objectives of this research, financial inclusion was disaggregated into money supply, number of commercial banks in the rural areas, and commercial bank deposits in the rural areas. Others include number of microfinance banks, microfinance bank deposits, point of sale and automated teller machine; with the time series data sourced from the CBN statistical bulletin, volume 32, 2021, indexmundi and world development indicators, 2021. Multiple regression analysis was utilized in the study in which the Auto-Regressive Distributed Lag (ARDL) model was the method of analysis. The ARDL model was engaged to examine the long-run relationship and short-run interactions among the variables. The results indicated that access to banks had a positive and significant effect on income per capita proxied for poverty reduction in Nigeria. Similarly, the results showed that ATM usage, bank penetration, and mobile banking exert positive and insignificant influence on poverty reduction proxy. These results imply that 1% improvement in access to banks, ATM usage, bank penetration, and mobile banking would lead to increase in poverty reduction proxy. On the above notes, the study recommended for more implementation of financial inclusion policies aimed at including more people in the remote areas into financial services. This can be done by mandating commercial banks and other financial service providers to extend their financial services to rural areas with effective monitoring. Furthermore, financial sector policies should be implemented to ensure more spread of automated teller machine in the hinterland. In so doing, automated teller machine would significantly contribute to per capita income proxied for poverty reduction in Nigeria.
Keywords: financial inclusion, Automated Teller Machine, Point of sale, money supply, ARDL

Introduction

Financial inclusion is described as the availability and equality of opportunities to access financial services. It refers or means a process by which individuals and businesses can access appropriate, affordable and truly financial products and services that meet their needs-transactions, payments, savings, credits, and insurance; delivered in questionable way. On the other hand, financial exclusion is the denial and lack of access to financial services such as bank deposit, access to credit, insurance, mortgages etc. On the other hand, financial exclusion is a precarious situation whereby the government and financial institution barriers hinders low income earners, small businesses, small holder farmers from easy access to least minimum financial services in the financial sector.

According to European Commission in 2018, financial exclusion is a limitation or barrier people encounter from accessing financial services and provision in the financial system thereby making them excludable in the financial market. Bridging the finance gap across the globe mid-wifed the paradigm of financial inclusion to cushion and mitigate the growing level of poverty, income inequality, unemployment and lowering level of production especially the large churnk of rural farmers' artisans and small holder

More so, statistics from the Global Findex database in 2018 reports that about 1.7 billion people are unbanked; the figure dropped significantly following the COVID-19 pandemic by about 40%. The essence of financial inclusion is to aggregate all the unbanked and under-banked into the financial net. This will enable them perform financial functions such as deposit, access to credit, insurance services and other forms of banking services.

Globally, unbanked statistic decreased from 76 percent to 51 percent in 2011 and 2021. Developing countries accounted for only 6 percent Nigeria's statistics showed decrease from 59% to 57%.

Contrarily, in Nigeria, this has not worked in Nigeria as it has been quite difficult for the mobile money service providers to penetrate the Nigerian market (Aziz & Naima, 2021). The worrisome reality is that most African economies including Nigeria are being run by a small fraction of the citizens, as such, any economy where the majority of the citizens are financially excluded and unbanked, the implication might be a threat to the economy (Okaro 2016). Effective performing and inclusive financial system propels equitable growth. It is characterized by the diversity of financial services which leads to wealth creation (Aduda & Kalunda, 2012). Sanusi (2011) attributed the rise in poverty level in Nigeria to the challenges of financial exclusion. Hence, achieving optimal level of financial inclusion in Nigeria implies empowering 70 per cent of the population living below poverty line, thereby boosting growth and development. It should be noted that when the financially poor are included in the financial services, it improves their ability to generate wealth as well as improve social welfare, and alleviates poverty (Kama & Adigun, 2013).

Despite the huge success recorded by the financial inclusion policy in the drive of financial access through the agency banking initiatives via POS and ATM, the access to credit by the poor and vulnerable group is still elusive and unrealistic. The tight ropes and bottlenecks and the high cost of borrowing makes it difficult for the poor to access credit from commercial banks is pervasive and prevalent in the financial system. There is no doubt that access to credit is essential to improving small holder farming, enterprises, traders, and by extension boost livelihood of families.

However, the enabling credit infrastructure that ought to boost financial access is inadequate and ineffective in the economy. This difficult condition faced by the poor and small holder firms to access credit differ from what obtains in developed countries where the financial system grants every customer easy access to credit card. The credit card automatically allows the customer, free access to credit facilities.

2. REVIEW OF RELATED LITERATURE

Conceptual Review

Financial inclusion

Financial inclusion, according to Abimbola et al. (2018), is defined as having access to formal financial services such as credit, savings, and insurance. Financial inclusion, according to Akhil (2016), is defined as the provision of inexpensive financial services to the poor, whereas El Said, Emara, and Pearlman (2020) define it as household access to and usage of financial products and services. According to Aribaba (2020), financial inclusion can be defined as a process that allows disadvantaged populations, such as low-income

earners, to have access to financial services at a cheaper cost during a specific time period. Financial inclusion, according to Ajide (2014), is the process of distributing a country's financial system to its citizens.

Financial inclusion policy is an attempt to close the gap that hitherto existed between deficit spending unit and surplus spending unit powered by the intermediation function of the financial system. It is the policy of the government to facilitate and increase access, usage and availability of financial services, provisions as well as increase the number of bankable groups in the financial system. The World *Bank* report describes financial inclusion as a process of raising individual access to basic financial services (saving, loans and insurance) in a safe and convenient manner especially among low income and more vulnerable income earners in the economy.

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Theoretical Review

This sub-section is concerned with a review of relevant and underlying theories so as to create a theoretical anchorage and impetus for the work. The work shall focus on some strands of theories. First, it reviewed the inclusive growth theories; the finance growth theories, the financial intermediation theory; the theory of information asymmetry and the endogenous growth theory.

The theory of inclusive growth

The theory of inclusive growth was propounded by Myrdal (1950). This theory states that inclusive growth in the economy can only be achieved when all the weaker sectors of the society, including agriculture and small scale industries, are nurtured and brought on par with other sectors of the society in terms of economic development. The major development challenge is to make the growth inclusive. Development economists have often been for a long time interested in the relationship between financial inclusion and economic growth, especially in the period which is known as the era of the Washington Consensus. According to the theory, a growing gross domestic product (GDP) is an evidence of a society, getting its collective act together for progress. As its economy grows, a society becomes more strongly organised, more compactly interwoven. Therefore, a sustained high growth is better and sustained high growth with inclusiveness is best for all. Policies for inclusive growth are vital components of majority of government strategies for sustainable growth. Inclusiveness is an essential ingredient of any successful growth strategy (Commission on Growth and Development, 2008).

Empirical Review

Thathsarani, Wei, and Samaraweera (2021) used an econometric technique of panel data with vector error correction models and a Granger causality test to investigate the effect of financial inclusion in economic growth and human development in eight countries in South Asia from 2004 to 2018. Financial inclusion has a long-term good influence on human capital development in South Asian countries, while it has a short-term positive impact on economic growth, according to the findings. Okonkwo and Nwant (2021) looked

at the impact of financial inclusion on economic growth in Nigeria from 1992 to 2018, using financial inclusion variables such as currency outside banking, currency in circulation, microfinance bank deposits, number of commercial bank branches, commercial bank credit to the private sector, loans and deposits of rural commercial bank branches, and nominal GDP. The OLS and Grander Causality tests were used to evaluate the data. The results revealed that loans extended by rural branches of commercial banks have a positive and significant relationship and causal effect on economic growth in Nigeria, while deposits of rural branches of commercial banks have causal effect on GDP in Nigeria and a positive relationship though not significant.

Aribaba, Adedokun, Oladele, Ahmodu and Olasehinde (2020) examined the effect of the financial inclusion on poverty alleviation among the low-income earners in Nigerian between the periods of (2004 – 2018), using ordinary least squares and error correction model. Loan to Depositor Ratio (LDR), Loan to Rural Areas (LRA), Financial Deeping Indicators (FDI) and Social Investment Loan (SIL) to SMEs were used to proxy financial inclusion while Poverty Index (PI) and Per Capita Income (PCI) were used as a proxy for poverty alleviation. The study shows that financial inclusion schemes play a significant role on poverty alleviation among the low-income earners in Nigerian. It also reduces poverty level and increases per capita income thereby enhance the standard of living through the new social investment scheme. From 2001 to 2016, Soyemi, Haruna, and Olowofela (2020) used the Fully Modified Ordinary Least Square (FMOLS) and Grander Causality test to investigate financial inclusion as a catalyst for attaining sustainable development in Nigeria. The research found that in the short run, there is a causal relationship between a number of commercial bank branches, demand deposits from rural regions, and loans to rural areas and HDI, while in the long run, the explanatory variables have a positive significant impact on HDI in Nigeria. The main conclusion was that financial inclusion has an impact on Nigeria's long-term growth. Ogbiede and Igbinigie (2019) examined the impact of financial inclusion on poverty alleviation in Nigeria using time series data for the period 2002 to 2015. The study employed the ordinary least squares multivariate regression technique. Financial inclusion is found to exert significant impact on per capita income, reduces poverty level and improves standard of living. Nwafor and Yomi (2018) studied the relationship between financial inclusion and economic growth in Nigeria using Two-staged Least Squares Regression Method. Findings revealed that financial inclusion have significant impact on economic growth in Nigeria within the period under review.

Yaya (2017) estimated the relationship between financial developments, economic growth and poverty reduction in nine African countries using auto regressive distributed lag model (ARDL). The result shows evidence of long run relationship among the variables in eight countries with GDP and financial deepening having a positive effect on poverty reduction in five countries including Benin, Cameroon, Cote d'Ivoire, Gabon and South Africa. The results indicated that poverty reduction having a positive effect on economic growth in three countries (Ghana, Nigeria and Senegal). Azran, Dilawar, Ejaz and Waheed (2012) carried out similar study in Pakistan using the auto regressive distributed lad model (ARDL) with error correction method to investigate the impact of financial development on poverty reduction. The results indicated that financial deepening (domestic credit to private sector and broad money supply) had impact on consumption per capital used as proxy for poverty. However, domestic bank asset was not found to have long run impacton poverty. In a related study, Benjamin (2012) used the 2SLS to investigate the impact of financial development on poverty reduction in developing countries. The study reported that increasing the availability of money and deposit opportunities rather than private credit have helped reduce poverty in developing countries.

Gazi, Muhammad, Mohamed and Frederic (2013), investigates the relationship between financial development, economic growth and poverty reduction in Bangladesh over the period between 1975 and 2011. All variables are tested for their order of co-integration in Bangladesh using the ADF and Zivot-Andrew structural break tests. Findings indicated that long run relationship between financial development, economic growth and poverty reduction exists in Bangladesh.

On the other hand, Nasreddine and Sami (2018) examine the impact of financial development on poverty reduction in middle-income countries using several estimation techniques. The results indicate that development of the banking system does not necessarily improve the poor's conditions. However, development of the stock market does. Muhammad (2014), attempts to examine the causal relationship between financial sector development, economic growth and poverty reduction in Nigeria. The study uses Autoregressive Distributed Lag model (ARDL). Empirical result of the study reveals that financial sector development does not cause poverty reduction. This implies that increase in the supply of loanable funds due to financial sector development is not enough to ensure poverty reduction. Similar report was documented by Yinusa and Alimi (2015). They examine the relationship between financial development, income inequality and poverty reduction in Nigeria.

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In another study conducted by Umaru (2018) on the effect of microfinance in three zones f Kebbi State. The study made use of qualitative research method through adopting Partial Least Square (PLS)-structural equation Model (SEM) technique. The result revealed that there is a significant relationship between financial inclusion and poverty influences the relationship between the variables of poverty and financial inclusions. Bala (2021) corroborates with Uamaru (2018) in his study of the effect of finance inclusion on performance of micro, small and medium size enterprises in Kankia LGA. The result showed that the key financial inclusion variables include ATM, mobile money, savings and credit positively affected SMEs.

Omar and Idaba (2020) in a study entitled, does financial inclusion reduce poverty and income inequality in developing countries? The study aimed at finding the impact of financial inclusion on reducing poverty and income inequality in 116 developing countries for the period 2014-2016. The study made use of financial inclusion variables such as per capital income, ratio of internet users, inflation and income inequality. The study adopted panel data analysis and standard econometrics method for the estimation and

testing. The result provided evidence that financial inclusion significantly reduces poverty and income inequity.

3. **Methodology**

The paper adopted regression method of analysis whereas the analytical methods employed in the investigation include descriptive statistics, unit root test and dynamic ordinary least square (DOLS) technique. The variables analyzed in the investigation are per capita income as a proxy for poverty reduction, broad money, number of commercial bank branches in the rural areas, commercial bank deposits in the rural areas, number of micro-finance bank branches, micro-finance bank deposits, point of sale (POS), and Automated Teller Machine (ATM). The econometric package used the variables is the E-view 10.0

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Model Specification

Economic models are specified given the functional relationships espoused by theory. This is done by transforming dependent and independent variables into mathematical symbols.

This study adapted the model of Aribaba, Adedokun, Oladele and Olasehinde (2020) who examined the relationship between financial inclusion and poverty reduction. The model of this was based on the theoretical model of Schumpeter (1912) who viewed that functional bank spurs potential entrepreneurs where the poor and rich have equal access to funds and the same rate of interest. The model was expressed as:

$$PCI = \alpha_0 + \alpha_1 MFBt + \alpha_2 LCBBRAt + \alpha_3 CBLSB + \alpha_4 M_2 + \mu t \qquad 1$$

Where; PCI is the per capita income, MFB is the micro-finance bank deposits, CBBRA is the commercial bank branches in the rural areas, CBLSB is the commercial bank loans services in rural branches and M_2 is broad money supply. Equation 1 above is modified to capture the interest of this study, and it expressed in functional form as:

$$PCI = f(M2, CBBRA, MBBRA, MBD, CBD, POS, ATM) \qquad 2$$

In linear function, the equation is specified as:

$$PCI = \beta_0 + \beta_1 M_2 + \beta_2 CBBRA + \beta_3 MBBRA + \beta_4 POS + \beta_5 ATM + \beta_6 MBDRA + \beta_7 CBDRA + Ut \qquad 3$$

In logarithm function, the equation is structurally specified as:

$$logPCI = \beta_0 + \beta_1 logM_2 + \beta_2 logCBBRA + \beta_3 logMBBR + \beta_4 logMBB + \beta_5 logMBD + \beta_6 POS + \beta_7 MBD + U_t \qquad 4$$

Where; M_2 is the broad money, CBBRA is the commercial bank branches in the rural area, MBBRA is the micro-finance bank branches in the rural areas, MBB is the number of microfinance bank, MBD is the micro-finance bank deposits, and POS is the point of sale, ATM is the Automated Teller Machine.

PRSENTATION OF RESULTS

Descriptive Statistics

Table 1: Summary of Statistics

	PCI	M2	CBBRA	CBDRA	MBB	MBD	POS	ATM
Mean	5.624143	7.916085	7.880350	2.185783	6.595828	4.024498	5.771494	8.019748
Median	5.638096	8.059974	7.367014	2.731237	6.779921	3.972562	6.105931	8.248610
Maximum	5.954155	10.60456	9.982461	6.057837	7.221105	6.157127	8.177516	9.307752
Minimum	5.301612	3.859044	6.514713	-3.912023	3.970292	1.855673	2.400619	5.990739
Std. Dev.	0.247363	2.070563	1.362387	2.809562	0.693153	1.060822	2.124801	1.051809

Skewness	-0.042233	-0.342002	0.210364	-0.989202	-3.098268	-0.102150	-0.394449	-0.738766
Kurtosis	1.327278	1.825046	1.258810	3.482543	11.76323	2.603383	1.709410	2.515304
Jarque-Bera	3.740178	2.464505	4.278339	5.529238	153.5883	0.265392	1.239323	1.209016
Probability	0.154110	0.291635	0.117753	0.063000	0.000000	0.875731	0.538127	0.546343
Sum	179.9726	253.3147	252.1712	69.94504	211.0665	128.7839	75.02942	96.23698
Sum Sq. Dev.	1.896848	132.9041	57.53905	244.7027	14.89430	34.88565	54.17735	12.16931
Observations	32	32	32	32	32	32	13	12

Sources: Researcher's computation from E-view 10

The mean value of PCI, M_2, CBBRA, CBDRA, MBB, MBD, POS, and ATM are 5.624143, 7.916085, 7.880350, 2.185783, 6.595828, 4.024498, 5.771494, and 8.019748, respectively, with commercial bank deposits in the rural areas and number of microfinance bank having the lowest mean, followed by per capita income. The median unveils the middle value of each variable. Hence, the median value of PCI, M_2, CBBRA, CBDRA, MBB, MBD, POS, and ATM include 5.638096, 8.059974, 7.367014, 2.731237, 6.779921, 3.972562, 6.105931, and 8.248610, respectively. The maximum and minimum statistics as indicated in the summary statistics tell us the maximum and minimum values among the variables. From the results, the variable with maximum value is money supply while the one with minimum value is per capita income. The standard deviation shows the deviation from the sample mean relative to each of the variables.

The skewness determines whether the variables used in the study is normally distributed; and the value for normally distributed is 0. From the table, PCI, M_2, CBBRA, CBDRA, MBB, MBD, POS, and ATM have values 0, implying that the series are normally distributed while MBB is not. The kurtosis on the other hand, measures the peakness and flatness of series distribution and with the kurtosis values of 1.327278, 1.825046, 1.258810, 2.603383, 1.709410, and 2.515304 for PCI, M_2, CBBRA, MBD, POS, and ATM, respectively except CBDRA and MBB have kurtosis values lower than 3, implying that the distribution is normally distributed

Unit Root Test

The unit root test is carried out to determine the order of integration among data series. The exercise is done using the Augmented Dickey-Fuller (ADF) unit root test; and the results are shown in table 1 below.

Table 2: ADF Unit Root Test

Trend and Intercept

	Level		First Difference			
Variables	ADF Statistic	5% CV	ADF Statistic	5% CV	Remarks	Rank
LPCI	-1.814288	-3.568379	-3.786421	-2.963972	Stationary	I(1)
LM_2	-0.819841	-3.562882	-4.279663	-3.568379	Stationary	I(1)
LCBBRA	-1.986160	-3.562882	-4.737115	-3.568379	Stationary	I(1)
LCBDRA	-1.916880	-3.568379	-4.167078	-3.568379	Stationary	I(1)
LMBB	-13.48316	-3.568379	----------	---------	Stationary	I(0)
LMBD	-3.574438	-3.562882	----------	---------	Stationary	I(0)

POS	1.084006	-3.562882	-4.431647	-3.568379	Stationary	I(1)
ATM	-5.964948	-4.246503	----------	---------	Stationary	I(0)

Sources: computation from E-view 10

The table 2 above illustrates the results of the ADF unit root test. The results showed that all the variables except number of microfinance bank, microfinance bank deposits and automated teller machine variables were non-stationary at levels; but at first differencing, the non-stationarity variables indicated stationarity. These claims are evidenced by the ADF statistics and their corresponding p-values. At the stationarity level, all the ADF statistics are all greater than 5% critical value. These imply that the variables possess long-run properties, showing that their mean, variance, and covariance are constant overtime and can be utilize for time series econometrics research. Thus, the stationarity test unveils mixed order of integration prompting the application of the autoregressive distributed lag (ARDL) model in this investigation.

Test of Cointegration

The ARDL bounds test deals with long-run coefficients test of variables under consideration. This test is inevitable on the event of mixed order of integration among the variables. The results are given below:

Table 3: ARDL Bounds Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	10.75560	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9
Actual Sample Size	30		Finite Sample: n=30	
		10%	2.277	3.498
		5%	2.73	4.163
		1%	3.864	5.694

Sources: Computation from E-view 10

The table 3 portrays the results of long-run equilibrium relationship among the variables considered. As a decision rule, the test would reject the null hypothesis (H_0) of no long-run equilibrium association among the variables, if the F-stat value is greater than 0.05 critical value at the upper bound. From the results, F-statistic value is 10.75560 while the upper bound at 5% critical value is 3.21. Since the F-statistic of 10.75560 is greater than 3.21 critical value at upper bounds, the study, therefore, rejects the null hypothesis (H_0) and concludes that evidence of long-run equilibrium relationship is found among the variables.

Table 4: ARDL Long-run Coefficient Test

Levels Equation

Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2	0.172498	0.029408	5.865610	0.0000
LCBBRA	0.000244	0.036542	-0.006677	0.9947
LCBDRA	0.007984	0.005191	-1.538096	0.1414

LMBB	0.120199	0.039940	-3.009513	0.0075
LMBD	0.048597	0.049238	-0.986969	0.3367
POS	3.01E-07	5.02E-05	0.005995	0.9953
ATM	2.01E-05	2.53E-05	-0.794611	0.4372
C	5.383616	0.259238	20.76709	0.0000

Sources: Computation from E-view 10

LPCI = 5.383616 + 0.172498LM_2 + 0.000244LCBBRA + 0.007984LCBDRA + 0.120199LMBB + 0.048597LMBD + 3.01E-07POS + 2.01E-05ATM

The table 4 above presents the results of the ARDL long-run coefficients test between financial inclusion and poverty reduction by employing the following variables: LPCI, LM2, LCBBRA, LCBDRA, LMBB, LMBD, POS, and ATM. From the results, commercial bank deposits in the rural areas (LCBDRA), number of commercial bank branches in the rural areas (CBBRA), microfinance bank deposits (LMBD), point of sale (POS) and automated teller machine (ATM) have positive and insignificant effects on per capita income (LPCI) in the long-run. Similarly, the results also showed that money supply (LM_2) and number of microfinance bank branches (LMBB) have a positive and significant influence on per capita income in the long-run. These claims are supported by the coefficients and p-values estimated from the ARDL long-run test. From the results, the coefficients of LM_2, LCBBRA, LCBDRA, LMBB, LMBD, POS, and ATM are 0.172498, 0.000244, 0.007984, 0.120199, 0.048597, 3.01E-07, and 2.01E-05, respectively, while the corresponding p-values of the variables are 0.0000, 0.9947, 0.1414, 0.0075, 0.3367, 0.9953, and 0.4372, respectively.

Table 5: ARDL Error Correction Regression

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LM2)	0.062358	0.015986	-3.900841	0.0010
D(LMBB)	0.000325	0.008484	0.038356	0.9698
D(LMBD)	0.000587	0.005481	-0.107076	0.9159
CointEq(-1)*	-0.369348	0.031235	-11.82467	0.0000

R-squared	0.838649	Mean dependent var	0.014719
Adjusted R-squared	0.820032	S.D. dependent var	0.037435
S.E. of regression	0.015881	Akaike info criterion	-5.323822
Sum squared resid	0.006557	Schwarz criterion	-5.136996
Log likelihood	83.85733	Hannan-Quinn criter.	-5.264055
Durbin-Watson stat	1.718377		

Sources: Computation from E-view 10

Table 5 depicts the result of ARDL ECM estimation. The error correction term [ECT(-1)] has a value of -0.369348 with a p-value of 0.0000. The result indicates that the annual speed of adjustment in the correction of short-run disequilibrium towards long-run equilibrium relationship is 36.9%. The multiple coefficient

of determination (R^2) value is 0.820032, which implies that the total variations in per capita income (explained variable) accounted for by the explanatory variables is 82% , while the remaining 18% is attributed to other variables not included in the model.

Diagnostic Tests

Every diagnostic test is employed primarily to determine whether or not the parameters of the model are stable as suggested by Pesaran and Pesaran (1997). Hence, the results of the diagnostic tests are presented in tables 6

Autocorrelation and heteroscedasticity tests

Table 6: LM serial correlation and heteroscedasticity tests

S/N	Diagnostic test	Obs*R-squared	Prob. Chi-Square(2)	Remarks
1.	Serial Correlation LM Test	1.664689	0.4350	No evidence of serial correlation in the model
2.	Heteroskedasticity Test: ARCH	0.436974	0.5086	No evidence of heteroscedasticity in the model

Sources: Researcher's computation from E-view 10

From the results, the Obs*R-squared statistics of LM test and heteroscedasticity test are 1.664689 and 0.436974, while their corresponding Prob.Chi-Square(2) values are 0.4350 and 0.5086, respectively. Since the Prob.Chi-Square(2) values of 0.4350 and 0.5086 are each greater than 0.05 critical value, the study accepts the H_0 of no autocorrelation and heteroscedasticity in the model and concludes that the presence of autocorrelation is not found in the model. It also confirms presence of homoscedasticity in the estimated model.

5. Policy Recommendation

Since work finds that access to banks exerts positive and significant effect on poverty reduction in Nigeria, the monetary authority should increase their stake on financial inclusion policies.

The analysis also discovered that ATM usage has a positive and insignificant impact on poverty reduction in Nigeria, government via the monetary authorities should implement financial sector policies that ensure more spread of automated teller machine.

The study as well revealed that bank penetration proxied by commercial bank deposits in the rural areas and microfinance bank deposits have a positive and insignificant influence on poverty reduction in Nigeria, the government should direct banks to increase their bank financial service activities in the rural areas; with the objectives of overcoming the problem of financial exclusion suffered by those in the hinterland.

Also, this investigation revealed that mobile banking proxied by point of sale has a positive and insignificant effect on poverty reduction in Nigeria. The monetary authorities should as a matter of fact, subsidize the procurement cost of the POS device as a way of making it available to smallholder enterises

Since, the study indicated that money supply has a positive and significant impact on poverty reduction in Nigeria. The central bank of Nigeria, should continue to utilize monetary policy anchored on money supply to tackle financial inclusion problem, especially as it involves money outside banks and money in circulation.

Conclusion

Considering the fact that financial inclusion is very important to income per capita improvement and hence, poverty reduction in Nigeria. Therefore, this study has made its findings and policy recommendations. Thus, it is the belief of this paper that if the above recommendations are adhered to it will go a long way in solving the problem of financial exclusion in Nigerian rural areas.

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