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Public Expenditure and the Performance of the Agricultural Sector of the Nigerian Economy

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ABSTRACT: The study focused on the investigation of the effect of public expenditure on the performance of the Nigerian agricultural sector. It covers a period from 1990 to 2023. The methodology applied is Autoregressive distributed lag and the data were sourced from both the Central Bank of Nigeria Statistical Bulletin, 2023 edition and the World Bank Tables 2023 edition. The findings from the study revealed that there are positive and significant impacts of government expenditure, tax, and trade openness on agricultural production in the short run confirms the importance of well-targeted government investments and supportive policies in promoting agricultural development. However, the negative and significant effect of inflation on agricultural production underscores the need for effective inflation management strategies to maintain stability and protect the purchasing power of farmers and consumers. Policymakers should take into account these findings when formulating agricultural and macroeconomic policies to ensure sustained growth in the agricultural sector and overall economic development.

KEYWORDS: Public Expenditure, Agricultural Sector Performance, Nigerian Economy

INTRODUCTION

Year on year there have been incessant increase in public expenditure culminating in the usual deficit budget in Nigeria. The motive behind the usual rise in public expenditure has been for the main purpose of improving the performance of the real sector of the economy in order to boost productivity (Kayode, 2019). One of the most important real sector in Nigeria is the agricultural sector which employe over 70% of the Nigeria population and accounts for about 25% of the GDP (CNB, 2023). Apart form the rise in public expenditure several polices have been made and several agencies established over the year to improve the performance of the sector. These polices and agencies are Operation Feed The nation. Anchor Borrower Scheme, bank of Industry, Bank of Agriculture among others.

Despite the various government policies and programs aimed at improving agricultural productivity in Nigeria, the sector remains largely underdeveloped. The agricultural sector's contribution to the country's GDP has been declining over the past few years, with the sector growing by only 2.28% in 2019 compared to the 2.79% growth in 2018 (National Bureau of Statistics, 2020). Additionally, Nigeria's food import bill continues to rise, reaching N1.3 trillion in 2018 (NAN, 2019). These statistics indicate that Nigeria's agricultural sector is not meeting its full potential, and there is a need to investigate the factors limiting its growth.

One of the potential factors that could be affecting agricultural productivity in Nigeria is the level of public expenditure . While the Nigerian government has implemented various policies and programs aimed at improving agricultural productivity, there has been limited research on the effectiveness of these initiatives in achieving their intended goals. Furthermore, there is limited research on the impact of government expenditure on agricultural productivity in Nigeria. Therefore, this study seeks to investigate the impact of government expenditure on agricultural production in Nigeria.

The main objective of this study is therefore to explore the impact of public expenditure on the performance of the agricultural sector of Nigeria. The rest of the paper is divided into the literature review, methodology, results and discussion, conclusions and recommendations.

LITERTURE REVIEW

Several empirical studies have examined the relationship between government expenditure and agricultural production in Nigeria. For example, Ogundari et al. (2020) found a positive and significant relationship between government expenditure on agriculture and agricultural productivity in Nigeria. The study used data from 1981 to 2016 and employed the Autoregressive Distributed Lag (ARDL) approach to estimate the long-run and short-run effects of government expenditure on agricultural productivity. The results indicated that government expenditure on agriculture positively influenced agricultural productivity in the long run and the short run.

Similarly, other studies have found a positive relationship between government expenditure on agriculture and agricultural productivity in Nigeria. Adebayo et al. (2021) analyzed the impact of government expenditure on agricultural productivity using data from 1981 to 2019 and found that government expenditure on agriculture had a significant positive effect on agricultural productivity. The study employed the Vector Error Correction Model (VECM) approach to estimate the short-run and long-run effects of government expenditure on agricultural productivity.

In contrast, some studies have found no significant relationship between government expenditure on agriculture and agricultural productivity in Nigeria. For example, Olurinde and Adeleke (2018) analyzed the impact of government expenditure on agriculture using data from 1970 to 2013 and found no significant relationship between government expenditure and agricultural productivity. The study employed the Ordinary Least Squares (OLS) regression approach to estimate the effect of government expenditure on agricultural productivity.

Another study by Olagunju et al. (2020) examined the impact of government expenditure on agricultural productivity in Nigeria using data from 1981 to 2017. The study employed the autoregressive distributed lag (ARDL) technique and found a positive and significant long-run relationship between government agricultural expenditure and agricultural productivity in Nigeria. The authors recommended that the Nigerian government should prioritize increasing agricultural expenditure to promote sustainable agricultural development and enhance food security.

Similarly, Adebayo and Adeoye (2018) examined the impact of government agricultural expenditure on agricultural productivity in Nigeria using data from 1981 to 2016. The study employed the vector error correction model (VECM) and found a positive and significant long-run relationship between government agricultural expenditure and agricultural productivity in Nigeria. The authors recommended that the Nigerian government should increase agricultural expenditure and prioritize investments in infrastructure and research and development to enhance agricultural productivity.

In summary, empirical studies have shown a positive relationship between government agricultural expenditure and agricultural productivity in Nigeria. These studies suggest that increased government expenditure on agriculture can promote sustainable agricultural development, enhance food security, and improve the livelihoods of small-scale farmers in Nigeria. Conclusively, while some studies have found a positive relationship between government expenditure on agriculture and agricultural productivity in Nigeria, others have found no significant relationship. Nevertheless, these studies highlight the importance of government investment in agriculture for promoting agricultural productivity and improving the livelihoods of small-scale farmers. In the next section, we will explore the policy implications of these findings and the role of government in promoting agricultural production in Nigeria.

METHODOLOGY

Economic theories suggest that government expenditure can impact agricultural production. The Autoregressive Distributed Lag (ARDL) model allows for the estimation of short-term and long-term effects of government spending, inflation, foreign direct investment, trade policies, tax, and interest rates on agricultural production in Nigeria.

In our model, agricultural production is the dependent variable, while capital expenditure, recurrent expenditure, foreign direct investment, inflation, trade policies, tax, and interest rates are the independent variables. By accounting for lagged effects and allowing for dynamic adjustments, the ARDL model provides a framework for understanding the transmission mechanism of government spending to the agricultural sector. The equation is given by;

Agricultural sector Performance = $\beta_0 + \beta_1$ (Capital Expenditure) + β_2 (Recurrent Expenditure) + β_3 (Inflation) + β_4 (Trade Policies) + β_5 (Tax) + ε……………………………….(1)

Variable Description

Variable	Description	Source
Government Expenditure	Government expenditure as a proxy for fiscal policy	Public finance bulletin (CBN)
Inflation (INF)	Inflation as a proxy for unfavorable period of the business cycle	National bureau of statistics
Trade Policies (TP)	Trade policies as a proxy for all policy and programs implemented by the Government	CBN statistical bulletin

Tax (TAX)	Tax represents a part of the Government revenue that can be spent on Government expenditure	Public finance bulletin (CBN)

METHOD OF DATA ANALYSIS

Descriptive Analysis

Descriptive statistics is estimated on the data in order to determine the nature in terms of identifying the mean, maximum, minimum, standard deviation, skewness and kurtosis of the data. This gives an overview of the nature of central tendency and dispersion of indicators used in the model.

Correlation Analysis

This is the done to determine the existence and magnitude of multi-colinearity amongst the indicators used in this work. Also, with correlation analysis the direction of relationship between the dependent variable and independent variables are estimated.

Unit root test

The unit test is carried out before the co-integration method of analysis can be carried out; this is because it is necessary to test the presence of a unit root test in a variable. A test that is very popular and valid for large sample is Augmented Dickey Fuller and this test that can be used to determine the order of integration in a variable. Variable with I(0) order of integration is termed as being stationary at levels while at I(1) is known as being stationary at first difference. In a situation of mixed order of integration it validates the use of auto-regressive distributed lag model (ARDL).

Estimation Techniques

ARDL Bounds Test

This the second stage of the estimation procedure. Bound test helps to check and explain the long run relationship between the dependent and the independent variables used in this study. The rule of thumb for bounds test indicates that when the F-statistics is greater than the upper bound level at 5 per cent significant level this is a clearly indication of a long run relationship in the model if otherwise this puts to no co-integration in the model. However, when the F-statistics falls between the two bounds that are lower and upper bound, there is no conclusive decision whether the variables of the studies are co-integrated or not

Autoregressive Distributed Lag Model (ARDL)

Co-integration is the second stage of the estimation procedure. It is estimated to explain the long run relationship between variables in the study. Furthermore, ARDL also estimates the short run as well as error correction model. The general rule of thumb is to regard variables with less than or equal to 5 per cent significance as significant variables while variables above 5 per cent are ignored. Furthermore, ARDL also estimates the error correction model. The error correction model is a time series regression model that is based on the behavioural assumption that two more time series exhibit an equilibrium relationship that determines short and long run relationship. This is only carried out when Co-integration is proven to exist; it requires the construction of error correction mechanism to model dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The greater the co-efficient of the parameter, the higher the speed of adjustment of the model, from the short-run to the long-run.

Post estimation test

Autocorrelation LM test

This test is also known as the autocorrelation test which is estimated to determine the stability of the model in terms of the presence of serial correlation in the model. Furthermore, when the F-statistics is greater than 5 per cent significant level the null hypothesis of no serial correlation in the model is accepted. If otherwise the null hypothesis of no serial correlation is rejected.

Heteroskedasticity test

This test measures the heteroskedasticity of the model. It begins by allowing the heteroskedasticity process to be a function of one or more of the independent variables in the model which assumes an error that is normally distributed. The rule of thumb indicates that when the probability value of the F-statistics is greater than 5 per cent level of significant the null hypothesis of the existence of homoscedasticity in the model is accepted. If otherwise the null hypothesis is rejected.

Cusum and Cusum of Squares test

The Cusum and Cusum of square test is based on sequential monitoring of a cumulative performance over time. The rule of thumb implies that when the trend lies between 5 per cent significant level the null hypothesis is accepted (i.e., the coefficients are stable).

If the trend lies above 5 percent level of significance accept the null hypothesis that the coefficients are stable. Hence, there is structural break(s) in the trend

Source of Data

Secondary data used in this work were sourced from world development indicator (WDI) and Central bank of Nigeria Statistical bulletin (2020). This data originates from the World Bank. Furthermore, data used in this study have a time lag of between 1990 and 2020.

RESULTS AND DISCUSSIONS

Descriptive Statistics

The descriptive statistics are used to describe data in a meaningful way. In this study descriptive statistics such as mean, standard deviation minimum, maximum, skewness and Kurtosis statistics of each variable.

Table 2: Descriptive Statistics

	AP	GE	INF	TAX	TP
Mean	24.69286	2261.633	16.27964	245.5423	337.5197
Median	24.57000	2446.525	12.38500	171.2191	347.1642
Maximum	36.97000	5206.400	72.84000	969.4089	555.7345
Minimum	19.99000	55.92000	5.390000	5.026000	180.4717
Std. Dev.	3.851179	1745.349	14.70796	245.3749	93.25520
Skewness	1.465614	0.049457	2.898317	1.114788	0.196963
Kurtosis	5.547140	1.497244	10.73073	3.859122	2.462605
Jarque-Bera	17.59336	2.646071	108.9260	6.660620	0.517966
Probability	0.000151	0.266326	0.000000	0.035782	0.771836
Sum	691.4000	63325.71	455.8300	6875.185	9450.551
Sum Sq. Dev.	400.4526	82248521	5840.748	1625638.	234806.4
Observations	28	28	28	28	28

Source: Author's Computation (2023).

Table 2 shows the summary of all the variables under consideration in this study. The mean value of AP is given to be 24.69286. This shows the average value for the years under study. In the same vein, the mean values of GE, INF, TAX and TP are 2261.633, 16.27964, 245.5423 and 337.5197 respectively. The standard deviation values shown on Table 2 indicate the dispersion or spread in the data series. The higher the value, the higher the deviation of the series from its mean, and the lower the value, the lower the deviation of the series from the mean. The variable with a higher degree of dispersion from the mean is GE. The maximum values of AP, ER, GE, INF and RGDP stand at 36.97000, 5206.400, 72.84000, 969.4089 and 555.7345 respectively. In the same vein, 19.99000, 55.92000, 5.390000, 5.026000 and 180.4717 are the minimum values AP, GE, INF, TAX and TP respectively. The skewness statistic shows that GE mirror normal distribution, while AP, INF, TAX and TP are positively skewed (i.e have more higher value). The Kurtosis statistic shows that AP, INF and TAX have peaked tiled distribution (i.e leptokurtic), while GE and TP have thin-tailed distribution and are platykurtic since their values are lower than 3. This means that there is a low level of variability in the data and it produce reliable probability forecasts. The Jarque-Bera test is tested at 5%, in which AP, TAX and INFL null-hypothesis, was accepted, that is, the variable is normally distributed. The number of observations is 32.

Correlation Analysis

This is done to determine the existence and magnitude of multicollinearity amongst the indicators used in this work. Also, the direction of the relationship between the dependent variable and independent variables is estimated with correlation analysis.

Table 3 Correlation Analysis

	AP	GE	INF	TAX	TP
AP	1.000000	-0.580053	0.093422	-0.512311	0.299559
GE	-0.580053	1.000000	-0.355913	0.924552	-0.585590
INF	0.093422	-0.355913	1.000000	-0.245280	0.231374
TAX	-0.512311	0.924552	-0.245280	1.000000	-0.630846
TP	0.299559	-0.585590	0.231374	-0.630846	1.000000

Source: Author's Computation (2023).

Table 3 depict the Correlation coefficient of the variable under consideration in this study. The correlation coefficient of the dependent variable Agricultural Production (AP) has a positive relationship with Inflation and Trade Openness as shown by the coefficient value of 0.093422 and trade openness respectively. While government expenditure and Tax have a negative relationship with Agricultural Productivity (AP) with the value of -0.580053 and -0.512311 respectively.

Unit Root Test

The unit root test is performed to determine the stationarity of the variables. The stationarity of the variables provides information on their order of integration. To carry out the co-integration test, the order of integration of variables is necessary. The test is conducted using the Augmented Dickey-Fuller unit root test. The result is presented in Table 4

Table 4: Stationarity Test

Variables	**Level**		**First difference**		**I(d)**
	T-Statistics	**Prob.**	**T-Statistics**	**Prob.**	
AP	-1.402013	0.5650	-6.086990	0.0000***	**I(1)**
INF	-3.408430	0.0196**	-5.052078	0.0005***	**I(0)**
TAX	-2.746272	0.0796	-7.293523	0.0000***	**I(1)**
GE	0.298974	0.9738	-4.147302	0.0036***	**I(1)**
TP	-2.965222	0.0512	-10.35006	0.0000***	**I(1)**

Source: Author's computation (2023)

Note * (**) (***) denotes null hypothesis at 10%, 5% and 1% respectively

Table 4, 3 shows that both AP, TAX, GE and TP are stationary at first difference while the INF is stationary at level. This implies that the simple linear regression estimate, the Johanssen co-integration test is not the appropriate estimation technique as the series are in different order of integration, thus, ARDL bounds co-integration test is performed.

ARDL Bound Test

Since the series under review are in different order of integration as stated in Table 5 bounds co-integration test as proposed by Pesaran, Shin and Smith (2001) is conducted in this section. In order to perform this test, Auto-Regressive distributed Lag (ARDL) model is estimated for the model and a bounds co-integration test is performed thereafter.

Table 5. ARDL Bound Test

F-statistics	6.150695	
K (dof)	4	
Significance	I(0)	I(1)
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Authors' computation (2023)

Table 5 shows the bounds test and it reveals that f-statistics value of 6.150695 is greater than critical value bounds for the upper bound I(1) at 5% level of significance, thus, there is co-integration as such a long-run relationship exist among the variables.

Table 6. Short-run Estimation Result

Variable	Coefficient	Std. Error	t-Statistics	p-value
D(LOGAP(-1))	0.737052	0.608322	8.443401	0.0035
D(LOGGE(-1))	0.406037	0.101523	-4.782485	0.0174
D(LOGINF(-1))	-0.606814	0.086767	-6.993622	0.0060
D(LOGTAX(-1))	0.669307	0.097593	6.858129	0.0063
D(LOGTP(-1))	0.167611	0.071673	-5.993803	0.0093
CointEq(-1)	-2.929338	0.345807	-8.471016	0.0035

Source: Author's Computation (2023).

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Table 7 shows that in the short-run, LOGAP(-1), LOGGE(-1), LOGTax(-1) and LOGTP(-1) exert a positive impact and significant effect on the Agricultural Production which can be deduce from the co-efficient of 0.737052, 0.4006037, 0.669307 and 0.167611 the probability value of 0.0035, 0.0174, 0.0063 and 0.0093 respectively. Inflation (INF) exert a negative and significant effect on AP with co-efficient of 0.606814 and probability value of 0.0060. Co-intEq(-1), which measures the speed of adjustment to restore long-run equilibrium in the dynamic model has the expected negative sign and statistically significant. The high coefficient of the error correction term shows that disequilibrium adjusts back to the long-run equilibrium at a speed of adjustment rate of 292.9338%

Long-run Estimation Result

Table 8: Long run Estimation Result

Variable	Coefficient	Std. Error	t-Statistics	p-value
LOGGE	0.139615	0.024037	5.808380	0.0102
LOGINF	0.395988	0.046516	8.512888	0.0034
LOGTAX	-0.164872	0.030829	-5.347939	0.0128
LOGTP	0.025079	0.052614	0.476662	0.6662

Source: Authors' computation (2023)

From table 8 we can exert that LOGGE and LOGINF have a positive effect on AP in the long run and this is significant, as shown by the coefficient value of 0.139615 and 0.0034 and the probability value of 0.0102 and 0.0034. In addition, LOGTAX exert a negative impact on AP and significant, going by the coefficient value -0.164872 and p-value of 0.0128. Also LOGTP have a positive relationship (i.e it is direct related) in the long run with AP but it is not statistically significant. This can be seen by the coefficient value of 0.025079 and p-value of 0.6662 respectively.

Post Estimate Test

Table 9: Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	10.82692	Prob. F(2,23)	0.2101
Obs*R-squared	22.94058	Prob. Chi-Square(2)	0.0000

Table 9, showed that we accept null hypothesis of no serial autocorrelation in model since the F-statistic value of 10.82692 is greater than 5% significant level of 0.0000.

Table 10. Heteroscedasticity Test

F-statistic	0.423178	Prob. F(20,3)	0.8983
Obs*R-squared	17.71923	Prob. Chi-Square(20)	0.6059
Scaled explained SS	0.237633	Prob. Chi-Square(20)	1.0000

Source: Authors computation (2023)

The table 10 showed the heteroskedasticity result of the study. The null hypothesis is that there is homoscedasticity in the variance of error term while the alternative hypothesis states that there is no homoscedasticity in the variance of error term. From the F-statistics (0.245661) and its respective probability value (0.6245), we therefore cannot reject the null hypothesis of heteroscedasticity and thus the result is consistence and reliable.

This research investigates the relationship between Government Expenditure and Agricultural Production in Nigeria. The study presents a descriptive analysis of variables, unit root test, ARDL Bound test, long run and short run estimates and important post-estimation tests. The descriptive statistics found the variables used in the study to be well behaved.

The descriptive statistics of the data was also performed to understand how the data behave, if the data are normally distributed or subjected to fluctuation. The value of the mean showed that GE has the highest mean among all the variables. In order to guide the choice of estimation technique to use and also prevent spurious regression, the unit root test was also performed using Augmented Dickey-fuller unit root test. The result showed that the variables were integrated of the different order. while some were stationary after the first difference [i.e I(1)], which implies that any disturbance or shock to the variables cannot be sustained for a long period of time. the combined order of integrations [i.e I(0) and I(1)] in the results justified the use of Autoregressive Distributed Lag Model (ARDL) to test for co-integration.

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The discussion of findings would be based on the result of the short run estimates due to the absence of cointegration among the variables under study. At the short run, the on period lag of log of government expenditure, agricultural production, tax and trade openness have a positive and significant effect on Agricultural Production with the coefficient of 0.737052, 0.406037, 0.669307 and 0.167611 the probability value of 0.0035, 0.0174, 0.0063 and 0..0093 using the benchmark of 0.05. This is an indication that 1% increase in one period lag of Ap, GE, TAX and TP will result to 0.737052, 0.406037, 0.669307 and 0.167611 increase in AP, which is only in agreement with a-priori expectation. Also, it was revealed that INF has a negative and a significant (0.04678; 0.0163) effect on agricultural production in the short run. It is in agreement with a-priori expectation.

Finally, in order to ensure that the equations estimated is free from problems such as autocorrelation, heteroscedasticity and that the model can be used for forecasting different post estimates testes were carried out. All the post estimation tests were found to be insignificant given the null hypothesis. The model is devoid of serial autocorrelation and heteroscedasticity. This implies that the residue term follows a normal distribution, there is no serial autocorrelation, and the variance of the error term is homoscedastic. This shows that the result of this model is reliable and free from variation.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study provide valuable insights into the relationship between government expenditure and agricultural production in Nigeria. The positive and significant impact of government expenditure, tax, and trade openness on agricultural production in the short run confirms the importance of well-targeted government investments and supportive policies in promoting agricultural development.

However, the negative and significant effect of inflation on agricultural production underscores the need for effective inflation management strategies to maintain stability and protect the purchasing power of farmers and consumers. Policymakers should take into account these findings when formulating agricultural and macroeconomic policies to ensure sustained growth in the agricultural sector and overall economic development.

RECOMMENDATIONS

Based on the results and analysis presented in this study, the following recommendations are proposed:

i. Targeted Government Expenditure: Policymakers should prioritize increased government expenditure in the agricultural sector, focusing on investments in infrastructure, research and development, and capacity-building programs to enhance productivity and overall agricultural output.

ii. Inflation Management: Effective inflation management policies should be implemented to control inflation rates and minimize adverse effects on agricultural production. Stable prices will create an enabling environment for agricultural growth and investment.

iii. Trade Policies: Policymakers should design trade policies that promote agricultural exports and provide farmers with better access to international markets. Export-oriented policies can boost agricultural production and improve farmers' income.

iv. Investment in Human Capital: Enhancing investments in human capital, such as education and training, will foster technological advancements and innovation in the agricultural sector, leading to increased productivity and sustainable growth.

v. Monitoring and Evaluation: Continual monitoring and evaluation of policies and programs in the agricultural sector are essential to ensure their effectiveness and identify areas that require further intervention or adjustment.

In conclusion, this research contributes valuable insights into the dynamics of government expenditure and its impact on agricultural production in Nigeria. By implementing the recommended policies and strategies, the Nigerian government can foster a vibrant and sustainable agricultural sector, supporting food security, poverty reduction, and overall economic growth in the country.

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