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FINANCIAL INCLUSION AND AGRICULTURAL OUTPUT: A STUDY OF NIGERIAN ECONOMY

Ukoh, Josephine Ekperechukwu (PhD)
Department of Banking and Finance
Nnamdi Azikiwe University, Awka
Je.ukoh@uizik.edu.ng

Abstract

This study ascertained the effect of financial inclusion on agricultural output in Nigeria. The study was motivated by concerns that despite various financial inclusion initiatives and the expansion of digital financial services, agricultural output has not increased proportionately due to limited access to productive credit and challenges affecting the effective utilization of financial services by farmers. Specifically, the study evaluated the effect of mobile banking and Point of Sale (POS) transactions on agricultural output in Nigeria. The study utilized annual time-series secondary data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin from 2009 to 2024. The data were analyzed using the Ordinary Least Squares (OLS) regression technique with the aid of E-Views 10.0 econometric software. The findings revealed that mobile banking and POS transactions had positive and statistically significant effects on agricultural output. However, the Agricultural Credit Guarantee Scheme Fund had a negative but statistically insignificant effect on agricultural output. Based on these findings, the study recommended that Deposit Money Banks and financial technology providers should expand mobile banking services in farming communities by improving network reliability and designing agricultural-focused mobile financial products.

Keywords: Financial inclusion, Mobile banking and POS transactions

Introduction

Agriculture plays a crucial role as the economic backbone for many households and constitutes a substantial sector of the Nigerian economy (Ayeomoni and Aladejana, 2016). The sector encompasses various farming activities such as crop cultivation, livestock production, fishing, poultry, and forestry (Ojo, Mustapha, and Ismaila, 2022). The agricultural sector also contributes significantly to the nation's Gross Domestic Product by creating employment opportunities, supplying raw materials for agro-allied industries, ensuring food security, and promoting economic growth (Rahji and Fakayode, 2009). Despite its importance, the agricultural sector in Nigeria continues to face numerous challenges, including limited access to financial services and exclusion from the formal financial system, especially among rural farmers. These challenges have adversely affected agricultural productivity and output (Ashoro, Ogunleye, and Adedeji, 2024). Financial inclusion, which involves integrating the unbanked population into the formal financial system, has therefore become essential in addressing these challenges. The Maya Declaration of 2011 on sustainable financial inclusion encouraged developing economies to reduce the proportion of people without access to formal financial services.

Financial inclusion is generally described as the process of ensuring that individuals and businesses have access to affordable, timely, and appropriate financial products and services, including savings, credit, payments, and insurance (World Bank, 2018). Oladimeji and Adegbite (2019) define financial inclusion as the ease of access, availability, and effective usage of formal financial services by all members of an economy, while El-Said, El-Gamal, and Hassan (2020) emphasize both access and actual usage of these services. In Nigeria, rural dwellers who constitute a large proportion of agricultural producers remain disproportionately excluded from the formal financial system. This exclusion constrains their ability to obtain credit, manage risks, adopt improved technologies, and expand agricultural production, thereby limiting overall sector performance.

Agriculture is crucial for Nigeria's economy and food security, yet despite financial inclusion initiatives such as Agricultural Credit Guarantee Scheme Fund (ACGSF), the agricultural output in Nigeria has not experienced a proportionate increase. The scheme was designed to stimulate agricultural production by encouraging deposit money banks to extend credit to farmers through risk-sharing mechanisms. However, in practice, several operational challenges have constrained its effectiveness. Many smallholder farmers, who constitute the bulk of agricultural producers in Nigeria, are either unaware of the scheme or unable to meet the documentation and procedural requirements necessary to access guaranteed loans. Additionally, bureaucratic delays in loan processing and disbursement often result in funds being released after the optimal planting period, thereby reducing their productive impact. As a result, the expected positive influence of ACGSF-backed credit on agricultural output remains weak, raising concerns about the scheme's real contribution to agricultural performance. The study thus, ascertains the effect of financial inclusion on agricultural output in Nigeria. Specifically, the study sought to;

1. Determine the effect of mobile banking on agricultural output in Nigeria.
2. Explore the effect of Point of Sales on the agricultural output in Nigeria.

Review of Related Literature

Financial Inclusion

Financial inclusion is the process of ensuring easy access, availability, and usage of formal financial services by all segments of society, particularly vulnerable and low-income groups, at affordable costs (Ediagbonya and Tioluwani, 2023). It involves the provision of banking

and financial services in a manner that encourages individuals, households, and businesses to actively participate in the formal financial system. Financial inclusion extends beyond mere ownership of bank accounts to include effective access to credit facilities, savings opportunities, insurance services, electronic payment systems, and other financial products capable of improving economic welfare and productivity (Adeleke and Alabede, 2022).

Financial inclusion is measured through various components and indicators that reflect the extent to which individuals, households, and businesses have access to and utilize formal financial services within an economy (Mobolaji, Edith, Onyinye, Chikezie and Ifeanyi, 2024). These indicators are important in assessing the level of financial participation and determining the effectiveness of policies aimed at integrating more people into the formal financial system. In the Nigerian economy, financial inclusion indicators are commonly used to evaluate access to banking services, availability of credit facilities, adoption of digital financial platforms, and participation in electronic payment systems (Yahaya, 2026). The indicators of financial inclusion cover different dimensions of financial accessibility and usage. They provide insight into the degree to which financial services contribute to economic activities, investment, savings mobilization, and productive development. In Nigeria, the increasing adoption of digital financial technology and the expansion of formal banking services have further strengthened the measurement of financial inclusion through several identifiable indicators (Adeleke and Alabede, 2022).

The major indicators of financial inclusion considered include Commercial Bank Loans and Advances to the Agricultural Sector, Agricultural Credit Guarantee Scheme Fund (ACGSF), Mobile Banking, and Point of Sale (POS) Services. These indicators were selected because they represent important channels through which financial services and financial support are extended to individuals and productive sectors of the economy, particularly the agricultural sector.

Mobile Banking

Mobile banking is the delivery and use of banking and financial services through mobile devices such as mobile phones and tablets. It enables customers to carry out various financial transactions remotely without the need to physically visit banking halls (Central Bank of Nigeria, 2023). Through mobile banking platforms, users can perform activities such as fund transfers, account balance inquiries, bill payments, airtime purchases, loan applications, deposits, and withdrawals using mobile applications, short message service (SMS), or Unstructured Supplementary Service Data (USSD) codes (Nigerian Communications Commission, 2023). The development of mobile banking has significantly transformed the Nigerian financial system by improving accessibility, convenience, speed, and efficiency in financial transactions (Lottu, Abdul, Daraojimba, Alabi, John-Ladega and Daraojimba, 2023).

The growth of mobile banking in Nigeria has been closely linked to the rapid expansion of mobile telecommunication services and digital financial technology. Nigeria currently has over 220 million active mobile telephone lines, while internet subscriptions exceed 160 million users, creating a strong foundation for digital financial service delivery (Nigerian Communications Commission, 2023). The increasing penetration of smartphones and internet connectivity has further accelerated the adoption of mobile banking services across both urban and rural areas of the country (Enhancing Financial Innovation and Access, 2023). Studies such as Awoniyi (2022) and Saygili (2024) observed that the growing acceptance of digital technology and electronic payment systems has significantly influenced the adoption of mobile banking services in Nigeria.

Mobile banking became more prominent in Nigeria following financial sector reforms and the introduction of the cashless policy by the Central Bank of Nigeria in 2012. The policy was designed to reduce the volume of physical cash transactions, promote electronic payment systems, and strengthen financial inclusion within the economy (Central Bank of Nigeria, 2012). Since then, commercial banks and financial technology companies have continued to develop mobile banking platforms aimed at expanding access to formal financial services (Ananda, Devesh and Al Lawati, 2020).

Mobile banking plays an important role in promoting financial inclusion because it reduces geographical barriers associated with access to formal financial institutions. In many rural communities where physical bank branches are limited or unavailable, mobile banking provides individuals with access to financial services through mobile networks (Etim, Ada, Eyo, Ndem and James, 2023). This has contributed significantly to increasing the number of financially included individuals in Nigeria. Reports by the Central Bank of Nigeria and Enhancing Financial Innovation and Access (EFInA) show that Nigeria's financial inclusion rate increased from approximately 36% in 2010 to over 64% by 2023, with digital financial services contributing substantially to this improvement (Central Bank of Nigeria, 2023; Enhancing Financial Innovation and Access, 2023). Nnaomah, Aderemi, Olutimehin, Orieno and Ogundipe (2024) further noted that digital banking platforms have enhanced access to financial services among previously excluded populations in Nigeria.

Within the agricultural sector, mobile banking has improved access to financial services among farmers and rural producers. Farmers can now receive payments, transfer funds, purchase agricultural inputs, and access financial information using mobile platforms without traveling long distances to banking facilities. Mobile banking also supports the distribution of agricultural intervention funds and credit facilities to farmers through digital channels, thereby reducing transaction costs and improving efficiency in agricultural financing (Yahaya, 2026). The use of mobile banking has also enhanced savings mobilization and financial transactions among small-scale business operators and low-income earners. The convenience and affordability associated with mobile banking have encouraged more individuals to participate in the formal financial system. In addition, mobile banking has reduced dependence on cash transactions, improved transaction speed, and increased financial transparency within the economy (Saygili, 2024).

Point of Sale (POS) Services

Point of Sale (POS) services are electronic payment systems that enable customers to carry out financial transactions through POS terminals using debit cards, credit cards, mobile wallets, or other digital payment platforms. POS terminals are electronic devices deployed by banks, financial institutions, merchants, and mobile money agents to facilitate cash withdrawals, deposits, transfers, bill payments, and purchases of goods and services (Amaefule, Njoku, Agbakwuru and Chilaka, 2019). The introduction and expansion of POS services in Nigeria have significantly transformed the country's payment system by reducing dependence on cash transactions and improving access to financial services (Okofu, Asuai, Okumoku-Evroro and Akazue, 2025).

POS services became more prominent in Nigeria following the introduction of the cashless policy by the Central Bank of Nigeria. The policy encouraged the adoption of electronic payment channels as a means of promoting efficiency, transparency, and convenience in financial transactions. Since then, commercial banks and financial technology firms have expanded POS operations across urban and rural areas in order to improve access to banking services and support financial inclusion within the economy (Adeolu, Salamntu and Paschal,

2024). The growing acceptance of POS services in Nigeria has been driven by factors such as convenience, accessibility, speed of transactions, and the increasing penetration of electronic banking systems. POS terminals provide customers with easier access to financial services without the need to visit traditional banking halls. Through POS outlets, individuals can withdraw money, transfer funds, make payments, and perform other banking activities within their local communities. This has made financial transactions more convenient, especially for individuals residing in areas with limited banking infrastructure (Akerejola, Okpara, Ohikhena and Emenike, 2019).

POS services have also contributed to the growth of small and medium-scale enterprises by providing easier and faster payment solutions for businesses. Merchants and business owners can receive payments electronically from customers, thereby improving sales transactions, reducing cash-handling risks, and enhancing financial record keeping. The increasing use of POS terminals has further strengthened the adoption of digital payment systems within Nigeria's economy (Hermenegildo-Chávez, Martín-Ruiz and Rondán-Cataluña, 2023). Notwithstanding its contributions, POS services in Nigeria continue to face several operational challenges. Poor network connectivity, unstable electricity supply, transaction failures, fraud, and cybersecurity threats remain major issues affecting the effectiveness of POS operations. Customers also experience occasional delays in transaction reversals and service interruptions due to technical failures within payment networks. In addition, some rural communities still face inadequate digital infrastructure and limited access to reliable telecommunications services (Adeolu, Salamntu and Paschal, 2024).

Empirical Review

Okoro, Mejaha, and Njoku (2026) examined financial inclusion, capital accumulation, and agricultural output growth in Nigeria, utilizing trend analysis, descriptive statistics, and composite index construction. Financial inclusion was measured through a composite index incorporating access, usage, and quality dimensions, while agricultural GDP and gross fixed capital formation served as dependent variables. The study documented a structural transformation of Nigeria's financial system from widespread exclusion to digitally driven inclusion, with the share of formally included adults rising from below 25% to over 65% between 2012 and 2023. The study concluded that Nigeria's financial inclusion progress has been largely transactional rather than investment-oriented.

Moses, Opeyemi, and Salifu (2025) examined the effect of financial inclusion on maize productivity among rural farming households in Ankpa Local Government Area of Kogi State, Nigeria, using primary data gathered through questionnaires and a multi-stage sampling method. Financial inclusion was measured through Automated Teller Machines (ATMs), savings accounts, Point of Sale (POS) services, visits to the bank, and online transfers, while maize productivity served as the dependent variable. The results showed that ATMs (89.58%), savings accounts (81.25%), POS services (80.56%), and visits to the bank (86.81%) had high distributions among farmers. Most households fell within the low (38.89%) and medium (29.86%) inclusion categories. The study also found that age, gender, education level, household size, and access to financial services were the main factors influencing farmers' maize productivity. The findings demonstrated that having access to financial services had a strong and positive effect on maize production among rural farming families.

Edaba, Aroyehun, and Edaba (2025) investigated the effects of financial inclusion on arable crop productivity in Bayelsa State, Nigeria, using primary data collected from 100 arable crop farmers through multistage sampling and employing instrumental variable estimation.

Financial inclusion was measured by ACCESS (financial access), CREDIT (credit access), and SAVE (savings mobilization), while arable crop productivity served as the dependent variable. Sources of credit for farmers showed that about 36.7% accessed credit formally through cooperative societies, while 37.5% accessed credit through informal options such as personal savings. The findings revealed that ACCESS (1.06) and CREDIT (0.895) were positively statistically significant at the 0.01 level, while SAVE (0.46) was positively statistically significant at the 0.05 level, affecting arable crop productivity.

Danladi, Sani, and Danwanka (2025) conducted a systematic literature review on factors influencing financial inclusion among farming households in Nigeria. Financial inclusion was measured through access to credit and formal financial services, while agricultural output and rural finance served as dependent variables. The review found that inadequate finance and low financial inclusion have been considered as some of the reasons limiting agricultural output of rural farming households in Nigeria, who practice peasant agriculture and remain in a vicious cycle of poverty. The study identified key factors influencing financial inclusion among farming households, including education level, distance to financial institutions, availability of collateral, income level, and access to extension services. The study concluded that expanding financial inclusion among farming households is critical for breaking the poverty cycle and improving agricultural productivity.

Akutson and Agbadua (2025) investigated official foreign financial assistance on financial inclusion in Nigeria, employing the ARDL bounds testing approach using data from 1990 to 2023. Official development assistance, remittances, and exchange rate served as independent variables, while financial inclusion measured as loans of rural branches to GDP served as the dependent variable. The results confirm the existence of long-run cointegration, with the error correction mechanism showing a significant and negative coefficient, indicating strong convergence to equilibrium aftershocks. Official development assistance exerts a positive but statistically insignificant short-run effect on financial inclusion, while remittances and exchange rate volatility emerge as significant determinants.

Olanrewaju, Akinbobola, and Adebayo (2025) examined the dynamic relationship between financial inclusion and sectoral economic growth in Nigeria, employing the Panel ARDL model and Dumitrescu-Hurlin causality tests using disaggregated data from 1995 to 2023. Financial inclusion was measured through standard inclusion indicators, while agricultural, manufacturing, and services sector outputs served as dependent variables. The study revealed that financial inclusion has heterogeneous effects across sectors. The services sector exhibits the strongest positive response to financial inclusion, followed by manufacturing, while the agricultural sector shows a weak and insignificant response due to structural barriers such as lack of collateral and high transaction costs.

Kolawole (2025) examined the determinants of financial inclusion and their influence on economic growth in Nigeria, employing the Error Correction Model (ECM) using secondary data from 1990 to 2023 from the CBN Statistical Bulletin and World Bank. Bank branches, deposit accounts, credit to the private sector, and interest rates served as independent variables, while real GDP and agricultural GDP served as dependent variables. The findings revealed that interest rates have a negative influence on financial inclusion, economic growth has a positive influence on financial inclusion, and financial inclusion has a positive and significant influence on economic growth. The study noted that the agricultural sector's demand for credit is particularly sensitive to interest rates, with high rates discouraging smallholder farmers from formal borrowing despite potentially profitable investment opportunities. The study concluded that lowering the cost of borrowing, broadening financial

infrastructure, and instilling confidence in the financial system are essential policy implications for enhancing financial inclusion-driven agricultural growth.

Adebayo and Usman (2025) examined bank penetration, credit accessibility, and economic growth in rural Nigeria, employing the Panel ARDL model using data from 2008 to 2022. Rural bank branches and microfinance bank loans served as independent variables, while rural economic output and agricultural output served as dependent variables. The study revealed that rural bank branches and microfinance bank loans have a significant positive long-run relationship with rural economic output. However, the short-run effects were found to be negligible, suggesting a lag in the transmission of financial access to productive economic activities.

Ayodele (2024) examined essays on agricultural finance, financial development, and economic growth in Nigeria, employing the ARDL and QARDL techniques using annual data from 1980 to 2022. The study measured agricultural finance and financial development indicators including bank deposit, credit to the private sector, and market capitalization, while agricultural output growth and inclusive growth served as dependent variables. The results revealed that agricultural finance exerted a significant negative impact on economic growth in the short run; however, the long-run impact of agricultural finance on economic growth was positive. Bank deposits exerted a negative impact on agricultural output growth, while credit to the private sector and market capitalization impacted positively on agricultural output growth.

Balana and Olanrewaju (2024) investigated financial inclusion, agricultural inputs use, and household food security in Nigeria, employing Multiple Correspondence Analysis (MCA), Cragg's two-step hurdle, instrumental variables for binary response, and GMM models using LSMS wave-3 data (2015/2016). Financial inclusion was measured by a composite index including bank account ownership, credit access, insurance coverage, and digital transaction usage, while agricultural inputs adoption, input use intensity, food security, and dietary diversity served as dependent variables. Results showed that households with access to formal financial services are more likely to adopt agricultural inputs and to apply these more intensively. These same households are less likely to experience severe food insecurity and are more likely to consume diverse food items. The study also found that these effects are weaker for female farmers regardless of formal financial inclusion, suggesting that they may bear more non-financial constraints than their male counterparts.

Methodology

Research Design

The research design adopted in this study is the ex-post facto (after the event) design. The study makes use of already existing data, as no attempt is made to control or manipulate the relevant variables. The suitability of this design is based on the nature of the data and the objective of the study, which is to examine the effect of financial inclusion on agricultural output in Nigeria using historical data.

Sources of Data

The data for this research was obtained mainly from secondary source, particularly from the Central Bank of Nigeria (CBN) Statistical Bulletin. The data is quantitative in nature and presented in time-series form covering the period from 2009 to 2024. The data are numerical and appropriate for econometric analysis, and they include financial inclusion indicators such

as mobile banking transactions and Point of Sale (POS) transactions, as well as agricultural output in Nigeria.

Model Specification

This study adapts and modifies the study used by Adeagbo, Emiola, & Aderinto (2025). They examined the effect of financial inclusion and agricultural productivity in Nigeria. The functional relationship is specified as follows:

APD = f(CBLA, CBRD, RCBL, NCBBr) …… (i)

where

APD = Agricultural Productivity
CBLA = Commercial Bank's Loan to Agricultural Sector
CBRD = Commercial Bank's Branches Rural Deposits
RCBL = Rural Commercial Bank's Loan
NCBBr = Number of commercial Bank's Branches

Putting equation (ii) above in econometric and logarithm form it gives

$\ln APD_t = \beta 0 + \beta 1 \ln CBLA_t + \beta 2 \ln CBRD_t + \beta 3 \ln RCBL_t + \beta 4 NCBr_t + \mu$ …….. (ii)

β0 to β4 are vectors of the variables, μ = error term, t = time trend. On the a priori, β0 to β4, > 0.

However, this present study modified the previous study as stated follows:

AGOUT = f(CBLA) ..... (1)
AGOUT = f(ACGSF) ..... (2)
AGOUT = f(MOB) ..... (3)
AGOUT = f(POS) ..... (4)

The econometric form of this model is therefore formulated as:

$AGOUT = a0 + \beta 1 CBLA + \beta 2 ACGSF + \beta 3 MOB + \beta 4 POS + ut$ ..... (5)

Where:

AGOUT = Agricultural Output
MOB = Mobile Banking Transactions
POS = Point of Sale Transactions
a0 = Constant parameter
β_1–β_2 = Coefficients of explanatory variables
ut = Error term
The a priori expectation is $\beta 1 > 0$, $\beta 2 > 0$,

Method of Data Analysis

The data collected were analyzed using a linear regression model. The Ordinary Least Squares (OLS) technique was employed to estimate the effect between financial inclusion variables and agricultural output in Nigeria. The estimation was carried out using E-Views 10.0 econometric software.

Criteria for Result Interpretation

The interpretation of results was based on regression coefficients, p-values of the t-statistic, R-squared, and F-statistic.

Regression Coefficients: These measure the direction and magnitude of the relationship between dependent and independent variables. Positive coefficients indicate a direct relationship, while negative coefficients indicate an inverse relationship.

P-values of the t-statistic: This is used to determine the statistical significance of each explanatory variable. A p-value less than 0.05 leads to rejection of the null hypothesis, while a value greater than 0.05 leads to acceptance.

R-squared: This measures the explanatory power of the model, showing the proportion of variation in agricultural output explained by financial inclusion variables.

Test of Research Hypotheses

The hypotheses of this study were tested using probability values (p-values). The decision rule states that if the p-value is less than 0.05, the null hypothesis is rejected, otherwise it is accepted.

Data Analysis

Table 1: Descriptive Statistics Summary of Data

	AGO	MB	POS
Mean	28113.48	50108.39	25788.7
Median	22738.03	929.4482	1084.405
Maximum	56478.98	392711.9	223272.8
Minimum	11625.44	1.27	11.03
Std. Dev.	14851.94	108872	59838.4
Skewness	0.705721	2.346013	2.612004
Kurtosis	2.133972	7.433582	8.745173
Jarque-Bera	1.828116	27.78117	40.19818
Probability	0.400894	0.000001	0
Sum	449815.7	801734.3	412619.3
Sum Sq. Dev.	3.31E+09	1.78E+11	5.37E+10
Observations	16	16	16

***Source**: E-view 10.0 Output*

Table 1 shows the descriptive statistics results for the entire sample of the study. We observed that for the full sample, the mean (or standard deviation) values for Agricultural Output (AGO), Commercial Bank Loans to Agriculture (CBLA), Agricultural Credit Guarantee Fund Scheme (ACGFS), Mobile Banking (MB), and Point of Sale Transactions (POS) are 28113.48, 873.3842, 7980383, 50108.39, and 25788.7 (or 14851.94, 808.9574, 2498554, 108872, and 59838.4), respectively. The maximum and minimum values for the five variables are found between 12,456,251 and 1.27, respectively. The skewness has both negative and positive values, which shows a negatively and positively skewed distribution. Specifically, ACGFS has a negative skewness value of -0.150130, while AGO, CBLA, MB, and POS have positive skewness values of 0.705721, 1.279244, 2.346013, and 2.612004, respectively.

Unit Root Test

Table 2: Unit Root Test Results using Augmented Dickey-Fuller (ADF)

Variables	**T-ADF**	**Lag Length**	**5% Level**	**Prob.**	**Remark**	**Decision**
AGO	-5.114774	1(2)	-3.119910	0.0017	Stationary	Reject H0
MB	-3.360963	1(1)	-3.098896	0.0316	Stationary	Reject H0

POS	-4.856572	1(1)	-3.098896	0.0022	Stationary	Reject H0

Source: *Computer Analysis using E-views 10.0*

The summarized unit root test from Table 4.3 displays the tests for stationarity properties of the series following the Augmented Dickey-Fuller (ADF) statistics. AGO and ACGFS were stationary at the second difference, while CBLA, MB, and POS were stationary at the first difference. As reported, the ADF statistics for the respective variables were all more negative than the critical values at a 5% significance level. The reported P-values were all less than the 0.05 chosen level of significance, for which cause, the Null Hypothesis of the presence of unit root in all the variables is convincingly rejected. Accordingly, AGO and ACGFS are integrated of order two, I(2), while CBLA, MB, and POS are integrated of order one, I(1).

Test of Hypotheses

Hypothesis One

H_{O1}: Mobile Banking has no significant effect on agricultural output in Nigeria.
H_{ll}: Mobile Banking has a significant effect on agricultural output in Nigeria.

Table 3: OLS Regression Output

Dependent Variable: LOGAGO
Method: Least Squares
Date: 08/16/26 Time: 07:28
Sample: 2009 2024
Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMB	0.134982	0.005718	23.60597	0.0000
C	9.168000	0.045355	202.1387	0.0000

R-squared	0.975492	Mean dependent var	10.11693
Adjusted R-squared	0.973741	S.D. dependent var	0.518465
S.E. of regression	0.084015	Akaike info criterion	-1.999183
Sum squared resid	0.098818	Schwarz criterion	-1.902609
Log likelihood	17.99346	Hannan-Quinn criter.	-1.994237
F-statistic	557.2418	Durbin-Watson stat	0.612795
Prob(F-statistic)	0.000000		

Source*: E-view 10.0 Output*

Interpretation of Result

The coefficient of LOGMB is 0.134982, indicating a positive relationship between Mobile Banking and Agricultural Output in Nigeria. It implies that a 1% increase in Mobile Banking is associated with an approximately 0.1350% increase in agricultural output, holding other factors constant. This positive relationship is consistent with the a priori expectation, as increased use of mobile banking can improve farmers' access to financial services, facilitate transactions, and enhance the ease of accessing funds for agricultural activities. The probability value of 0.0000 is less than the 5% level of significance. This indicates that Mobile Banking has a positive and statistically significant effect on agricultural output in Nigeria during the period under review.

Decision

The OLS regression result indicates that Mobile Banking has a positive and statistically significant effect on Agricultural Output in Nigeria, since the probability value of 0.0000 is

less than the 5% level of significance. Therefore, the null hypothesis is rejected, while the alternative hypothesis is accepted. It is concluded that Mobile Banking has a significant effect on agricultural output in Nigeria during the period under review.

Hypothesis Two

H_{O2}: Point of Sale (POS) transactions have no significant effect on agricultural output in Nigeria.

H_{12}: Point of Sale (POS) transactions have a significant effect on agricultural output in Nigeria.

Table 4: OLS Regression Output

Dependent Variable: LOGAGO
Method: Least Squares
Date: 08/16/26 Time: 07:28
Sample: 2009 2024
Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGPOS	0.164317	0.006691	24.55862	0.0000
C	8.966421	0.051020	175.7440	0.0000

R-squared	0.977314	Mean dependent var	10.11693
Adjusted R-squared	0.975694	S.D. dependent var	0.518465
S.E. of regression	0.080831	Akaike info criterion	-2.076444
Sum squared resid	0.091471	Schwarz criterion	-1.979870
Log likelihood	18.61155	Hannan-Quinn criter.	-2.071498
F-statistic	603.1260	Durbin-Watson stat	1.084343
Prob(F-statistic)	0.000000		

***Source**: E-view 10.0 Output*

Interpretation of Result

The coefficient of LOGPOS is 0.164317, indicating a positive relationship between Point of Sale (POS) transactions and Agricultural Output in Nigeria. It implies that a 1% increase in POS transactions is associated with an approximately 0.1643% increase in agricultural output, holding other factors constant. This positive relationship is consistent with the a priori expectation, as increased POS transactions can improve the accessibility and efficiency of financial transactions for farmers and other participants in the agricultural sector. The probability value of 0.0000 is less than the 5% level of significance. This indicates that POS transactions have a positive and statistically significant effect on agricultural output in Nigeria during the period under review.

Decision

The OLS regression result indicates that Point of Sale (POS) transactions have a positive and statistically significant effect on Agricultural Output in Nigeria, since the probability value of 0.0000 is less than the 5% level of significance. Therefore, the null hypothesis is rejected, while the alternative hypothesis is accepted. It is concluded that Point of Sale (POS) transactions have a significant effect on agricultural output in Nigeria during the period under review.

Conclusion

The study examined the effect of financial inclusion on agricultural output in Nigeria, using Mobile Banking and Point of Sale Transactions as indicators of financial inclusion. The findings revealed that Mobile Banking and POS Transactions had positive and statistically significant effects on agricultural output, while the Agricultural Credit Guarantee Scheme Fund had a negative but statistically insignificant effect. The findings demonstrate that access to formal mobile banking and POS services improve the accessibility of financial services, particularly for farmers in areas where conventional banking facilities are limited. Challenges relating to accessibility, lending conditions, awareness, disbursement, and effective utilization may limit the ability of such schemes to achieve their intended objectives.

The study concludes that financial inclusion has an important role in promoting agricultural output in Nigeria, particularly through increased access to commercial bank credit and digital financial services. However, the effectiveness of financial inclusion initiatives depends on the extent to which farmers can access and productively utilize the financial services provided.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. Deposit Money Banks and financial technology providers should expand mobile banking services in farming communities by improving network reliability and designing agricultural-focused mobile financial products. Mobile platforms should allow farmers to make input payments, receive proceeds from produce sales, transfer funds, save regularly, and access suitable agricultural credit without travelling long distances to bank branches. USSD-based services should also be maintained for farmers who use basic mobile phones or have limited internet access.

2. Banks and licensed POS operators should increase the availability of reliable POS services in rural farming communities and ensure that agents have sufficient cash and electronic liquidity during peak farming periods. POS agents located close to farming clusters and markets should be supported with adequate working capital and reliable network connectivity. This would reduce the time and transportation costs farmers incur when making payments, receiving funds, purchasing agricultural inputs, or accessing cash for farm-related activities.

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