AGRICULTURAL GOVERNMENT INVESTMENT SPENDING AND AGRICULTURAL OUTPUT: IMPLICATIONS FOR FOOD SECURITY IN NIGERIA

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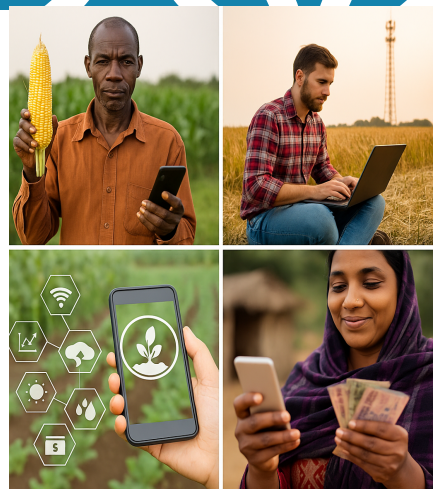

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1.0 INTRODUCTION

The agricultural sector has been very strategic in its contributions to the Nigerian economy over the past decades.

Fundamentally it gives work chances to the overflowing populace, annihilates neediness, and provides export earnings for the economy.

According to economic history, agricultural revolution provides fundamentally the pre-condition for take-off for any economy, Amire & Arigbele (2016).

INTRODUCTION

Though Nigeria is rich in oil and other mineral resources, the economy is still largely dependent on the agricultural sector.

Agriculture is the largest contributor to Gross Domestic Production (GDP) with yields representing 80%, ranger service 3% and fishery 4% of the GDP. It gives work to about 65% of the grown-up workforce.

INTRODUCTION

The agro-modern sector heavily depends on agriculture for raw materials, with majority of non-oil export earnings originating from this sector.

Agriculture plays a crucial role in the economic development of a country in several ways:

it significantly contributes to national food self-sufficiency by meeting greater percentage of total food consumption needs, supports a healthy and peaceful population, and serves as a vital source of nutrition for households Anyanwu, (1997); Apeh & Emmanuel (2019).

STATEMENT OF RESEARCH PROBLEM

Agricultural investment is seen to be very crucial for any economy hence the recurrent spending by governments and private sector each year to improve the sectors output.

However, despite the continuous investment in agriculture, the economy has gone through one of its worst economic periods as food availability is dwindling as well as inflationary pressure is up, with low foreign investment in the agricultural sector.

STATEMENT OF RESEARCH PROBLEM

Though existing literature (Olayemi, and Yusuf (2005); Agbenyour (2014); Olufemi (2019); Adama, Ohwofasi &Ogunjobi (2016) have debated if agricultural investment spending is positively or negatively related to agricultural output, the argument remains investment in agriculture serves a good function as a catalyst for food security.

Therefore, this research examined the extent and nature of the effect of agricultural investment spending on the sectors output and its implication for food security in Nigeria.

LITERATURE REVIEW

Conceptual Review:

- **Food Security:** entails consistent access to sufficient, safe, and nutritious food; including availability, access, utilization, and stability., FAO ( )
- **Investment in Agriculture:** Includes government and private sector investment outlay n the agricultural sector which is intended to improve the productivity of the sector, enhance the sectors growth and overall contribution to Nigerian economy
- **Agricultural output** comprises of the aggregate sectoral production in relation to total GDP in the country.

CAPITAL IN AGRICULTURAL PRODUCTION

Capital plays a pivotal role in modern agricultural production.

It includes physical capital (machinery, equipment, buildings), financial capital (investments, loans), and technological capital (advanced farming technologies).

Capital enhances productivity by enabling more efficient use of labour and materials, reducing manual effort, and improving crop yields

THEORETICAL REVIEW

Dual Sector Model

This paradigm states that an economy experiences two transitions: a traditional agricultural sector and a modern industrialised sector

The Dual Sector Model offers details on the evolution and understanding of structural change in the Nigerian economy. By examining several perspectives on how shifts in agricultural productivity impact this two-pronged process, we can arrive at a more nuanced comprehension of the interplay between variables derived from both sectors coexist.

BALANCED GROWTH THEORY

The theory of balanced growth promotes equitable and concurrent development in several sectors to attain long-term economic advancement.

Adopting a balanced growth strategy in Nigeria's agriculture industry entails expanding the range of agricultural endeavours, making infrastructural investments, and encouraging the advancement of education and skill sets.

EMPIRICAL AND METHODOLOGICAL REVIEW

Cynthia and Dikeogu (2023) investigated the impact of agricultural sector productivity on employment generation in Nigeria from 1981 to 2021, employing various analytical techniques including descriptive statistics and Error Correction Modelling.

Their findings revealed a long-run relationship between agricultural productivity and employment generation; however, only forestry was found to create jobs, while crop production, livestock, fishing, and bank credit to agriculture did not contribute to employment

EMPIRICAL AND METHODOLOGICAL REVIEW

Consequently, Anthony & Tijjani, (2022) employed an Autoregressive Distributed Lag (ARDL) model to analyse the effect of government finance in the agricultural sector and its panacea for food security in Nigeria.

The study finds that investing in agriculture through channels like commercial bank credit and government expenditure is crucial for enhancing food security in Nigeria. Commercial banks credit to agriculture, government expenditure and interest rate also influences food security.

EMPIRICAL AND METHODOLOGICAL REVIEW

FAO (2020) report also shows that the burden of malnutrition in all its forms continues to be a challenge.

There has been some progress for child stunting, low birthweight and exclusive breastfeeding, but at a pace that is still too slow.

EMPIRICAL AND METHODOLOGICAL REVIEW

The study recommended promoting bank financing for agriculture and enhancing loan guarantees for farmers, emphasizing that commercial bank credit, the agricultural credit guarantee scheme fund, government expenditure on agriculture, and interest rates significantly impact food security in Nigeria

3.0: THEORETICAL FRAMEWORK AND METHODOLOGY

Theoretical Framework:

This study leverages the production function to examine the impact of capital investment expenditure on agricultural output. The production function is a fundamental concept in economics that describes the relationship between input factors and the resulting output.

In the context of agriculture, the production function can be expressed as:

Cobb-Douglas Production Function Approach:
The production function provides a structured approach to analyzing the relationship between inputs—such as labour, capital, and materials—and agricultural outputs.

THEORETICAL FRAMEWORK AND METHODOLOGY

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THEORETICAL FRAMEWORK AND METHODOLOGY

In the context of agriculture, the production function can be expressed as:

$$Q = f(L, K, M) \qquad (3.1)$$

where:

Q represents the quantity of agricultural output,

L denotes labour input,

K signifies capital input,

M encompasses materials or other inputs (such as seeds, fertilizers, and water).

THEORETICAL FRAMEWORK AND METHODOLOGY

This study, adopts the Cobb-Douglas production function due to its flexibility and widespread application in agricultural economics. The Cobb-Douglas function is specified as:

$$Q = AL^{\alpha} K^{\beta} M^{\gamma} \qquad (3.2)$$

Where:

A is the total factor productivity (TFP),

α, β, and γ are the output elasticities of labour, capital, and materials, respectively.

THEORETICAL FRAMEWORK AND METHODOLOGY

The present study however focuses more on financial capital represented by commercial banks credit to the agricultural sector, agricultural credit guarantee scheme, government investment on infrastructure and human capital proxied by the agricultural labour force.

The study model can be viewed through the lens of a production function, specifically a Cobb-Douglas or a Translog production function

. This approach assumes that agricultural output is a function of various inputs comprising of credit, government expenditure, interest rate, Agricultural labor and capital) that contribute to the production process.

EMPIRICAL MODEL

$$AQ_t = A.(CBCA_t,^{\beta 1}\ ACGS_t^{\beta 2},\ GEA_t^{\beta 3},\ GIFE_t^{\beta 4},\ PLR_t^{\beta 5},\ AGLF_t^{\beta 6},\ GFCF_t\ ^{\beta 7} \quad (3.3)$$

Where:

A is constant, the subscript t represent year,

βi is the elasticity of agricultural output with respect to each input indicating how a percentage change in each input affects the agricultural output. And

EMPIRICAL MODEL

AQ_t is agricultural output as a percentage of gross domestic output.

$CBCA_t$ is commercial banks credit to agriculture overtime,

$ACGS_t$ is agricultural credit guarantee scheme fund,

GEA_t is government expenditure on agriculture overtime,

GIFEt is government expenditure on infrastructure overtime and

$AGLF_t$ is Agricultural Labour measuring Agricultural employment.

$GFCF_t$ is gross fixed capital formation.

EMPIRICAL MODEL (ARDL)

The econometric form of equation 1 is presented as:

$$\ln AQ_t = \beta_0 + \beta_1 \ln CBCA_t + \beta_2 \ln ACGS_t + \beta_3 \ln GEA_t + \beta_4 GIFE_t + \beta_5 PLRt + \beta_6 AGLF + \beta_7 GFCF + V_t \quad (3.4)$$

Equation (3.4) is expressed in its ARDL equation as:

$$AQ_t = \sum_{i=1}^{p} \alpha i AQt - i + \sum_{i=0}^{n} \gamma Xt - i + \boldsymbol{\varepsilon_t} \quad (3.5)$$

Whre:

X_t is the explanatory variables expressed in equation (3.4)

A priori expectations

DATA USED AND THEIR SOURCE.

The study engaged time series data sourced from the Statistical Bulletin of the Central Bank of Nigeria (CBN), World Development Indicators (WDI) of the World Bank, and the International Labour Organization (ILO).

DATA ESTIMATION

Unit Root Testing

Augmented Dickey Fuller (ADF) Testing

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Testing

ARDL Bound Cointegration Approach

DATA ESTIMATION

If cointegration is confirmed, the long-run relationship can be estimated using the following long-run form:

$$Y_t = \alpha + \beta X_t + u_t \qquad (3.6)$$

Where:

u_t is the long-run error correction term.

DATA ESTIMATION

The short-run dynamics can be captured using an error correction model (ECM).

$$\Delta Y_1 = \theta_0 + \theta_1 \Delta X_t + \lambda (Y_t\text{-}_1\text{-}\alpha\text{-} \beta X_{t-1}) + £_t \qquad (3.7)$$

The short-run dynamics of the model can also be expressed in an error correction framework, which incorporates the information from the long-run relationship:

DATA ANALYSIS

TABLE1. DESCRIPTIVE STATISTICS

	AQ	CBCA1	AGLF	GFCF	ACGS	GEA	GIFE	PLR
Mean	0.246	0.070	44.550	0.227	4.370	0.016	0.521	17.983
Median	0.243	0.048	43.876	0.191	4.145	0.011	0.568	17.770
Maximum	0.374	0.196	52.357	0.354	12.460	0.132	0.771	29.800
Minimum	0.202	0.014	37.985	0.138	0.080	0.005	0.112	11.480
Std. Dev.	0.038	0.055	5.541	0.085	3.993	0.022	0.171	3.522
Skewness	1.571	1.162	0.159	0.395	0.367	5.047	-0.787	0.982
Kurtosis	6.022	2.971	1.407	1.438	1.737	27.538	2.674	5.713

DESCRIPTIVE STATISTICS

Descriptive statistics for various economic variables, encompassing Agricultural Output, Commercial bank credit to the agricultural sector, Agricultural Sector employment, Gross fixed Capital formation, Agricultural credit guarantee Scheme fund, Government Infrastructural expenditure, and Prime lending rate are presented.

The mean of AQ (0.246) and median (0.243) suggest a reasonably consistent level of agricultural output across observations, indicating potential stability in productivity.

For CBCA1, both the mean (0.070) and median (0.048) are low, suggesting limited access or utilization of credit in the agricultural sector, which may impede growth potential.

DESCRIPTIVE STATISTICS

The mean AGLF (44.55) and median (43.876) highlight a substantial labor force in agriculture, which is typically vital for production.

GFCF averages (mean: 0.227; median: 0.191) indicate moderate investment in fixed capital,

while ACGS (mean:4.370; median:4.145) highlights substantial governmental commitment towards agricultural credit guarantees, although effectiveness is questionable given the results discussed previously

TABLE2: ADF UNIT ROOT AND KPSS STATIONARITY TESTS

Variable	ADF @ Level	ADF @ First Difference	Order of Integration	KPSS @ Level	KPSS @ First Difference	Order of Integration
AQ	-2.560	-7.026***	I(1)	0.293	0.500**	I(1)
CBCA	-1.298	-7.962***	I(1)	0.506**	0.282	I(0)
AGLF	-1.018	-1.922	NS	0.611**	1.406	I(0)
GFCF	-1.224	-2.739*	I(1)	0.583**	0.114	I(0)
ACGS	-1.305	-6.915***	I(1)	0.538**	0.065	I(0)
GEA	-0.391	-7.123***	I(1)	0.068	0.316***	I(1)
GIFE	-2.229	-5.014***	I(1)	0.195	0.464**	I(0)
PLR	-2.189	-6.059***	I(1)	0.669	0.426*	I(1)

ADF UNIT ROOT TESTING

Note; The ADF unit root test is used to test the stationarity of the time series variables both @level and first difference.

NS denotes non-stationary series.

*** *one percent significant level,*

** *five percent significant level,*

* *one percent significant level.*

KPSS STATIONARITY TESTS

The non-parametric KPSS test was used for the mixed I(0) and I(1) variables with the assumption of a deterministic trend in the series (Lujia .& Weichi, 2021).

T-values were obtained using Newey-West long-run variance calculated with Autocovariance lag and Bartlett-type kernel weight function to account for heteroskedasticity and autocorrelation in the residuals.

Standard error was adjusted for autocorrelation in deriving the T-statistics

TABLE3. ARDL BOUND TEST

Test Statistics	Value	K
F-statistics	4.986834	**7**
Critical bound value		
Significance	**I(0)**	**I(1)**
10%	1.92	2.89
5%	2.17	3.21
2.5%	2.43	3.51
1%	2.73	3.9

ARDL BOUND TEST

; *Cointegration analysis is necessary to establish the existence of a long-run relationship among the variables of the model given the stationarity of the variables at level or first difference has been verified.*

This study applied the ARDL bound test approach whereby the F-statistics is compared with its critical value at a 5 percent significance level

TABLE4. LEVELS EQUATION

Variables	Coefficients	Standard Error	T-Statistics
CBCA1	-0.130	0.282	-0.461
AGLF	0.003	0.005	0.459
GFCF	-0.502	0.320	-1.566
ACGS	-0.015***	0.004	-4.201
GEA	-1.356***	0.451	-3.006
GIFE	0.091	0.090	1.007
PLR	0.001	0.003	0.090
AQ	0.293*	0.166	1.762
Adj R^2	0.7854		
F-statistic	7.635		
P-value	0.000		

TABLE5. SHORT-RUN ESTIMATES

Variables	Coefficients	Standard Error	T-Statistics
D(ACGS)	-0.005***	0.001	-3.705
D(ACGS(-1))	0.006***	0.002	3.965
D(GEA)	-0.445***	0.105	-4.218
D(GEA(-1))	0.344**	0.133	2.593
D(GIFE)	0.100***	0.027	3.734
D(GIFE(-1))	0.091***	0.027	3.386
D(PLR)	0.004***	0.001	4.454
D(PLR(-1))	0.004***	0.001	4.174
CointEq(-1)*	-0.808***	0.095	-8.515

SHORT-RUN ESTIMATES

; *The short-run association between the independent and dependent variable with the first difference of agricultural output is highlighted to show the impact of the lagged variables.*

*** *one percent significant level,*

** *five percent significant level.*

The error correct term is negatively signed, significant and within the expected magnitude of zero (0) and (1) suggesting a converging system.

TABLE6. DIAGNOSTIC TEST RESULTS

Heteroskedasticity Test		Breusch-Pagan-Godfre P-value	
F-statistic	2.247451	Probability F-Statistics (16,13)	0.0735
Obs*R-squared	22.03419	Prob. Chi-Square (16)	0.1421
Scaled explained SS	2.690374	Prob. Chi-Square (16)	0.9999

TABLE7. DIAGNOSTIC TEST RESULTS

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.099133	Prob. F (1,12)	0.7583
Obs*R-squared	0.245803	Prob. Chi-Square (1)	0.6200
Jarque-Bera Test			
Jarque-Bera	0.7229442	Probability	0.696651
Ramsey Reset Test			
	Value	**Df**	
F-statistics	0.726553	(1, 18)	0.4052

5.0 : SUMMARY, RECOMMENDATIONS AND CONCLUSION

- The analysis of study long run result shows that all variables of the study model apart from agricultural credit guarantee scheme and government expenditure had insignificant effect on agricultural output.

- It thus shows that private and public agricultural investment appears as the most dominant determinant of food availability in Nigeria

In-depth analysis of the result shows a significant inverse relationship between private and public investment in agricultural and agricultural production.

Specifically, holding other variables at constant a percentage increase in agricultural private and public investment results to 0.015 and 1.36 retarded effect on food security.

5.0 SUMMARY, RECOMMENDATIONS AND CONCLUSION

The long run estimates of agricultural investment show a significant retarded effect on food production.

The long run result was supported by the short-run slope coefficient of public and private agricultural investment

This is explained by the in adequate investment in the agricultural sector that retards food production.

5.0 SUMMARY, RECOMMENDATIONS AND CONCLUSION

Evidence from this present study stresses the fact that agricultural credit and interest rate constitute a significant driver of agricultural productivity, highlighting the need for improved access to financial services for farmers

The positive impact of agricultural credit on output suggests that improving access to credit facilities can significantly boost agricultural productivity. This implies that policymakers should develop and implement programs that provide affordable credit to small-scale farmers

5.0 : SUMMARY, RECOMMENDATIONS AND CONCLUSION

Key Recommendations:

The positive impact of agricultural credit on output suggests that improving access to credit facilities can significantly boost agricultural productivity

This implies that policymakers should develop and implement programs that provide affordable credit to small-scale farmers.

This could include microfinance initiatives and partnerships with financial institutions to offer low-interest loans

5.0 SUMMARY, RECOMMENDATIONS AND CONCLUSION

The significant role of government expenditure in enhancing agricultural output highlights the need for sustained public investment in the sector.

The government should prioritize and increase its investment spending on agriculture, focusing on infrastructure development, research, and extension services.

This includes building rural roads, irrigation systems, and storage facilities.

CONCLUSION

Adequate agricultural investment will ultimately help to address the current challenges related to infrastructure deficiencies that limits market access, increases post-harvest losses, and rise in transportation cost for farmers.

Poor access to credit restricts farmers ability to invest in modern farming techniques and inputs, thereby constraining productivity and food supply.

CONCLUSION

It also limits adoption of technology that retards improvement in output and resilient to external shocks.

The study findings highlight the critical role of agricultural private and public investment through the mechanism of agricultural credit, government expenditure, government infrastructural expenditure and monetary policy rate in enhancing agricultural output and food supply in Nigeria.

CONCLUSION

By addressing the financial and infrastructural needs of the agricultural sector, policymakers can significantly boost productivity and ensure sustainable agricultural growth and availability of food in the country.

The findings underscore the importance of targeted investments and supportive policies to unlock the full potential of Nigeria's agricultural sector for sustainable food security.

LIMITATION & FUTURE STUDY

- Future research should explore the impact of government policies and emerging tech like AI and blockchain on food systems and growth.

- The case of panel data approach and more enlongated time series observation are further suggested

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