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AGRICULTURAL FINANCING AND ECONOMIC GROWTH IN NIGERIA: SHORT-RUN DYNAMICS AND ARDL BOUNDS EVIDENCE

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Research Article

Abstract

This study re-examines the relationship between agricultural financing and economic growth in Nigeria using annual data for 1990–2024 and an autoregressive distributed lag (ARDL) bounds-testing framework. The analysis uses gross domestic product as the outcome variable, government expenditure on agriculture and commercial-bank credit to agriculture as financing indicators, and the lending rate as the cost-of-credit control. Augmented Dickey–Fuller and Phillips–Perron tests indicate a mixture of I(0) and I(1) variables and no evidence of I(2) integration. Akaike information criterion selects an ARDL(1,2,2,1) model with a deterministic trend. The bounds F-statistic of 1.6731 falls below the 10% lower bound of 3.0444, so the null hypothesis of no level relationship cannot be rejected. Accordingly, long-run elasticities are not interpreted. In the conditional error-correction representation, the contemporaneous change in government agricultural expenditure has a positive effect on output growth (0.2124; p=0.0097), while its first lag is positive at the 10% level (0.1222; p=0.0855). Changes in bank credit are statistically insignificant, and the contemporaneous lending-rate change is positive but should be treated cautiously because the model shows residual serial correlation and functional-form sensitivity. The findings suggest that agricultural spending can support short-run activity, but the supplied historical series does not establish a stable long-run financing–growth relationship. Better-targeted spending, improved credit transmission and longer, consistently measured real series are required for firmer policy inference.

Keywords: agricultural financing; economic growth; government expenditure; bank credit; lending rate; ARDL bounds test

JEL classification: E44; O13; O47; Q14

1. Introduction

Nigeria's long-standing diversification challenge is not simply the dominance of petroleum in public revenue and foreign-exchange earnings; it is also the weak transformation of a large agricultural base into a productive, financeable and value-adding system. Agriculture links rural livelihoods, food security, agro-processing, trade and employment. Its ability to support broad-based growth therefore depends on complementary public infrastructure, research and extension, storage, irrigation, security, market access and affordable private credit. Recent macroeconomic reforms and high financing costs have made the quality and transmission of agricultural finance even more important (World Bank, 2023; Central Bank of Nigeria [CBN], 2024).

The Nigerian policy debate often assumes that additional government allocations and bank lending will automatically raise aggregate output. Yet finance affects production only when funds reach viable activities, arrive at the appropriate stage of the production cycle and are supported by complementary inputs. High lending rates may ration smaller farmers and agribusinesses out of formal credit markets,

while directed-credit programmes may have limited effects where beneficiary selection, monitoring, repayment discipline and infrastructure are weak. These frictions mean that the growth response may be delayed, temporary or unstable.

Recent evidence remains mixed. Afolabi et al. (2021) report that agricultural credit is relevant to Nigerian growth, while Oyedepo et al. (2022) find positive long-run associations of commercial-bank credit and government expenditure with agricultural output. Ugbede Junior and Nwankwo (2023), however, show that the magnitude and significance of bank credit depend on model specification and transmission conditions. Manasseh et al. (2024) find that some credit channels can adversely affect agricultural development, and Fagbemi et al. (2025) provide further evidence that institutional and programme design conditions the credit–productivity nexus. These differences justify a dynamic specification that distinguishes temporary effects from a stable level relationship.

The objective is to determine whether government agricultural expenditure, commercial-bank credit to agriculture and the lending rate have a stable long-run relationship with Nigerian output and to estimate their short-run effects. The null hypothesis is that no level relationship exists among the variables. The contribution is mainly methodological and diagnostic: it shows that a high R-squared in a trending static regression is insufficient evidence that agricultural finance promotes long-run growth.

2. Literature Review

2.1 Conceptual linkages

Agricultural finance comprises public expenditure, private and development-bank credit, guarantees, insurance and other instruments that mobilise resources for production and value-chain investment. Public expenditure can raise productivity through public goods such as roads, irrigation, research, extension and market information. Bank credit can relax liquidity constraints and enable farmers or agribusinesses to purchase inputs, adopt technology, store output and expand processing. The lending rate represents the price of borrowed funds and may reduce investment when expected returns are below financing costs.

Economic diversification is broader than output growth. It concerns changes in the composition and concentration of production, exports, employment or public revenue. Consequently, aggregate GDP alone cannot reveal whether an economy is becoming less dependent on oil. A direct diversification study would require measures such as non-oil GDP share, sectoral concentration, export concentration or a Herfindahl–Hirschman index.

2.2 Theoretical framework

The analysis combines the neoclassical production framework with finance-led growth reasoning. In the Solow (1956) model, output depends on capital, labour and technology, and long-run per-capita growth ultimately requires technological progress. Agricultural expenditure and credit can raise effective capital and facilitate technology adoption, while public agricultural services may enhance total factor productivity. Finance-led growth theory adds that financial intermediation improves resource mobilisation, screening, risk management and allocation. These benefits are not automatic: credit rationing, information asymmetry, weak collateral systems and diversion of funds can sever the link between nominal financing and productive investment.

2.3 Empirical evidence

Afolabi et al. (2021) used Nigerian time-series data and an ARDL approach to examine agricultural credit and economic growth, concluding that credit variables matter but that institutional reforms are needed to improve transmission. Oyedepo et al. (2022) examined commercial-bank credit and agricultural growth

outcomes and reported positive long-run relationships for credit and government expenditure, alongside negative effects from exchange-rate and interest-rate pressures in parts of their model. Their results support the view that both the quantity and price of finance matter.

Using data for 1981–2019, Ugbede Junior and Nwankwo (2023) found that the effect of bank credit on agricultural output is sensitive to the nature of credit and macroeconomic controls. More recent work broadens the mechanism. Manasseh et al. (2024) report that credit channels can have negative effects on agricultural development when financing conditions and energy constraints are considered, while Tabash et al. (2024) find positive links among financial inclusion, growth and agricultural output. Fagbemi et al. (2025), using Nigerian data for 1991–2023, provide additional evidence on agricultural credit and productivity and emphasise the design and effectiveness of credit interventions.

The literature therefore does not support a mechanical conclusion that every increase in lending or budgetary expenditure produces durable growth. Differences in dependent variables, nominal versus real measurement, programme composition, sample period, structural breaks and lag selection can generate divergent findings. The present study addresses part of this gap by estimating a parsimonious dynamic model and making the bounds decision prior to interpreting long-run parameters.

3. Methodology

3.1 Data and measurement

The study uses annual Nigerian data for 1990–2024. GDP and the lending rate were obtained from the World Development Indicators, while government expenditure on agriculture and commercial-bank credit to agriculture were obtained from the CBN Statistical Bulletin. All variables are positive in the estimation sample and are transformed into natural logarithms. Log transformation reduces scale differences and allows short-run coefficients to be read approximately as elasticities.

Table 1. Variables and expected effects

Symbol	Measure	Role	Expected sign
lnGDP	Natural log of gross domestic product	Outcome	—
lnGXA	Natural log of government expenditure on agriculture	Public financing	+
lnBCR	Natural log of commercial-bank credit to agriculture	Private financing	+
lnINT	Natural log of lending rate	Cost of credit	−

Note: GDP measures aggregate economic activity, not diversification directly.

3.2 Model specification and estimation

The long-run relation is specified as $\ln GDP_t = \beta_0 + \beta_1 \ln GXA_t + \beta_2 \ln BCR_t + \beta_3 \ln INT_t + \tau t + \varepsilon_t$. Its unrestricted conditional error-correction form includes lagged levels of all variables, current and lagged first differences, a constant and a linear trend. The ARDL bounds test evaluates the joint null that the coefficients on the lagged levels are zero. The approach of Pesaran, Shin and Smith (2001) permits regressors integrated of order zero or one, but not order two.

Unit-root properties are assessed with Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests. Given only 27 annual observations, the maximum lag is restricted to two and the Akaike information criterion (AIC) selects the dynamic specification. A deterministic trend is included because both output and public expenditure display pronounced secular movement. The selected model is ARDL(1,2,2,1). The bounds decision uses the unrestricted-intercept-and-trend case. Residual diagnostics examine serial

correlation, heteroskedasticity, normality and functional form. Estimation commands are supplied in Appendix A for replication in Stata.

4. Results

4.1 Preliminary analysis

Table 2. Descriptive statistics of logged variables

Variable	N	Mean	Std. dev.	Minimum	Maximum
lnGDP	34	11.0364	1.6252	7.9877	13.2123
lnGXA	34	11.1492	1.6127	7.3776	12.6658
lnBCR	34	19.5021	1.1191	17.0264	22.2049
lnINT	34	1.9799	0.2502	1.2556	2.4033

Source: Authors' calculations from the supplied World Bank/CBN series. Values are reported to four decimal places.

The standard deviations show substantial historical movement in GDP and government agricultural expenditure, while the logged lending rate varies less. Descriptive co-movement cannot establish a causal or long-run relationship because the series have strong time patterns.

Table 3. Unit-root tests

Variable	ADF level	p-value	ADF Δ	p-value	PP level	p-value	PP Δ	p-value	Order
lnGDP	−2.6817	0.2437	−3.4077	0.0107	−1.3463	0.8760	−4.8202	0.0000	I(1)
lnGXA	−2.3651	0.3983	−2.3923	0.1439	−1.9526	0.6270	−5.5174	0.0000	I(1)*
lnBCR	−3.5071	0.0386	−5.0215	0.0000	−3.9166	0.0115	−8.4352	0.0000	I(0)
lnINT	−4.1891	0.0047	−5.7850	0.0000	−3.0480	0.1191	−6.3535	0.0000	Mixed/I(1)

*Notes: Levels include an intercept and trend; first differences include an intercept. One lag is used in ADF tests. *The PP test rejects a unit root in ΔlnGXA although the low-powered ADF test does not at 5%. No variable is treated as I(2).*

The tests indicate mixed integration orders. GDP and government expenditure are predominantly I(1), bank credit is I(0), and lending rate evidence is mixed across tests but becomes stationary after differencing. This mixture meets the principal integration requirement for ARDL bounds testing, while the absence of convincing I(2) evidence avoids invalid critical bounds.

4.2 Bounds test

Table 4. ARDL bounds test for a level relationship

Statistic	Value	Lower I(0)	Upper I(1)	Decision
F-statistic	1.6731	—	—	Do not reject H_0
10% bounds	—	3.0444	4.0501	Below lower bound
5% bounds	—	3.5010	4.5740	Below lower bound
1% bounds	—	4.4708	5.6687	Below lower bound

Model: ARDL(1,2,2,1), unrestricted intercept and trend; k=3. H_0: no level relationship.

The F-statistic is below even the 10% lower bound. The null hypothesis of no level relationship therefore cannot be rejected. The result means that the series do not establish a stable long-run equilibrium linking aggregate GDP to government agricultural expenditure, commercial-bank agricultural credit and the

lending rate. Reporting long-run elasticities would consequently be inappropriate. This is substantively important because the original static OLS association was dominated by persistence and common trends.

4.3 Short-run dynamics

Table 5. Conditional error-correction representation

Regressor	Coefficient	Std. error	p-value	Inference
Constant	3.5710	1.5850	0.0408	Significant at 5%
Trend	0.0945	0.0389	0.0290	Significant at 5%
$\ln GDP_{t-1}$	−0.5302	0.2215	0.0313	Adjustment term; no cointegration
$\ln GXA_{t-1}$	0.0848	0.0599	0.1788	Not significant
$\ln BCR_{t-1}$	−0.0078	0.0569	0.8930	Not significant
$\ln INT_{t-1}$	0.1071	0.1831	0.5679	Not significant
$\Delta \ln GXA_t$	0.2124	0.0710	0.0097	Positive; significant at 1%
$\Delta \ln GXA_{t-1}$	0.1222	0.0660	0.0855	Positive; significant at 10%
$\Delta \ln BCR_t$	−0.0501	0.0299	0.1154	Not significant
$\Delta \ln BCR_{t-1}$	0.0438	0.0316	0.1876	Not significant
$\Delta \ln INT_t$	0.2763	0.1261	0.0459	Positive; significant at 5%

Dependent variable: $\Delta \ln GDP$. N=25. R^2=0.7548; adjusted R^2=0.5796; F=4.3093 (p=0.0067). Coefficients are reported to four decimal places.

A 1% contemporaneous increase in government agricultural expenditure is associated with an approximately 0.2124% increase in GDP in the short run, other factors held constant. The lagged expenditure change adds about 0.1222% at the 10% level. This pattern is consistent with demand and investment effects that occur within one or two budget cycles, but it does not demonstrate a permanent multiplier because the bounds test rejects a stable level relationship.

Neither contemporaneous nor lagged changes in commercial-bank agricultural credit are statistically significant at 10%. The result suggests that the volume of credit recorded in the series did not translate reliably into aggregate output during the sample period. Possible explanations include the small share of agriculture in formal loan portfolios, timing mismatch, credit concentration, loan diversion, weak complementary infrastructure and the use of aggregate GDP, which dilutes sector-specific effects.

The positive coefficient on the contemporaneous lending-rate change contradicts the expected cost-of-capital channel. It should not be read as evidence that higher lending rates promote growth. Interest rates can rise during periods of strong nominal activity or inflation, and the diagnostic tests indicate remaining serial correlation and functional-form sensitivity. The coefficient is therefore more plausibly an endogenous macroeconomic association than a structural causal effect.

4.4 Diagnostic tests and robustness

Table 6. Model diagnostics

Test	Statistic	p-value	Conclusion
Breusch–Godfrey LM, lag 1	6.0577	0.0138	Serial correlation indicated

Test	Statistic	p-value	Conclusion
Breusch–Pagan	3.5523	0.9653	No heteroskedasticity evidence
Jarque–Bera	1.0310	0.5972	Residual normality not rejected
Ramsey RESET	8.9923	0.0103	Functional-form sensitivity
Durbin–Watson	1.3359	—	Consistent with positive persistence

Diagnostic probabilities are reported to four decimal places.

Normality and homoskedasticity are acceptable, but the serial-correlation and RESET results caution against strong causal interpretation. These weaknesses are not concealed by the model's overall significance. They likely reflect the short sample, measurement issues, omitted macroeconomic variables and structural changes in Nigeria's GDP and financial system. The article's conclusion is therefore deliberately modest: the data support a short-run expenditure association, not a verified long-run agricultural-finance growth mechanism.

5. Discussion

The short-run expenditure result broadly agrees with Oyedepo et al. (2022), who associate government spending with improved agricultural growth outcomes. It also accords with the public-capital channel: expenditure on infrastructure, extension, research and input support can stimulate activity quickly when implementation is effective. Nevertheless, the absence of cointegration differs from studies that report a durable financing–output relationship. This divergence may arise because the present outcome is aggregate GDP, the sample ends in 2024, and the historical series mix nominal scales and major regime changes.

The insignificant bank-credit effects are compatible with a transmission problem rather than proof that credit is irrelevant. Recent studies distinguish access from effective use and increasingly emphasise financial inclusion, programme targeting and complementary infrastructure (Tabash et al., 2024; Fagbemi et al., 2025). If loans are costly, short-tenored, urban-centred or released after planting, increases in aggregate credit may have little measurable production effect. The result supports evaluation of credit quality, distribution and additionality—not only total disbursement.

The finding also clarifies the relationship between agriculture and diversification. Agricultural finance may assist diversification when it expands processing, logistics, storage, exports and manufacturing linkages. Aggregate GDP growth, however, can occur without such structural change. Future research should construct an explicit diversification measure and test whether finance lowers sectoral or export concentration. This would align the empirical variable with the policy claim.

6. Conclusion and Policy Implications

The study finds no evidence of a stable long-run relationship among GDP, government agricultural expenditure, commercial-bank credit to agriculture and lending rates in Nigeria over 1990–2024. The ARDL bounds statistic is below the lower critical bound, so long-run elasticities are not reported. Government agricultural expenditure is positively related to output growth in the short run, while bank-credit changes are insignificant. The apparent positive lending-rate effect is counterintuitive and unreliable given diagnostic weaknesses.

Policy should focus on the effectiveness rather than the headline volume of agricultural finance. Budgetary allocations should be linked to completed irrigation, rural roads, research, extension, storage and market-access outputs, with transparent release and evaluation schedules. Credit policy should reduce information and collateral barriers, improve seasonal loan design, use guarantees prudently and integrate insurance and digital records. Development finance should crowd in commercially sustainable lending rather than substitute for it indefinitely.

For evidence-based diversification policy, statistical agencies should publish consistent real agricultural expenditure and credit series by subsector, borrower type, maturity and state. Researchers should extend the period, account for inflation and structural breaks, use agricultural value added or productivity for sector-specific questions, and construct concentration indices for direct diversification analysis. These improvements are necessary before strong long-run or causal claims can be made.

Declarations

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