

The Impact of Selected Macroeconomic Variables on Agricultural Sector Performance in Nigeria

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Abstract

The study investigates the impact of selected macroeconomic variables on agricultural sector performance in Nigeria using time series data spanning from 1990 to 2021. The research adopts an ex-post facto design and utilizes data obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin. Advanced statistical tools, including Auto Regressive Distributed Lag (ARDL) models, Descriptive Statistics, Augmented Dickey-Fuller Unit Root Tests, Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) Tests, and the Cumulative Sum of Recursive Residuals (CUSUM) Squares Test, were employed. The findings reveal that credit to the private sector has a positive but insignificant impact on agricultural sector performance. Broad money supply, monetary policy rate, and inflation rate exhibit negative and insignificant impacts, while banks' lending rates show a positive and significant impact. Jointly, the selected macroeconomic variables have a weak but significant impact on agricultural sector performance. The results highlight that while macroeconomic variables collectively influence the sector, the lending rate plays a more critical role in agricultural growth. Based on these findings, the study recommends improving access to agricultural credit through simplified loan processes and specialized financing products, enhancing monetary policy transmission to reduce financial intermediation frictions, and fostering a stable macroeconomic environment through effective inflation control and exchange rate management. Additionally, monetary policy adjustments should consider their potential effects on different sectors, including agriculture, to ensure sustainable credit growth and investment. Stabilizing inflation through sound fiscal and monetary policies is also emphasized to create a conducive environment for agricultural producers.

Keywords: Macroeconomic Variables, Agricultural Sector Performance, ARDL, Monetary Policy, Inflation, Lending Rate, Nigeria, Time Series Analysis.

Introduction

Agriculture has been a cornerstone of African economies, contributing significantly to trade and industrial production. For instance, more than 80% of trade value and over 50% of raw materials for industries in many African countries originate from the agricultural sector (Osabohien, Adeleye, & Dei Alwis, 2020). Despite its essential role, the performance of agriculture in Africa has varied across countries. In Nigeria, agricultural productivity has declined due to inadequate credit facilities, low yields of staple crops, and limited mechanization, which have kept yields below global averages (Chandio, 2019; World Bank, 2022). Over the past three decades, the competitiveness of Africa's export crops has diminished, increasing reliance on imported food, a trend exacerbated by the COVID-19

pandemic's disruptions to global food supply chains (FAO, 2021). This scenario underscores the urgent need to diversify Nigeria's economy from over-dependence on oil to agriculture, especially given the vulnerability of the economy to volatile global oil prices (Nnaemeka, 2021; Akinyemi & Odusanya, 2022).

The agricultural sector remains a critical contributor to Nigeria's economy, accounting for over 32% of the Gross Domestic Product (GDP) and employing more than 65% of the workforce (Matthew, 2019). Nigeria boasts immense potential for agricultural growth, with approximately 37 million hectares of arable land and diverse agro-ecological conditions conducive to year-round production (IFPRI, 2021). However, the availability of resources alone does not guarantee productivity. This highlights the need for strategic investments, innovative financing mechanisms, and policy interventions to unlock the sector's full potential (Adegbite et al., 2023).

The relationship between banking and agriculture in Nigeria has been a contentious issue due to the perceived inadequacy of credit access for agricultural activities. Government interventions, such as the establishment of the Nigerian Agricultural, Cooperative, and Rural Development Bank (NACRDB) and the Anchor Borrowers' Programme, aim to address this gap by providing loans on short-, medium-, and long-term bases (Sunny, 2013; CBN, 2023). Scholars emphasize the importance of bank credit in fostering agricultural growth. For instance, Akpansung and Babalola (2012) and Obamuyi, Edun, and Kayode (2013) found a positive relationship between bank credit and agricultural sector growth in Nigeria, aligning with financial intermediation theory (Gurley & Shaw, 1967). More recent studies corroborate these findings, with evidence suggesting that access to tailored credit facilities significantly enhances productivity and resilience in the agricultural sector (Umar & Usman, 2021).

Historically, agriculture was the backbone of Nigeria's economy, contributing about 90% of foreign earnings before the discovery of crude oil (Ijaiya & Abdulraheem, 2000). Even today, agriculture remains a reliable sector despite being overshadowed by the oil and gas industry. Recent studies, such as those by Ogbanje, Yahaya, and Kolawole (2012), Sunny (2013), and Okoroafor and Ekezie (2022), have found significant positive relationships between bank credit and agricultural output in Nigeria. These findings highlight the enduring influence of agriculture on the economy and underscore the need to evaluate how macroeconomic variables, including inflation, exchange rates, and interest rates, impact the sector's performance. This study seeks to analyze the effects of selected macroeconomic variables on agricultural sector performance in Nigeria, providing insights into how these factors shape the sector's development trajectory.

Statement of the Problem

Nigeria, with its abundant arable land and significant agricultural potential, continues to grapple with issues of hunger, unemployment, and insufficient raw material supply for agro-industries. The neglect of the agricultural sector and the preference for commercial ventures by deposit money banks (DMBs) has been a central concern. Despite the

introduction of policies aimed at enhancing agricultural financing, banks have remained hesitant to extend credit to the sector, often citing high risks and low returns. The stringent requirements imposed by banks, such as high-interest rates and rigid collateral demands, deter many potential farmers, leaving the sector underfunded and largely untapped (Agunuwai, 2015). This issue persists despite the agricultural sector's potential to significantly reduce unemployment and ensure food security. Thus, the accessibility of agricultural credit remains a pressing problem in Nigeria.

Even when credit is available, the inability of some farmers to meet the requirements for collateral or demonstrate financial discipline exacerbates the problem. Farmers often face accusations of misappropriating loans for non-agricultural purposes, leading to loan defaults and further discouraging banks from lending to the sector. Additionally, external factors such as fluctuating government policies, bureaucratic bottlenecks, and inflation rates further compound the challenges faced by agricultural stakeholders. These systemic barriers limit the efficacy of credit interventions in boosting agricultural productivity, raising concerns about the alignment of Nigeria's macroeconomic policies with agricultural development goals (Ayeomoni & Aladejana, 2016). The interplay of these factors highlights the urgent need for a comprehensive examination of the relationship between macroeconomic variables and agricultural sector performance.

Extant literature provides mixed findings on the impact of credit availability on agricultural growth. For instance, studies by Udih (2014) and Agunuwai (2015) suggest a positive relationship between credit access and agricultural productivity, emphasizing the role of adequate funding in fostering food security and economic growth. Conversely, Olowofeso (2017), using the NARDL model, reported no significant impact of credit on short-term agricultural output, suggesting that only cumulative long-term credit changes contribute meaningfully to growth. Similarly, Khatai and Bathia (1993), in their study of real interest rates across developing economies, found limited significance in the relationship between interest rates and investment in agriculture. These contrasting findings underscore the need for further research to clarify the extent to which selected macroeconomic variables influence agricultural performance in Nigeria.

Research Questions

In alignment with the objectives of this research, the following research questions were formulated:

1. How does credit to the private sector influence the performance of the agricultural sector in Nigeria?
2. In what ways does broad money supply impact the performance of the agricultural sector in Nigeria?
3. To what extent does the monetary policy rate shape the performance of the agricultural sector in Nigeria?
4. How does the inflation rate affect the performance of the agricultural sector in Nigeria?

5. What is the impact of the lending rate on the performance of the agricultural sector in Nigeria?

Research Hypotheses

Based on the research questions, the following hypotheses have been formulated:

H₀₁: Credit to the private sector does not significantly influence the performance of the agricultural sector in Nigeria.

H₀₂: Broad money supply does not have a significant impact on the performance of the agricultural sector in Nigeria.

H₀₃: The monetary policy rate does not significantly affect the performance of the agricultural sector in Nigeria.

H₀₄: The inflation rate does not have a significant impact on the performance of the agricultural sector in Nigeria.

H₀₅: The lending rate does not have a significant impact on the performance of the agricultural sector in Nigeria.

Literature Review

Conceptual Review:

Credit to the Private Sector

Credit to the private sector refers to financial resources provided by financial institutions to businesses and individuals for investment and consumption purposes. In the agricultural sector, access to credit enables farmers to invest in modern technologies, purchase quality inputs, and expand production, thereby boosting sectoral performance. The availability of credit can stimulate agricultural productivity and improve rural livelihoods, as noted by Idowu et al. (2022), but limited access often hampers growth. In Nigeria, constraints such as high collateral requirements, bureaucratic bottlenecks, and financial institution aversion to agricultural risks significantly limit the private sector's credit access, ultimately affecting the sector's development potential.

Broad Money Supply (M₂)

Broad money supply represents the total amount of money in circulation within an economy, including physical currency and various deposit accounts. Its influence on the agricultural sector stems from its role in determining liquidity levels and investment capacity. An increase in broad money supply can provide more financial resources for agricultural projects, spurring growth through enhanced access to credit and investments. However, if not well-managed, excess money supply can lead to inflation, eroding purchasing power and adversely affecting the sector (Olayemi & Eze, 2023). In Nigeria, effective monetary policy is critical to balance liquidity and stabilize agricultural sector performance.

Monetary Policy Rate

The monetary policy rate (MPR) is a key instrument used by central banks to regulate lending rates and manage economic activity. Changes in the MPR influence the cost of borrowing and investment decisions across sectors, including agriculture. A lower MPR can stimulate agricultural growth by making loans more affordable for farmers, while a higher MPR may discourage borrowing, constraining investments (Okafor & Yusuf, 2021). In Nigeria, the responsiveness of the agricultural sector to MPR adjustments underscores its reliance on affordable credit for sustained performance and development.

Inflation Rate

The inflation rate, which measures the average price level increase over time, profoundly affects the agricultural sector by altering production costs, input affordability, and consumer purchasing power. High inflation can increase the cost of fertilizers, seeds, and equipment, reducing farm profitability and discouraging production. Conversely, moderate inflation may stimulate investment by signaling higher future returns (Adebayo & Kolawole, 2022). In Nigeria, persistent inflationary pressures, driven by macroeconomic instability, remain a critical challenge to achieving sustainable agricultural growth.

Lending Rate

The lending rate is the interest rate financial institutions charge borrowers, directly impacting the cost of agricultural financing. High lending rates often discourage farmers from taking loans, limiting investments in farm inputs and mechanization, which are vital for productivity. On the other hand, lower lending rates can encourage borrowing, facilitating sectoral expansion and innovation (Agbo & Nwachukwu, 2021). In Nigeria, elevated lending rates are frequently cited as a barrier to agricultural development, highlighting the need for policy interventions to create more favorable financing conditions.

Agricultural Sector Performance

Agricultural sector performance refers to the ability of the agriculture industry to contribute effectively to economic growth, food security, employment, and rural development. It encompasses various indicators such as crop yield, livestock productivity, technological adoption, and market access, which collectively measure the efficiency and impact of the sector. A well-performing agricultural sector is critical for nations, particularly those in developing regions, as it supports a significant portion of their GDP, provides employment opportunities, and ensures food availability for growing populations (FAO, 2021). This performance is shaped by factors including government policies, access to agricultural inputs, infrastructural development, and the influence of external factors like climate conditions and global market trends (World Bank, 2022). In regions where agriculture serves as the backbone of the economy, enhancing performance through innovation and investment is pivotal to achieving sustainable development.

Theoretical Review:

Loan Pricing Theory

The Loan Pricing Theory posits that the cost of borrowing is determined by several factors, including the risk profile of the borrower, the prevailing interest rates, and the opportunity cost of funds for the lender. This theory is particularly relevant to understanding the agricultural sector in Nigeria, where access to affordable credit is critical. Agricultural enterprises often face higher borrowing costs due to perceived risks such as price volatility, weather unpredictability, and longer repayment cycles. According to Stiglitz and Weiss (1981), financial institutions consider these factors when determining loan terms, which directly impacts farmers' access to credit and, consequently, agricultural performance. By understanding the dynamics of loan pricing, policymakers can craft interventions that reduce credit costs for farmers, thereby improving their productivity and contribution to the economy.

Theory of Multiple Lending

The Theory of Multiple Lending suggests that borrowers often secure credit from multiple lenders to meet their financial needs or mitigate risks associated with single-lender dependency. This theory is applicable in Nigeria's agricultural sector, where small-scale farmers may access loans from formal institutions, microfinance banks, or informal credit sources. Degryse et al. (2009) argue that while multiple borrowing can enhance liquidity, it may also lead to over-indebtedness if poorly managed. Understanding this theory is critical for designing policies that ensure efficient credit distribution, minimizing the risk of default while enhancing agricultural productivity.

Credit Market Theory

Credit Market Theory examines the dynamics of demand and supply in credit markets, focusing on how imperfections, such as information asymmetry and collateral constraints, impact credit allocation. According to Mishkin (2004), these imperfections often lead to credit rationing, where certain sectors, including agriculture, receive limited financial resources. This theory provides a framework for analyzing the barriers that Nigerian farmers face in accessing sufficient credit. Addressing these issues through targeted reforms can ensure that credit flows to the agricultural sector are optimized, enhancing its contribution to the economy.

Financial Intermediation Theory

The financial intermediation theory, developed by Gurley and Shaw (1967), forms the foundation of this study. This theory elucidates the critical role of financial institutions, particularly banks, in an economy by serving as intermediaries that facilitate the flow of funds from surplus agents (savers) to deficit agents (borrowers). By pooling resources and allocating them efficiently, financial intermediaries contribute significantly to private sector growth, including sectors like agriculture, by offering credit and other financial

services (Degryse, 2004). In agriculture, these institutions can lower transaction costs and address risks, thereby enhancing farmers' access to credit. Such efficient intermediation ensures that resources are channeled into productive investments, promoting sectoral performance and broader economic growth (Scholtens & van Wensveen, 2003).

Empirical Review:

A lot has been reviewed in terms of credit activities of various deposit money banks and Agriculture. Some opinions deliberated on the factor responsible for banks willingness to extend much credit to some sector of the economy such as the agricultural sector, while some discussed effect of such extension of credits on productivity and output.

Agunuwa (2015) examined the impact of commercial banks' credit on agricultural productivity in Nigeria. Using Ordinary Least Squares (OLS) regression, the study found a positive relationship between commercial bank credit and agricultural productivity, indicating that increased access to credit can improve agricultural output.

Similarly, Udihi (2014) investigated the effect of bank credit on agricultural development. The study used both primary and secondary data from five banks and ten agricultural enterprises in Delta State. A simple random sampling technique was employed, and the data were analyzed using percentages, means, standard deviations, and Pearson product-moment correlation. The findings revealed that bank credit to agricultural entrepreneurs promotes development and productivity, although the regulated credits had minimal impact on entrepreneurship performance.

Obansa and Maduekwe (2013) employed the Granger causality test to explore the relationship between agricultural financing and economic growth in Nigeria. The results indicated bi-directional causality between economic growth and agricultural financing, suggesting that improvements in agricultural financing contribute to economic growth, and vice versa.

Ayeomoni and Aladejana (2016) examined the nexus between agricultural credit and economic growth from 1986 to 2014. Their findings confirmed that agricultural credit has a significant relationship with economic growth both in the short and long run. Variables such as credit to the agricultural sector, real exchange rate, interest rate, private investment, and inflation rate were found to influence economic growth in Nigeria.

In contrast, Olowofeso (2017) used the nonlinear autoregressive distributed lag (NARDL) model to analyze the impact of credit to agriculture on output growth. The study showed no evidence of asymmetry in the short run, but found that cumulative agricultural output growth was positively affected by the lagged impact of positive credit changes.

Egwu (2016) focused on the impact of agricultural financing on output, economic growth, and poverty alleviation in Nigeria. Using OLS regression, the study found a significant long-term relationship between commercial bank credit, the Agricultural Credit Guarantee Scheme Fund, and agricultural sector output, suggesting that agricultural credit plays a crucial role in fostering economic growth and poverty reduction.

Waseem (2017) applied Johansen co-integration and the Vector Error Correction Model to analyze the relationship between agriculture credit and GDP growth. The study found that agricultural GDP is highly responsive to increases in agricultural credit, and there is a unidirectional causality running from agricultural credit to agricultural GDP.

Felicia (2011) used regression analysis to identify the key determinants of commercial banks' lending behavior in Nigeria. The study concluded that commercial bank deposits have the greatest impact on lending decisions, underscoring the importance of a stable deposit base for agricultural financing.

Khat and Bathia (1993) employed a non-parametric approach to investigate the relationship between interest rates and macroeconomic variables like savings and investment across 64 developing countries, including Nigeria. The study found that real interest rates had a minimal impact on these variables, indicating that other factors may be at play in influencing economic behavior.

Adofu and Audu (2010) used OLS to assess the effects of interest rate deregulation on agricultural productivity in Nigeria. Their findings revealed that interest rates play a significant role in economic activities, and suggested that monetary authorities should carefully manage interest rates to avoid negative effects on savers and investors.

Rasheed (2010) applied the error correction model (ECM) to investigate interest rate determination in Nigeria. The study found that as the Nigerian financial sector becomes more integrated with global markets, returns on foreign assets increasingly influence domestic interest rates.

Okwo, Mbajiaku, and Ugwunta (2012) examined the effect of bank credit to the private sector on economic growth in Nigeria using time series data. The study found a positive and significant relationship between bank credit and GDP, suggesting that access to credit can stimulate economic growth.

Oluwafemi, Akinlo, and Elumilade (2014) used OLS regression to study the impact of bank credit on Nigeria's real sector between 1980 and 2010. The results showed that credit to the manufacturing sector has a significant effect on growth in both the short and long run, indicating that enhanced credit access to the real sector can boost economic development.

Andabai (2014) used OLS to analyze the relationship between private sector development and economic growth in Nigeria between 1987 and 2013. The study found a positive and significant relationship between private sector development and GDP, suggesting that a vibrant private sector is critical for sustainable economic growth.

Yusuf and Aliyu (2013) employed multiple regression analysis to assess the impact of bank credit to the private sector on real sector growth in Nigeria. The study found a positive and significant impact, supporting the view that credit allocation to the private sector drives economic expansion.

Oladapo and Adefemi (2015) focused on sectoral allocation of bank credit and its effects on private sector growth in Nigeria from 1986 to 2010. The study found that credit allocated to government, personal, and professional sectors had a significant positive effect on economic growth.

Aurangzeb (2012) analyzed the role of banking sector credit in Pakistan's real sector growth, using data from 10 banks over the period 1981 to 2010. The study found that bank credit, particularly in the form of deposits, investments, and advances, had a negative impact on real sector growth, although investments and interest earnings showed a unidirectional causal relationship with economic growth.

Oladapo and Adefemi (2015) also contributed by investigating sectoral allocations of bank credit to the private sector, noting that only specific sectors such as government and personal loans had a significant positive impact on economic growth in Nigeria during the period from 1986 to 2010.

This literature suggests that bank credit plays a pivotal role in driving agricultural productivity, economic growth, and sectoral development in Nigeria. However, the effectiveness of this credit is contingent on appropriate policy frameworks, interest rates, and the allocation of funds to productive sectors.

Methodology

This study adopted an *ex-post-facto* research design to source and analyzes relevant data, as it involves the use of existing documented information from reputable institutions such as the World Bank, International Monetary Fund (IMF), Central Bank of Nigeria (CBN), and National Bureau of Statistics. This approach ensures the validity and reliability of findings by relying on credible official publications. Data for the study, covering a 32-year period (1990–2021), were sourced from the CBN Statistical Bulletin (2021) and presented in tables and descriptive statistical formats. The analysis utilized several advanced statistical tools, including Auto Regressive Distributed Lag (ARDL), Descriptive Statistics, Augmented Dickey-Fuller Unit Root Test, Breusch-Godfrey Serial Correlation LM Test, and the CUSUM of Squares Test. These methods were employed to interpret the data and test the hypothesis, providing robust parameter estimation through relevant statistical software. The use of secondary data forms the foundation for this analysis, ensuring a comprehensive evaluation of the variables under study.

Model Specification

Multivariate linear regression models are employed to test each of the null hypotheses proposed for this study. Based on the five formulated hypotheses, a model is adopted from Sunny (2013). The functional model is expressed as:

$$AGSO = f(CPS, M_2, MPR, INFLR, LDRT)$$

Where:

AGSO = Agricultural Sector Output (dependent variable)

CPS = Credit to the Private Sector

M₂ = Broad Money Supply

MPR = Monetary Policy Rate

INFLR = Inflation Rate

LDRT = Lending Rate

In this study, the model is modified by introducing bank credit to the agricultural sector as a proxy for credit to the private sector, which is used as an independent variable. The modified model is presented as:

The functional relationship for the model is expressed as follows:

$$AGSO = f(BCAS, M_2, MPR, INFLR, LDRT) \quad (1)$$

The econometric form of the equation is specified as:

$$\ln(AGSO) = b_0 + b_1 \ln BCAS_t + b_2 \ln M_{2t} + b_3 \ln MPR_t + b_4 \ln INFLR_t + b_5 \ln LDRT_t + u_t \quad (2)$$

Where:

AGSO = Agricultural Sector Output (dependent variable).

BCAS = Bank Credit to the Agricultural Sector.

M₂ = Broad Money Supply.

MPR = Monetary Policy Rate.

INFLR = Inflation Rate.

LDRT = Lending Rate.

b₀ = Intercept.

b₁, b₂, b₃, b₄, b₅ = Coefficients of the regression equation.

u_t = Stochastic or error term.

t = Time series data

Results and Discussion

Descriptive Statistics Result

Table 1: Descriptive Statistics

	LnAGSO	LnCPST	LnBRMS	LnMPRT	LnINFR	LnLDRT
Mean	9.050217	7.593842	7.916089	2.575132	2.500834	2.894452
Maximum	9.838331	10.40027	10.60456	3.258097	4.287716	3.394508
Minimum	8.150386	3.512968	3.859113	1.791759	0.262364	2.446685
Std. Dev.	0.616699	2.181303	2.070556	0.290935	0.715487	0.189750
Skewness	-0.218863	-0.315464	-0.341993	-0.610724	0.070167	0.137359
Kurtosis	1.423017	1.768120	1.825028	4.639897	6.038158	4.095510
Jarque-Bera	3.571306	2.554131	2.464529	5.574932	12.33346	1.700816
Probability	0.167688	0.278854	0.291631	0.061577	0.002098	0.427241
Observations	32	32	32	32	32	32

Source: Authors' computation from Eviews 10

Table 1 presents the descriptive statistics for the variables under study: agricultural sector output (LnAGSO), credit to the private sector (LnCPST), broad money supply (LnBRMS), monetary policy rate (LnMPRT), inflation rate (LnINFR), and banks' lending rate (LnLDRT), based on 32 observations. The mean values for these variables range from 2.50 for inflation rate (LnINFR) to 9.05 for agricultural sector output (LnAGSO), reflecting differences in magnitude. The maximum and minimum values highlight variability, with LnCPST showing the widest range (10.40 to 3.51), while LnLDRT exhibits the least variability (3.39 to 2.45).

Standard deviation indicates moderate dispersion, with LnCPST (2.18) and LnBRMS (2.07) showing relatively higher variability. Skewness values suggest that most variables are slightly negatively skewed except for LnINFR and LnLDRT, which are positively skewed. Kurtosis results reveal leptokurtic distributions for LnINFR and LnMPRT, while others are platykurtic. The Jarque-Bera test suggests non-normality for LnINFR ($p = 0.002$), while other variables exhibit p -values above 0.05, implying normal distributions. These statistics provide insight into the data's distribution and variability, crucial for model accuracy and interpretation.

Table 2: Augmented Dickey Fuller Unit Root Test

Variables	Unit Root Test @Levels			Unit Root Test @1 st Difference			Order of Integration
	Trend and Intercept			Trend and Intercept			
	t-stat	Critical Value	Prob.	t-stat	Critical Value	Prob.	
LnAGSO	-1.2064	-3.562882	0.8916	-4.9787	-3.568379	0.0019	I(1)
LnCPST	-0.8175	-3.562882	0.9529	-4.7433	-3.568379	0.0035	I(1)
LnBRMS	-0.8196	-3.562882	0.9527	-4.2795	-3.568379	0.0104	I(1)
LnMPRT	-2.8698	-3.562882	0.1853	-6.8010	-3.568379	0.0000	I(1)
LnINFR	-4.0342	-3.587527	0.0196				I(0)
LnLDRT	-4.6235	-3.562882	0.0044				I(0)

Source: Authors' computation

The results of the Augmented Dickey-Fuller Unit Root Test indicate that the variables exhibit a mixed order of integration. Specifically, LnAGSO, LnCPST, LnBRMS, and LnMPRT are integrated of order I(1), while LnINFR and LnLDRT are stationary at levels, integrated of order I(0). Thus, this will warrant the use of the ARDL Bound testing to check for the longrun relationship of the variables.

Autoregressive Distributive Lag (ARDL) Bound Test

Table 3: ARDL Bound Test

Test Statistic	Value	K		
F-statistic	8.192581	5		
Critical Value Bounds				
Significance	lo Bound	li Bound		
10%	2.26	3.35		
5%	2.62	3.79		
2.5%	2.96	4.18		
1%	3.41	4.68		

Source: Authors computation from Eviews 10

The ARDL Bound Test shows an F-statistic of 8.192581, which exceeds the critical value bounds at the 5% significance level ($I_0 = 2.62$, $I_1 = 3.79$). This indicates that there is a long-run relationship between the variables being tested, as the F-statistic falls outside the lower bound and above the upper bound for the 5% significance level. Therefore, we reject the null hypothesis of no cointegration.

Table 4: ARDL Shortrun Error Correction Model

Dependent Variable: LNAGSO

Variable	Coefficient	t-Statistic	Prob.	
C	0.034369	1.326913	0.1981	
D(LNAGSO(-1))	0.202924	1.192836	0.2456	
D(LNCPST)	0.169357	1.642719	0.1147	
D(LNBRMS)	-0.142989	-0.949953	0.3525	
D(LNINTR)	-0.050603	-0.956800	0.3491	
D(LNINFR)	-0.001125	-0.067483	0.9468	
D(LNLDRT)	0.174393	2.427773	0.0238	
ECM(-1)	-0.386211	-3.157503	0.0046	
R-squared	0.434614			
Adjusted R-squared	0.254719			
F-statistic	2.415927			
Prob(F-statistic)	0.053731			

Source: Eviews 10

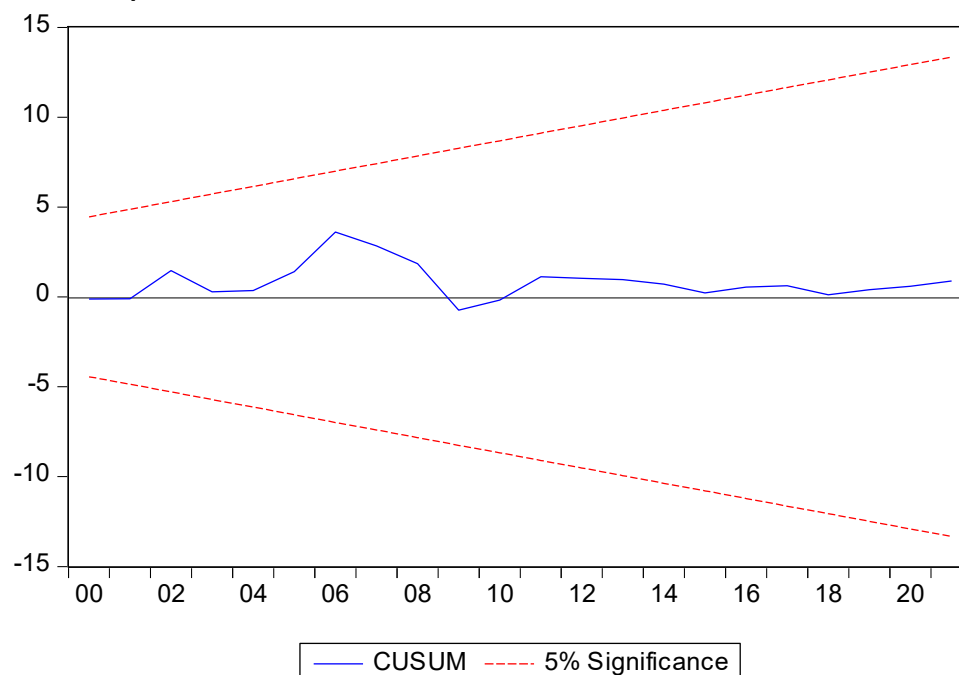
Residual Diagnostic Test

Table 5: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.482249	Prob F(2,20)	0.6244
Obs*R-squared	1.380187	Prob Chi-Square(2)	0.5015

Source: Authors' computation

The Breusch-Godfrey Serial Correlation LM Test results show an F-statistic of 0.482249 with a p-value of 0.6244, indicating no significant serial correlation at the 5% level. Similarly, the Obs*R-squared value of 1.380187 with a p-value of 0.5015 also suggests no evidence of serial correlation. Therefore, the null hypothesis of no serial correlation is not rejected.

Model Stability Result

Source: Eviews 10

Figure 1: Cumulative Sum (CUSUM) Test

The CUSUM test, as illustrated in Figure 1, indicates that the Cumulative Sum lies within the critical boundary at the 5% significance level. This confirms that the model remains stable throughout the study period.

Test of Hypotheses

H1: Credit to the Private Sector and Its Impact on Agricultural Sector Performance in Nigeria

The results show that credit to the private sector has a t-statistic of 1.6427 and a p-value of 0.1147, which is above the 5% significance level. Therefore, we accept the null hypothesis. This suggests that there is an insignificant positive effect of credit to the private sector on agricultural sector output in Nigeria.

H2: Broad Money Supply and Its Impact on Agricultural Sector Performance in Nigeria

The table shows that broad money supply has a t-statistic of -0.949953 and a p-value of 0.3525, which is above the 5% significance level. Consequently, we accept the null hypothesis. This indicates that broad money supply has a negative, but insignificant, effect on agricultural sector performance in Nigeria.

H3: Monetary Policy Rate and Its Impact on Agricultural Sector Performance in Nigeria

The results indicate that the monetary policy rate has a t-statistic of -0.9568 and a p-value of 0.3491, which exceeds the 5% significance level. Therefore, we accept the null

hypothesis. This suggests that the monetary policy rate has a negative, but insignificant, effect on agricultural sector performance in Nigeria.

H4: Inflation Rate and Its Impact on Agricultural Sector Performance in Nigeria

The inflation rate has a t-statistic of -0.067483 and a p-value of 0.9468, which is above the 5% significance level. As a result, we accept the null hypothesis, indicating that inflation rate has an insignificant negative effect on agricultural sector performance in Nigeria.

H5: Lending Rate and Its Impact on Agricultural Sector Performance in Nigeria

The table shows that the lending rate has a t-statistic of 2.427773 and a p-value of 0.0238, which is below the 5% significance level. In this case, we reject the null hypothesis. This indicates that the lending rate has a significant positive effect on agricultural sector output in Nigeria.

Discussion of Result Findings

Table 4 shows that the ARDL short-run Error Correction Model for economic growth is significant and negative, indicating that agricultural sector performance in Nigeria adjusts to changes in the long run. This suggests that the agricultural sector's performance is influenced by macroeconomic variables such as credit to the private sector, broad money supply, monetary policy rate, inflation rate, and lending rates. The Error Correction coefficient is -0.386211, which statistically implies that the economy adjusts to long-term equilibrium at a rate of 38.6% annually. This means that any deviations from equilibrium are corrected within the following year.

The findings of this study reveal important insights into the relationship between various financial variables and the performance of the agricultural sector in Nigeria. Hypothesis one (H₁), which examines the impact of credit to the private sector on agricultural performance, indicates that there is an insignificant positive relationship. The t-statistic of 1.6427 and a p-value of 0.1147, which exceeds the 5% significance level, suggest that although credit to the private sector has a positive effect, it is not statistically significant in influencing agricultural sector output in Nigeria. This finding aligns with similar studies, such as those by Agunuwa (2015) and Oladapo et al. (2015), who observed that while credit to the private sector is critical for economic growth, its impact on agricultural performance can be limited by factors such as inadequate infrastructure, interest rates, and access to loans. This underscores the importance of targeted policies to enhance the effectiveness of credit in stimulating agricultural productivity.

Hypothesis two (H₂) investigates the effect of broad money supply on agricultural performance. The results show a negative but insignificant effect, with a t-statistic of -0.949953 and a p-value of 0.3525. This implies that broad money supply does not significantly impact agricultural output, reinforcing findings from studies like those of Egwu (2016) and Rasheed (2010), who argued that broad money supply often fails to directly affect real-sector activities, especially in an economy like Nigeria's, where inflation and

currency depreciation may dilute its potential benefits. Similarly, hypothesis three (H₃) assesses the influence of the monetary policy rate on agricultural performance, revealing an insignificant negative effect (t-statistic of -0.956800 and p-value of 0.3491). This aligns with literature suggesting that high-interest rates can discourage investment in agriculture, as they increase the cost of borrowing, yet such impacts are not always statistically significant in the short term (Khat & Bathia, 1993).

Lastly, hypothesis four (H₄) and five (H₅) explore inflation rate and lending rates, respectively. The findings show that inflation has an insignificant negative effect on agricultural performance (t-statistic of -0.067483 and p-value of 0.9468), consistent with studies like those by Yusuf and Aliyu (2013), which highlighted the limited direct impact of inflation on agricultural output due to the high dependence of agriculture on factors like weather and government policies. However, the results for lending rates (t-statistic of 2.427773 and p-value of 0.0238) show a statistically significant positive impact on agricultural performance, confirming the crucial role of lending rates in facilitating investment and production in the agricultural sector, as supported by studies like Ayeomoni and Aladejana (2016). This suggests that reducing lending rates could improve access to finance for agricultural producers and stimulate sector growth.

Conclusion

This study, which analyzed macroeconomic variables and agricultural sector performance in Nigeria using time series data from 1990 to 2021, found that credit to the private sector had a positive but insignificant impact on agricultural performance. Broad money supply, monetary policy rate, and inflation rate were found to have negative and insignificant effects. In contrast, the lending rate had a positive and significant impact on agricultural performance. Overall, while the joint impact of macroeconomic variables on the agricultural sector was weak but significant, the results suggest that lending rates play a more influential role in driving agricultural sector performance.

Recommendations

The following recommendations are proposed based on the findings of the study:

1. **Enhancing Agricultural Credit Accessibility:** Financial institutions should take steps to improve access to credit for agricultural enterprises by simplifying loan application processes, reducing collateral requirements, and offering tailored agricultural financing products.
2. **Improving Monetary Policy Transmission:** Monetary authorities should enhance the effectiveness of monetary policy transmission mechanisms to ensure changes in broad money supply are effectively reflected in the real sector, particularly the agricultural sector, by minimizing frictions in the financial intermediation process.
3. **Fostering Macroeconomic Stability:** Monetary authorities should implement policies aimed at promoting macroeconomic stability, such as controlling inflation

and maintaining a stable exchange rate, to create a favorable environment for agricultural sector growth.

4. **Strategic Monetary Policy Adjustments:** Adjustments to the monetary policy rate should be carefully assessed for their potential impacts on various sectors, including agriculture, to support sustainable credit growth and agricultural investments.
5. **Inflation Control Measures:** Authorities should adopt sound macroeconomic policies, including fiscal discipline, prudent monetary policies, and effective supply-side interventions, to stabilize prices and reduce uncertainties for agricultural producers.
6. **Promoting Specialized Agricultural Lending:** Regulatory authorities should encourage banks to offer specialized agricultural lending products with competitive interest rates to enhance access to affordable financing for agricultural enterprises.

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APPENDIX

Table I: Selected Macroeconomic variables and Agricultural Sector Performance in Nigeria (1990–2021)

Year	Credit to Private Sector (₦, Bill)	Broad Money Supply (M ₂) (₦, Bill)	Monetary Policy Rate %	Inflation Rate %	Lending Rate %	Agricultural Sector Output (₦, Bill)
1990	33.55	47.42	18.50	7.2	25.50	3,464.72
1991	41.35	75.40	15.50	8.5	20.01	3,590.84
1992	58.12	111.11	17.50	13.3	29.80	3,674.79
1993	127.12	165.34	26.00	57.2	18.32	3,743.67
1994	143.42	230.29	13.50	57	21.00	3,839.68
1995	180.00	289.09	13.50	72.8	20.18	3,977.38
1996	238.60	345.85	13.50	8.5	19.74	4,133.55
1997	316.21	413.28	13.50	17.4	13.54	4,305.68
1998	351.96	488.15	13.50	8.4	18.29	4,475.24
1999	431.17	628.95	18.00	6.6	21.32	4,703.64
2000	530.37	878.46	14.00	1.3	17.98	4,840.97
2001	764.96	1,269.32	20.50	18.5	18.29	5,024.54
2002	930.49	1,505.96	16.50	12	24.85	7,817.08
2003	1,096.54	1,952.92	15.00	13.5	20.71	8,364.83
2004	1,421.66	2,131.82	15.00	11.8	19.18	8,888.57
2005	1,838.39	2,637.91	13.00	15.6	17.95	9,516.99
2006	2,290.62	3,797.91	10.00	8.5	17.26	10,222.47
2007	3,668.66	5,127.40	9.50	5.4	16.94	10,958.47
2008	7,899.14	8,643.43	9.75	11.6	15.14	11,645.37
2009	9,889.58	9,687.51	6.00	12	18.99	12,330.33
2010	10,518.17	11,101.46	6.25	13.7	17.59	13,048.89
2011	9,600.02	12,628.32	12.00	10.8	16.02	13,429.38
2012	13,293.64	15,503.41	12.00	12	16.79	14,329.71
2013	14,461.41	18,743.07	12.00	8.5	16.72	14,750.52
2014	16,753.00	20,415.61	13.00	8	16.55	15,380.39
2015	18,688.42	20,885.52	11.00	9	16.85	15,952.22
2016	21,025.24	24,259.00	14.00	15.7	16.87	16,607.34
2017	22,459.18	28,604.47	14.00	16.5	17.56	17,179.50
2018	22,646.33	29,774.43	14.00	11.4	19.33	17,544.15
2019	25,676.87	34,257.90	13.50	11.4	15.53	17,958.58
2020	29,030.01	36,038.01	11.50	13.71	12.32	18,348.18
2021	32,868.49	40,318.29	11.50	15.63	11.55	18,738.41

Source: CBN Statistical Bulletin, 2021