<u>*Original Research Article*</u>

EFFECT OF INCREASING PUBLIC DEBT ON AGRICULTURAL OUTPUT IN NIGERIA (1981-2022)

ABSTRACT

The study was conducted to examine the effect of public debt on agricultural output in Nigeria using time series data from 1981 to 2022. The study adopted the Augmented Dickey Fuller (ADF) unit root test, the bBound test for long run equilibrium relationship and the Autoregressive Distributed Lag Model (ARDL). The unit root test result showed that the dependent variable agricultural output and exchange rate are stationary at first difference while variables such as government agricultural expenditure and debt service ratio were stationary at levels. The bound test showed the presence of long run equilibrium relationship. The ARDL estimated result estimated indicated that public debt has no significant impact on agricultural output in Nigeria. Public debt has a negative relationship with agricultural output in Nigeria for the period under study and there is a one directional causality relationship between public debt and agricultural output in Nigeria. Therefore, the study recommended that the country should channel more funds and improve the institutional quality and policies that will boost the agricultural sector that will be beneficial to the country.

1. INTRODUCTION

Sustainable economic growth propelled by the real sector is important for a developing country like Nigeria. However, to achieve this, these poor income countries have resorted to borrowing to meet up with investment in the real sector such as the agricultural sector. Due to inadequacy of resources, countries are often faced with budget deficit. Hence, the governments borrow to fill the vacuum created by the fiscal gaps in the proposed expenditure and the expected revenue within a fiscal period, (Ogumuyiwa, 2011).

The borrowing made the government form the debt owed by the government of the country. Such borrowings either external or internal are meant to supplement domestic savings and allow such countries to carry out productive activities, (Ezeabisili, 2006). Also, when a country is unable to generate enough domestic savings to carry out their productive activities, they opt for borrowing, (Essien, Agboegbulem, Mba &Onumonu 2016). Such borrowings are termed as public debt which is a major source of public revenue. According to Soludo (2003), countries incurs debts for two broad macro-economic reasons; either to circumvent hard budget constraints or finance higher investments such as the agricultural sector. This implies that an economy indulges in borrowing to stimulate economic activities like in the agricultural sector and enhance standard of living of people.

However, stimulating agricultural output still occupies a priority position in the ranking of sectors according to government attention and support. It is considered as a growth driver, wealth creator and poverty reduction sector for a large majority of the Nigeria populace. As an economic activity agriculture contributed about 40% of GDP and provided 60% of employment in recent years (World Bank, 2021). Output from agriculture in Nigeria decreased to ₦3,597,916.08 million in the first quarter of 2019 from ₦4,978,775.48 million in the fourth quarter of 2018. It averaged ₦3,832,973.14 million from 2010 until 2021, reaching an all time high of ₦5,288,339.21 million in the third quarter of 2018 and a record low of ₦2,594,759.86 million in the first quarter of 2010 (NBS, 2021).Thus, the fluctuations in the contribution of agricultural sector to GDP have followed a pattern since the country shifted attention to oil as a major contributor to GDP.

With the fluctuations in the real sector particularly the agricultural sector output and the rising food insecurity, it is pertinent that a lot of borrowings and public debt is incurred. The past couple of decades have witnessed rising concern on the increase in Nigeria's public debt. Nigeria in the 80's advanced loans to International Monetary Fund (IMF) during the oil boom, but, later in 2000 to 2005 grouped among the leading nations of Africa that has serious public debt problems (Essien, Agboegbulem, Mba and Onomonu, 2016). The first significant rise in Nigeria's public debt occurred in 1987 when the total debt rose to N137.58 billion an increment of 96.9%. From then, the rise in Nigeria's public debt continued unabated such as at 2004, total public debt stood at N6188.03 billion. In 1986, total debt which was hitherto driven largely by domestic debt witnessed a reversal and is now driven by external debt.

Hence, the dominance of the external debt as well as the steady rise in total debt remained till 2005 when the country was granted debt pardon by the Paris Club. The debt forgiveness saw Nigeria's total debt and external debt reduced by 59% and 90.8%, respectively between 2004 and 2006 to N2,533.47 billion and N451.5 billion, (Essien et al 2016). Recently, records are showing that Nigeria sinks deeper into public debt unabated such that as at 2020, total public debt stood at N12705.62 trillion for external public debt and N16023.89 trillion (Debt Management Office, 2021).

Statement of Problem

Presently the Nigerian economy is faced with high level of poverty, unemployment, rising food insecurity, rising food prices, inability of the country to save and declining economic growth. The agricultural sector is one of the sectors being looked upon to help solve some of these problems. However the sector has not made the desired output contribution to the economic growth of Nigeria to improve the standard of the living of the people. This could be attributed to the fact that the farmers lack the required capital and equipments to engage in large scale farming with their hope relying on the government for support (Yerima & Tahir 2020)). However, other sectors also needs the government attention and the country lacks the required capital to meet all these needs and boost the needed output growth from all sectors including agriculture, thus the increase in public debt stock.

However, the debt overhang hypothesis relates to the potential negative effect of a heavy debt burden on output. This theory is based on the premise that if the debt will exceed the country's ability to repay in the near future, expected debt service is likely to be an increasing function on the output level of the country to the extent that the returns which would have been invested in the domestic economy will be taxed away by the existing debt stock (Krugman 1988).This points to the controversy in the relationship between debt and agricultural output, with the nature of the relationship inconclusive. The different ~~Research~~ research studies have pointed out that public debt can have positive or negative impact or relationship with output in an economy. Yerima & Tahir (2020) found that public debt having a positive impact on agricultural output in Nigeria, which supports the earlier studies by (Korman &Brahmasrene, 2007; Donald &Shuaglin, 1993) who believed that the impact is positive and significant. Meanwhile, studies such as (Ochalibe, Apeverga, &Omeje 2021) reported a negative impact of public debt on agricultural output in

Nigeria. Akpan, (2005), Nbukwe and Kalu (2016) haveas earlier found that the impact of public debt on output growth whether agricultural or not is negative and non significant. This implies that the empirical evidence relating the impact of public debt on agricultural output in Nigeria is inconclusive, thus the reason for this study. Therefore, this study intends to assess the degree to which public debt overhang significantly impact the agricultural output growth of Nigeria from 1981 to 2022 with the following objectives, by examine the effect of public debt stock on the agricultural output. Ascertain the relationship between public debt stock and the agricultural output in Nigeria and examine the causality relationship between public debt and the agricultural output in Nigeria.

2. MATERIALS AND METHODS

Conceptual Review

Concept of Public Debt

When government expenditure exceed the revenue, the economy enter into a deficit and the government can decides to borrow to finance the budget deficit, thereby creating a liability for itself known as public debt or government debt.Thus, public debt is the amount of money owed by the government of a country to external organization, another government or private individuals and organizations within the country, (Chowdhury, 2001) Such public debt can be classified as borrowings from external sources and internal sources, leading to external debt and domestic debt.

Empirical Review

Olumo, John and Mungai, (2023) conducted a study aimed at examining the effect of external debt on the performance of the agricultural sector in Kenya from 2002 to 2020. Employing a correlational research design, the study found that external debt leads to increase in the performance of the agricultural sector in Kenya. The study recommended that the government of Kenya needs to invest more funds borrowed for external sources on the agricultural sector to boost the agricultural sector growth.

Another positive link between debt and agricultural sector was found by (Ochalibe, Apeverga, &Omeje, 2021) who examined the nexus between government expenditure, debt policy instruments and agricultural growth in Nigeria for the period 1980-2018. The study adopted the trend analysis and distributed lag model in conjunction with two stage least squares (2SLS) as

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well the use of difference-in differences estimation model (DID) in analyzing the data. The results of the study show that an increase in debt leads to a decrease in agricultural growth, and macroeconomic policy instruments dynamics impacted on agricultural growth negatively. The study recommended increased government expenditure to agricultural sector, education, investing in human capital development through budgetary allocations and intervention funds for increased growth while policymakers should desist from increasing the debt profile as it gave less than proportionate effect on agricultural growth with negative consequences on the Nigerian economy.In addition,

Yerima & Tahir (2020) examined the impact of external debt on Nigeria's agricultural production from 1980 to 2016 employing the Autoregressive Distributed lag (ARDL) model for the analysis. The outcome of the analysis revealed that external debt stock has a significant positive impact on agricultural production, indicating that debt increase agricultural growth. The result further showed that external debt servicing do not impact on agricultural production in Nigeria.

Osuji, Ehrijakpor and Mgbeze (2023) aimed at investigating the nexus between external debt and growth in the agricultural sector in Nigeria covering the period 2006-2021. The analysis of the data was conducted using the ARDL model. The study found evidence that external debt leads to substantial increase in agricultural sector output. The study also revealed that debt servicing adversely affect agricultural sector output in Nigeria. Thus, the study recommended that policy makers and government must seek economy diversification in order to boost key sectors such as the agricultural sector.

Ukpe, Djomo, Olayiwola & Gama (2019) evaluated the extent to which changes in public external debt and changes in private investment affect the agricultural growth from 1980-2016. The study used the Monte Carlo simulation technique to simulate the extent to which increase in public external debt and decrease private investment affect agricultural growth; and simulate the extent to which decrease in public external debt and increase in private investment affect agricultural growth. The result of the study showed that by increasing public external debt and decreasing domestic private investment the simulated data was higher compared to the baseline result implying that it supports the Keynesian view. By decreasing public external debt and increasing domestic private investment, the scenario simulated data, for agricultural growth were lower compared to the baseline implying that private investment alone cannot sustain agricultural growth in Nigeria. The study therefore recommended that specialized development agencies

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should be set up with the aim of implementing and evaluating government policies on foreign external debt and domestic private investment.

Adesoye, Adellowokan, Maku and Salau (2018) examined how enhancing the agricultural value chain can contribute to rapid economic diversification in Nigeria within the period of 1981-2015. They used the autoregressive distributed lag (ARDL) model as the econometric method of estimation. Their inferences were drawn at 5% significant level. The result revealed that the agriculture expenditure had positive and significant impact on agriculture sector productivity in Nigeria. Their findings showed that agricultural raw material, agricultural machinery and agricultural land have direct impact on agricultural productivity in Nigeria. Agricultural machinery and agricultural land were found to be statistically significant at 5% significance level. The empirical results revealed that capital and labour have direct impact on economic growth. However, agriculture productivity had positive impact on economic growth in Nigeria. They concluded that agricultural value chain contributed significantly to the diversification of the Nigerian economy. Therefore, the authors suggest that government should make deliberate efforts to create institutions that will make policy programmes on agricultural development not only to enhance its growth and the overall output growth but also make it inclusive.

Research gap

Moreover, literature on the Nigerian debt stock is quite substantial. However, greater part of it is focused on aggregate level analysis; those on different types of public debt analysis are done with less comprehensive and current data. Consequently, very little information could be derived from it with regard to the macroeconomic and political transformations which have taken place on sectoral output like the agricultural sector. Some studies on the Nigerian economy are useful, although incomplete, as a comparative study involving public debt stock and agricultural sector output is scanty. The major deviation of this study from previous studies comes from methodology used and data. The study used a dynamic model which captured previous and past changes in the economic structure and a higher frequency data extending to 2022 which give room for robust result. .Previous studies used time series data that ended in 2020but there have been developments in the economy issues since. The present study is current; the data analysed cover 1981 to 2022.

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Many of the studies reviewed have pointed out that public debt can have positive or negative impact or relationship with output in an economy. Yerima & Tahir (2020) found public debt having a positive impact on agricultural output in Nigeria. Meanwhile, studies such as (Ochalibe, Apeverga, &Omeje 2021) reported a negative impact of public debt on agricultural output in Nigeria. Akpan, (2005) has earlier found that the impact of public debt on output growth whether agricultural or not is negative and non significant. This implies that the empirical evidence relating the impact of public debt on agricultural output in Nigeria has mixed findings warranting more studies to be carried out on the matter.

Theoretical Framework

The Traditional Keynes' Theory

The Keynesian economists proposed a positive relationship between public debt and output growth. In the Keynesian theory postulated by Keynes (1964), it was argued that an increase in government spending with revenue from borrowing and other sources stimulates the domestic economic activity thereby increasing aggregate demand, savings and private investment at any given level of interest rate and hence crowds-in private investment. The Keynesian approach proposed a positive relationship between public debt and economic growth. As far as the relationship between debt and economic growth is concerned, a reasonable level of borrowing is likely to enhance economic growth, through capital accumulation and productivity growth (Chowdhury, 2001). However, research opponents have argued that long term effects of a government debt threatening the sustainability of public finances are undeniably negative, (Mankiw, 2013). As a result, the assumptions of the Keynesian theory cannot be sustained in the medium or long term

3. METHODOLOGY

Research Design

In this study, ex post facto design and econometric tool shall be adopted in obtaining, analyzing and interpreting data relating to the objectives of the study. The choice of this type of design will allow the researcher the privilege of observing variables over a long period of time. For this reason, both the dependent and independent variables will be observed over the period, 1981 to 2020. Annual The secondary data sourced from the Central Bank of Nigeria 2022 statistical

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bulletins covering the period 1981-2022 will be used in this study. Data collected was analyzed and the hypotheses of this study tested using the Autoregressive Distributed Lag Model (ARDL) to ~~determine~~ Analyze the impact of the independent variables on the dependent variables - agricultural sector output.

Model Specification

Based on the theoretical position above the regression equation is a multiple linear regression equation

AGRICGDP = F (DEBT, AGRICEXP, DSERV, EXCH)...................................3.1

Where;

AGRICGDP = Agricultural sector gross domestic product (at constant basic prices);

DEBT = total debt stock;

AGRICEXP = Government expenditure on the agricultural sector;

DSERV = debt servicing and

EXCH = exchange rate (representing the macro-economy).

The econometric form of the Ordinary Least Square (OLS) multiple linear regression equation for the above functional relation is stated as:

$AGRICGDP = \beta_0 + \beta_1 DEBT + \beta_2 AGRICEXP + \beta_3 DSERV + \beta_4 EXCH + \mu_t$...............3.2

This is the equation for objective one

The ARDL form of equation 3.2 is specified to check the speed of adjustment between the long-run and the short-run model. This is specified as

$$\Delta AGRICGDP_t = \beta_0 + \beta_1 \sum_{i=1}^{n} \Delta AGRGDP_{t-1} + \beta_2 \sum_{i=1}^{n} \Delta DEBT_{t-1} + \beta_3 \sum_{i=1}^{n} \Delta AGRICEXP_{t-1} + \beta_4 \sum_{i=1}^{n}$$

$\Delta DSERV_{t-1} + \beta_5 EXCH_{t-1} + \beta_6 ECM_{t-1}$..3.3

The coefficient of the error correction (ECM_{t-1}) will indicate the percentage of the error corrected each year that is, the speed of adjustment.

Technique of data analysis

The modelling procedures adopted in this study are as follows:

The investigation was carried out using the OLS method estimating a multiple linear regression of the variables in equation (3.2). This is followed by testing the order of integration of the variables using Augmented Dickey Fuller (ADF) unit root test. If the variables tested in above are stationary at levels and first difference, then they are subjected to a bound test to ascertain

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their level of cointegration. Should co-integration exist the ARDL model is estimated where the speed of adjustment to equilibrium will be determined and diagnostic tests conducted.

4. DATA PRESENTATION AND ANALYSIS OF RESULTS

Unit Root Test

The order of integration and stationarity of all the series using the Augmented Dickey-Fuller (ADF) principle of establishing unit root was conducted. The ADF test was conducted on variables in order to determine their stationary nature and those found non stationary were differenced to get rid of the stochastic trend, a phenomenon associated with time series data. Tables 1 presents the summaries of the unit root test results for the series in levels and in first differences.

Table .1   Unit root test for the series in levels and fist difference

Variable	Level			1st difference			Result
	ADF stat	5%	10 %	ADF Stat	5 %	10 %	Remark
AGRICGDP	5.743953	-1.94960	-1.61159	-4.951585	-2.94114	-2.60906	I(1)
AGRICEXP	-4.90646	-3.52975	-3.19641	-			I(0)
EXCH	3.835636	-1.94960	-1.61159	-4.129123	-2.94114	-2.60906	I(1)
DEBT	-2.29172	-3.52975	-3.19641	-5.90565	-1.94985	-1.61146	I(1)
DSERV	-4.85183	-3.52975	-3.19641	-			I(0)

Source: Authors computation.

Note: I(0) – stationarity at levels; I(1) - stationanty at 1st difference.

The result indicateds that the government agricultural expenditure and debt service ratio are stationary at levels meaning they are integrated at order zero, while agricultural output, total debt stock and exchange rate are non-stationary at the levels since the absolute value of their ADF statistic did not exceed the critical value. Thus, there is a mixture of I(0) and I(1) variables with the dependent variable I(1) which necessitated the use of ARDL model.

Bound test

The bound test for long run equilibrium relationship is presented in Table 2 and the test result show that there is a long run equilibrium relationship (presence of co-integration) between the dependent variable (AGRICGDP) and the independent variables at 10 percent critical value but not at 5 percent critical value.

Table 2 Bound test for the estimation with exchange rate as Dependent variable

T-Statistics	5 % Critical Value Bounds		10% Critical Value Bound		Remark
F-Statistics	Lower	Upper	Lower	Upper	Co-integrated at

3.780080	2.86	4.01	2.45	3.52	10% but not 5 %

Source: Authors computation.

Estimation Results

With the unit root test showing a mixture of I(1) and I(0) variables and the bound test at 10 percent showing long run equilibrium relationship, the estimation of the ARDL cointegrated equation became necessary and the result presented in table 3. below.

Table .3:ARDL co-integrating and long run form - Selected model (2, 4, 1, 1, 4)

Variables	Agricultural output			
	Coefficient	Std. Error	T-statistics	Probability
D(AGRICGDP(-1))	0.320915	0.207320	1.547918	0.1381
D(AGRICEXP)	-0.007162	0.004771	-1.501192	0.1497
D(AGRICEXP(-1))	0.001076	0.004695	0.229060	0.8213
D(AGRICEXP(-2))	-0.008241	0.005215	-1.580392	0.1305
D(AGRICEXP(-3))	0.013430	0.007505	1.789484	0.0895
D(DEBT)	-5.588971	4.237771	-1.318847	0.2029
D(DSERV)	-1.965845	11.668818	-0.168470	0.8680
D(EXCH)	4.111189	3.219921	1.276798	0.2171
D(EXCH(-1))	6.349078	5.800950	1.094489	0.2874
D(EXCH(-2))	-29.220109	6.563161	-4.452139	0.0003
D(EXCH(-3))	29.624720	8.191022	3.616730	0.0018
CointEq(-1)	0.060082	0.080834	0.743277	0.4664

Source: Authors computation.

Table 3 presents the result that gives interpretation to the objectives one and two of the study. Objectives one is to examine the effect of total debt stockon agricultural output in Nigeria. The result shows that at both 5 percent and 10 percent significant level, total debt stock has no significant effecton agricultural output in Nigeria. This implies that total debt stock has not significantly impacted on the agricultural sector in Nigeria. However, the result shows that total debt stock and debt service have negative relationship with agricultural sector negatively which explains the result for the second objective of the study. This outcome is expected which means

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that an increase debt stock ought to lead a decrease in agricultural output in Nigeria and the reverse case.

Table 4 Results of diagnostic tests

Tests	X^2 Statistics	Probability
B-G serial correlation LM test	0.455351	0.7964
Heteroscedasticity	7.337151	0.9662

Source: Authors computation.

Due to the presence of the autoregressive terms the Breusch-Godfrey LM test for Serial correlation which explains whether the error terms in the model are serially correlated, the probability of the Breusch-Godfrey LM test ~~LM test~~ is 0.7964 which is greater than both 5% and 10% significant levels, suggesting that the errors in the model are not serially correlated. The BPG heteroscedasticity test is also not significant also implying that there is homoscedasticity.

Table: 5:Objective three – Toda-Yamamoto Granger Causality result

Dependent Variable: AGRICGDP			
Excluded	**Chi-sq**	**df**	**Prob.**
AGRICEXP	36.49463	3	0.0000
DEBT	0.885660	3	0.8289
DSGDPR	0.353278	3	0.9497
EXCH	22.18347	3	0.0001
All	92.93814	12	0.0000
Dependent variable: DEBT			
Excluded	Chi-sq	df	Prob.
AGRICGDP	7.485775	3	0.0579
AGRICEXP	0.364770	3	0.9474
DSGDPR	0.744124	3	0.8628
EXCH	0.756246	3	0.8599
All	12.40926	12	0.4134

Source: Authors computation.

The causality test shows that there is a one directional causality at 10% significance level between debt and agricultural output with the causality running from agricultural output to debt, implying that quest to increase agricultural output in Nigeria causes increase in public debt.

Discussion of Findings

Based on the result interpretation, the findings of the study are discussed as follows, firstly, the study found that public debt stock has no significant effect on agricultural output in Nigeria, this is unlike the findings of (Yerima & Tahir 2020); (Matthew & Mordecai 2016); and (Abula & Ben 2016) that found that found public debt has a significant effect on agricultural output. Secondly, the study found a negative relationship between public debt and agricultural output, which did not agree with that of (Yerima & Tahir 2020) and (Matthew & Mordecai 2016) who found that public debt has a positive relationship with agricultural output. However, this finding did agree with that the findings of (Abula & Ben 2016), (Atique and Malik, 2012), (Patilloet al 2004), and (Ezeabasili 2011) who have found that public debt has a negative relationship with agricultural output.This finding is not an unusual one, it points out to the fact that Nigeria's debt crisis can be attributed to factors not only peculiar with the agricultural sector, other factors such as weak and corrupt practices, overdependence in oil and other governance structures of the economy also play parts.

Lastly, the study also found that there is there is a one directional causality relationship between public debt and agricultural output in Nigeria with the causality flowing from agricultural output to debt, but previous findings such as (Matthew & Mordecai 2016) revealed that causation flows from domestic debt and public agricultural expenditure to agricultural output and not the other way round.

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study examined the impact of public debt stock on agricultural output in Nigeria.The variables used are gross domestic product from the agricultural sector (AGRICGDP) as the dependent variable, total debt stock, debt servicing, government expenditure on agriculture and exchange rate all as independent variables. Based on the Keynesian theoretical approach and

using the Autoregressive Distributed Lag model, ARDL), the major findings from ~~this~~ study ~~is~~ are: that debt stock has no significant effect on agricultural output in Nigeria. The policy implication derivable from the findings is that though government expenditure on the agricultural sector has been on a continuous increase but has not been matched with equal output and revenue increase from the sector and this has widened the reasons for continuous government borrowing and debt.

However, Nigerian political leaders in this era of globalization need to develop home-grown best practice policies and explore more export products outside natural resources and develop a sense of national patronage of its local products.

4.3 Recommendations for Policy

Based on the findings the study made these recommendations:

I.   Firstly, the result of the study found that public debt no significant impact on agricultural output but a negative relationship between public debt and agricultural output in Nigeria for the period of the study, which becomes necessary for government of Nigeria to reduce the size of large recurrent expenditure and move towards productive capital and other investment expenditures. The cost of running the government should be reduced and funds recovered from such put into investment ventures.

II. Secondly, the study found one directional causality relationship between agricultural output and public debt, the study therefore recommends that the country should diversify the economy so that other sources of revenue should be explored especially the agricultural sector and other non-oil sectors, so as to correct the disparity between revenue and expenditure and reduce the attendant fiscal deficit financing. Government should avoid being dependent on external and domestic borrowing to finance its deficits. Servicing both external and domestic debt hinders the growth and development of the country.

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Comment [NVK5]: Include are references which have mentioned in study like Atique and Malik, 2012

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