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Connection between Government Agricultural Spending and Agricultural Sector Growth in Nigeria: An Autoreegressive Distributed Lag (ARDL) Approach

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Abstract*—This study empirically evaluates the connection between government expenditure and agricultural growth in Nigeria from 1986 to 2024. The chosen secondary time series data were extracted from the Central Bank of Nigeria (CBN) and the World Bank Development Indicators (WDI) Database, 2024 editions. Agricultural value added (measure of agricultural sector annual contribution to GDP) (the dependent variable) was regressed as a function of aggregate government expenditure on agriculture, total number of manpower employed in the agricultural sector, gross fixed capital formation, carbon emission, federal government annual spending on internal security and aggregate public debt stock. The study adopted Augmented Dickey-Fuller Structural Breakpoint test to check for maximum order of integration of the variables used, and all the variables showed a mixed order of integration. ARDL Bounds test cointegration analysis shows evidence of long run relationship among the variables. Findings reveal that aggregate government expenditure on agriculture (GEXPA) was positive, although statistically insignificant in determining the agricultural sector contribution to GDP in the short run and long run in Nigeria. The Granger causality result shows that there is a strong and significant one-directional causality relationship running from gross fixed capital formation to agricultural value added (that is, GFCF→AGVA) between gross fixed capital formation and agricultural value added over the period under consideration. The study recommends, among others, that it is expedient to the concerned actors in the accounting and allocation of agricultural funds—especially the Ministry of Finance, Budget and National Planning, Ministry of Agriculture, etc., to be fair and just in expending the resources (funds) mapped for the welfare of the citizens through the various agricultural programmes; so as to achieve the desired SDGs goal or response in the country.

***Key words*—Government Expenditure, Agricultural Growth, Internal Security, Public Debt Stock, Carbon Emission, Gross Fixed Capital Formation, Youth Employment, Granger Causality, ARDL**

I. INTRODUCTION

The connection between the government involvement in agricultural activities in the terms of spending and aggregate agricultural output (or productivity) has long been debated in the literature. Some, especially the Keynesian economists, argue that high agricultural output (or productivity) are generally driven by increased government spending in the sector, whereas some, basically the Classical economists, hold the orthodox belief that high crop yield (agricultural output/productivity) are generally or wholly a function of the activities of the individuals or private sectors. However, despite the varying positions held above, it is believable that the duo factors of government spending and activities of the individuals or private sectors improve the agricultural productivity/output inextricably simultaneously.

In the modern thought, the genesis of government involvement in economic activities (modernized/mechanized agricultural activities inclusive) is traceable to the surfacing of the famous Keynesian school of thought in the wake of the 30s. This made possible the use of fiscal policy (the use of government expenditure and tax policies regulate economic activities) as an instrument for engendering macroeconomic management, and thus led to the employment of government/public expenditure in actualizing economic strength.

The part played by the agricultural sector in the pursuit and actualization of a sustainable growth and development of any economy cannot be overwhelmed or overstated. Agriculture, which remains simply, the art and science of crop and livestock production, goes a long way to provide food for the populace, raw materials to allied industries, timbers for shelter and woodworks, employment, incomes to the agriculturalists, and generally promotes the societal wellbeing. In the time past, before unearthing crude oil in Nigeria in the mid 50s and even prior to the civil war years of the late 60s, agriculture accounted hugely for the then growth and development of the Nigerian economy. The revenue

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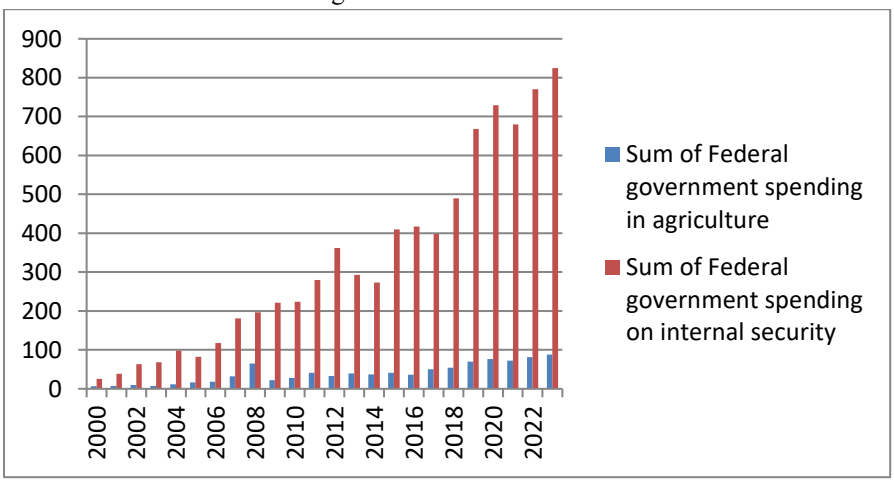
from crude oil was so enormous that the then political leaders began to shift emphasis from agriculture to mining and quarrying (mineral resources). Despite the unhandsome neglect of the agriculture sector, agriculture still remains the bastion of the Nigerian economy; directly, in terms of volume of employment opportunities it offers, as the sector provides for a momentous proportion of the country's employed labor force; and indirectly, through the imperative linkages it provides with the rest of the economy (Udoh, 2011).

Interestingly, the trend of agricultural output has been on the increase over the last four decades. Average annual agricultural output between the years 1981-1991 was ₦54.86 billion. Between the years 1992-2002, agricultural output in Nigeria has risen to ₦1321.84 billion. The average figure for agricultural value added between 2003 and 2018 was ₦13, 972.92 billion (CBN, 2018). Following the incremental and sequential pattern, the value agricultural output (agricultural sector contribution to GDP) averaged approximately ₦18, 688.55 billion between 2019 and 2023 (CBN, 2023). However, despite these increases in agricultural output, the problem of food insecurity and poverty continue to bemoan and ravage Nigerians. The greater percentages of the populace still wallow in abject poverty, hunger and inadequate resources. High rates of importation of foods characterize the Nigerian economy, despite the recent ban on the importation of rice and other food substances by the present administration. To this end, Edeh, Ogbodo and Onyekwelu (2020), report that 46 percent of Nigerians live in extreme poverty. By July 2020, this figure has catapulted to 50 percent. This poor outcome has been attributed to erratic and inefficient public expenditure on agriculture. The trend of government expenditure in agriculture has been erratic and fluctuating over the past three decades. Between 1981 and 1990, average capital expenditure by the federal government on agriculture was ₦0.938 billion. This trend increased to ₦6.103 billion between 1991 and 2000. Average capital expenditure on agriculture for the period 2001 to 2010 was ₦71.14 billion. The figure for average recurrent expenditure for the period 2011 to 2018 was ₦72.06 billion (CBN, 2018). In the same vein, the recurrent expenditure on agriculture in Nigeria averaged approximately ₦77.92 billion between 2019 and 2023 (CBN, 2023). A cursory look at these average figures depicts an increasing trend when one looks at it from decade to decade. However, when the figures are viewed on annual basis, the trend becomes erratic and fluctuating (Edeh, et al., 2020).

Figure 1.1: A bar graph representation of the annual national spending on agriculture and internal security in Nigeria from 2000 to 2023



Source: Authors' compilation and computation using Excel

Consequently, the figure above depicts an increasing trend of both the federal government spending on agriculture sector development and internal security. The observed rising pattern of these critical variables, by implication, transcends and signals a succulent agricultural atmosphere across the country. However, it is demeaning and demoralizing to still record rising food scarcity and insecurity, famine, and rising costs of food items as well as diminishing food supply nationwide.

In a separate development, even though, this expenditure on agricultural sector has perhaps been on the increase; especially by the current administration, it does not translate to corresponding

expansion or increase in economic growth. It is crystal clear that despite the rising public debt claimed for the development of the economy, especially the growth drivers of the economy—agriculture, manufacturing, health, education, etc., Nigeria still grapples with rising food inflation. It is evident that in Nigeria, government spending on agriculture continues to increase over the years while empirical evidence has revealed that the performance of the agricultural sector has not been impressive (Ogen, 2003 quoted in Ugwu, 2023). Finally, the agricultural sector in Nigeria has been plagued by various problems, including low productivity, inadequate funding, and poor infrastructure. Despite increased government expenditure on agriculture, the sector's performance remains unsatisfactory (Oyinlola, et al., 2018). As a departure, the present study argues that the negligence of certain paramount determinants of government spending in agriculture in Nigeria vis-à-vis public debt stock and government spending on internal security, by previous studies, remains probable; hence the need for further investigative research into the subject.

Finally, agriculture is a vital sector in Nigeria's economy, contributing significantly to the country's GDP, employment, and food security. Despite its significance, the sector faces various challenges, including inadequate funding, poor infrastructure, and inefficient policies. Government expenditure on agriculture is crucial in addressing these challenges and promoting agricultural growth (Audu, et al., 2020). Thus, study seeks to probe into the effectiveness of the federal government's spending in agricultural activities and programs in influencing or determining the output level of the sector within the stated period in this study.

The study has the following objectives: i. to evaluate the impact of aggregate government expenditure on agriculture on agricultural sector output in Nigeria. ii. to estimate the impact of total number of manpower employed in the agricultural sector on agricultural output in Nigeria. iii. to verify the impact of federal government annual spending on internal security on agricultural sector output in Nigeria. iv. to analyze that impact of aggregate public debt stock (domestic + external) on agricultural sector output in Nigeria. v. to explore the direction of causality link between government agricultural expenditure and agricultural output in Nigeria.

This paper is organized as follows: chapter describes the introduction, chapter two deals with literature review, chapter three is concerned with the methodology, chapter four treats the results and discussion while chapter five deals with the summary, conclusion and recommendations.

1. Government Agricultural Expenditure

Asmau (2020) conceives government spending as the allocation of funds to healthcare, education, national defense and other sectors in the economy in order to supply goods and services to the public sector, redistribute income, support certain industries and improve the economy as a whole. Government agricultural expenditure is the allocation on the agricultural sector which is aimed to boost agricultural productivity and output, thereby inciting economic growth. Government spending in agriculture comprises of expenses on sector policies and programs, construction of flood control, irrigation and drainage systems, operation or support of extension services or veterinary services to farmers, pest control services, crop inspection services, provision of grants and subsidies to farmers, etc. Investing in agriculture is one of the most effective ways of promoting agricultural productivity, raising real incomes, reducing poverty and food insecurity, and enhancing environmental sustainability (FAO, 2016).

2. Agricultural Sector Growth

In the words of Asma'u (2020), agricultural output is the total value of output an economy gets from crop production, livestock, forestry and fishery. Food and Agriculture Organization of the United Nations (FAO) as cited in Raheem Oyeleye and Adeniji (2014) reported that Nigeria's low fertilizer and improve seed utilization and inadequate government expenditure were largely responsible for the low productivity and the inability to compete with others. Most times, the farmers depend on less efficient traditional tools which results in less output compared to the use of tractors, harvesters.

II. EMPIRICAL REVIEW

Nomor and Udele (2024) examined how economic growth respond to government recurrent and capital agricultural expenditure through agricultural output channel in Nigeria from 1981-2022. The analytical

technique utilized was Structural Vector Autoregressive (SVAR) model. The contemporaneous result indicated that agricultural output responds positively to government recurrent agricultural expenditure. Similarly, economic growth responded to agricultural output positively. Result further showed that agricultural output has negative contemporaneous response to government capital agricultural expenditure while agricultural output had positive instantaneous effect on economic growth in Nigeria. The study concluded that economic growth responded positively to government recurrent agricultural expenditure through agricultural output contrary to the adverse influence of government capital agricultural expenditure to economic growth through agricultural output in Nigeria. It was recommended among others that government should improve on monitoring the use of funds meant for capital agricultural projects to ensure overall efficiency.

Christopher, Shagi and Batiyak (2024) studied on the impact of government expenditure on agricultural output in Nigeria using the Autoregressive Distributed Lag (ARDL) model. The study uncovered a negative correlation between both government credit to agriculture and government expenditure on agriculture and agricultural output. However, the study did not encompass how economic growth responds to recurrent and capital agricultural expenditure via output.

Agbana and Lubo (2022) investigated the nexus between government expenditure on agriculture economic growth in Nigeria from 1981 to 2021, using the Ordinary Least Squares (OLS) to analyze the time series data on agricultural expenditure proxy by agricultural credit guarantee scheme fund and government expenditure on agriculture; and economic growth proxy by real GDP. It was revealed that the variables government expenditure on agriculture and agricultural credit guarantee scheme fund have positive and significance impact on economic growth in Nigeria) for the period of study. Using the adjusted R square, the explanatory variables accounted for 71.3 per cent contribution to economic growth in Nigeria. Thus, the study therefore recommended that government should evolve policies toward diversifying the economy and encourage the campaign for improvements in the non-oil sectors of the economy especially agricultural sector.

Edeh, Ogbodo and Onyekwelu (2020) evaluated the impact of government expenditure on agriculture on agricultural sector output in Nigeria for the period 1981-2018 with time series data obtained from the Central Bank of Nigeria Statistical Bulletin and Annual Reports. Agricultural value added was specified as a function of labour force, capital expenditure, recurrent expenditure, agricultural loans, average annual rainfall, interest rate and economic reforms. The result of the ARDL model technique analysis reveals that capital expenditure is positively related to agricultural output and it is also statistically significant at 5 % in the current year (P(t) = 0.0080). However, recurrent expenditure has a negative and insignificant impact on agricultural output (P(t) = 0.6657). The study recommends that governments at all levels should intensify and increase expenditure on capital items in agriculture sector.

Okorie, Osabuohien & Oaikhenan (2020) examine the effects of electricity consumption and government agricultural spending on agricultural output (AGOP) in Nigeria for the period 1981 to 2017. The Philip Peron's unit root test showed that the time series data were not stationary at levels. The ARDL result shows that poor electricity supply has significantly retarded the level of agricultural output in Nigeria while public agricultural spending indicates a weak positive lag effect on agricultural sector performance.

Osabohien, Adeleye, & De Alwis, (2020) used cointegration equations to examine the impact of agro-financing impacts on food production in Nigeria for the period 1981–2018. After testing the time series data for stationarity, the Canonical Cointegration regression approaches show that agro-financing is statistically significant in explaining the level of food production in Nigeria. One percent increase in farmers' access to agricultural finance is associated with an increase in food production by 0.002%–0.006%.

Alabi and Abu (2020) analyzed the impact of agricultural public expenditure on agricultural productivity in Nigeria. The relevant time series data for the study were obtained from secondary sources. The data ranged from 1981 to 2014.The study used Co-integration and Error Correction model and system of equations approach to model agricultural

productivity and government expenditure. The heterogeneous impacts of components of government spending on agricultural productivity were also estimated. The study revealed that although, recurrent and total agricultural public expenditure does not impact on agricultural productivity, agricultural public capital expenditure has positive impact on agricultural productivity which materializes with lag. The study recommends that agricultural budget execution rate should be improved through quick passage and timely implementation of the budgets. Agricultural public expenditure should be realigned to favour investments in irrigation, R&D and rural development which currently attracted lower budgetary allocations in Nigerian agricultural budgets.

Keji and Efuntade (2020) assessed the link between agricultural output growth and government spending in Nigeria from 1981 to 2018. The study employed the ARDL approach. The results show both short and long run effect of government spending on the growth of agricultural output in Nigeria. The policy implication is that any disruption in government spending on agricultural sector would have adverse effect on agricultural output growth in Nigeria. It was suggested that government should re-double it efforts in terms food security through improved agricultural policies.

Asmau (2020) investigated the impact of government agricultural expenditure on economic growth in Nigeria. Time series data were gathered from secondary sources on real GDP, government agricultural expenditure, agricultural output and agricultural credit from the CBN statistical bulletin covering the period between 1981 and 2019. Econometric methods such as Augmented Dickey-Fuller unit root test, Johansen Co-integration test, Ordinary Least Squares method and Granger Causality tests were used for data analysis. The study revealed that the overall model was statistically significant at 5% level of significance. Agricultural output and agricultural credit have a positive effect on economic growth whereas government agricultural expenditure has a negative effect on economic growth. Therefore, the study recommends that budget allocations to the agricultural sector should be closely monitored and ensured that they are channeled into the right targets.

Apata (2019) investigates the drivers of public spending policy mechanisms that accounts for growth in the agricultural sector output in Nigeria and China using time series data for the period 1970-2016. The result of the of the Random-effects model shows that that the policy of public expenditure (PUEXP) and intervention (INTEV) variables were significant but negative for Nigeria, while the variables were significant and positive for China.

De & Dkhar, (2018) examine the short and long run relationship between government expenditure on agriculture and its allied sector and agricultural output of Meghalaya for the period 1984-85 to 2013-14. Bound test cointegration was used to test for long run relationship. The result of the ARDL estimation shows that reveals that in the long run, the effect of public expenditure through agriculture and allied activities, on agricultural output is significantly negative, while expenditures on education and transport on agricultural output are significantly positive.

Aina, & Omojola, (2017) examined the impact of government expenditure on agricultural sector performance in Nigeria for the period 1980 and 2013 using secondary data from the Central Bank of Nigeria Statistical bulletin . The result of the Error correction modeling shows that there is a significant and positive relationship between government expenditure on agriculture and agricultural production output.

Richard, Nwite, Ndubuisi, Onwe, Okereke and Ogiji (2019) investigate the effects of fiscal policy on real sector growth in Nigeria, focusing on government capital expenditure and its effect on the growth of the agricultural sector in Nigeria, and covering the periods between 1980 and 2017. The study made use of Auto regressive Distributed Lag Models. The results of the study showed that there is a significant effect of government capital expenditure on the growth of the agricultural sector in Nigeria.

Kenny (2019) investigated the role of agricultural sector performance on economic growth in Nigeria. The study utilized the ADF unit root test, co-integration test and vector error correction model. The study revealed that agricultural credit guarantee scheme fund has a positive but insignificant impact on the agricultural domestic production and public spending on agriculture have significant effects on the domestic agricultural production.

Uremadu, Ariwa and Uramadu (2018) assess the effect of government agricultural expenditure on agricultural output using time series data from 1981 to 2014. The data was analyzed using cointegration test and vector error correction model. The Johansen co-integration tests revealed that there is a long-run relationship between agricultural output and government agricultural expenditure. The vector error correction model results indicated that agricultural output adjusted rapidly to changes in total government agricultural expenditure, real exchange rate, banking system credit to agriculture, average annual rainfall and population growth rate.

Ewetan, Fakile, Urhie and Odunatan (2017) investigated the long-run relationship between agricultural output and economic growth in Nigeria for the period 1981 to 2014 using annual time series data obtained from Central Bank of Nigeria, National Bureau of Statistics, International Monetary Fund and World Bank Development Index. Phillip Perron unit root test, Johansen Cointegration test, Vector error correction model and granger causality testing were adopted for data analysis. The cointegration results showed that there is a long run relationship between agricultural output and economic growth. The long run parameters for agricultural output, inflation rate and exchange rate show statistically significant relationship with economic growth but interest rate has no significant relationship with economic growth.

Mathew and Mordecai (2016) studied the impact of public agricultural expenditure on agricultural output in Nigeria from 1981 to 2014 with annual time series data collected from the Central Bank of Nigeria. The study made use of Augmented Dickey-Fuller test, Johansen Co-integration test, Error Correction Method (ECM) and Granger Causality test. The Johansen Co-integration test discovered that there is a long-run relationship between agricultural output, public agricultural expenditure, commercial bank loans to the agricultural sector and interest rates. The results of the ECM model indicated that public agricultural expenditure has a significant but negative impact on agricultural output whereas commercial bank loans to the agricultural sector and interest rate have insignificant positive impacts on agricultural output in Nigeria.

Ayunku and Etale (2015) investigated the effect of agriculture spending on economic growth in Nigeria over a period of 34 years between 1977 and 2010. The study employed Augmented Dickey Fuller and Phillip Perron unit root tests, Johansen Cointegration and Error Correction Model tests. They found that economic growth (GDP) was mainly influenced by changes in agricultural expenditure, inflation, interest rate and exchange rate. These variables stimulate economic growth in Nigeria both in the short-run and long-run.

Shuaib, Igbinosun and Ahmed (2015) examine the impact of government agricultural expenditure on the growth of the Nigerian economy from 1960 to 2012. The study employed the ordinary least squares (OLS) technique in analyzing the data. The study employed secondary data sourced from National Bureau of Statistics and Central Bank of Nigeria. The results revealed that government agricultural expenditure has a direct relationship with economic growth. It also revealed that inflation rate and interest rate have negative relationship with economic growth.

III. GAP IN LITERATURE

Although a great deal of research work has been carried out on the subject worldwide with mixed research findings, only few (Asma'u, 2020) has been concerned with causal relationship. When the variable inclusion is being considered, this work will serve as one of the most recent research works on the topic to take cognizance of youths' employment strength of the agricultural sector, public debt stock and public spending on internal security. This research work intends to fill the gap in the literature by discussing extensively on the causal relationship between government spending in agriculture and agricultural production or output from 1986 to 2024. The interest of the researcher in extending the analysis to the year 2024 was informed by the fate of the agricultural sector of the Nigerian economy amidst the business cycles and rising sectoral budgetary allocation to agriculture in the country recently.

IV. DATA AND METHODOLOGY

The unit root test for stationarity and descriptive statistics are two of the preliminary tests that are performed on the time series variables that are used

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to ascertain the connection between the variables. The Autoregressive Distributed Lag Model (ARDL) is used to estimate the parameters for the selected model. Additional post-estimation tests were performed to ensure the rationality of the findings.

Both the short-term dynamics and the cointegration (long term) connection between the regress and regressors are examined using the Autoregressive Distributed Lag (ARDL) Bounds testing system. The bounds test is a better cointegration method than the Johansen techniques method. According to Pesaran, Shin, and Smith (2001), the bound test is essentially calculated using Ordinary Least Squares to compute an estimated error correction version of the Autoregressive Distributed Lag (ARDL) model by Ordinary Least Squares (OLS) estimator. The hypothesis that there is no cointegration among the variables will be tested against the possibility that there is cointegration among the variables using an F-test of the joint significance of the coefficients of the lagged levels of the variables.

Either way, the F-test has a nonstandard distribution for the variables: 1(0) or 1(1). Two sets of adjusted critical values—the lower and upper bounds—are presented by Pesaran, Shin, and Smith (2001). Whereas the other set assumes that all variables are 1(1), the first set assumes that all variables are 1(0). The illogical hypothesis of no cointegration would be rejected if the calculated F-statistic is greater than the upper bound critical value. However, if it falls below the lower bound, then the null would not be rejected. Finally, if it falls between the lower and upper bound, then the result would be uncertain. The long run form of the ARDL model is re-specified thus;

$$\Delta AGVA_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta AGVA_{t-i} + \sum_{i=1}^{p} \alpha_2 \Delta GEXPA_{t-i} + \sum_{i=1}^{p} \alpha_3 \Delta AGSE_{t-i} + \sum_{i=1}^{p} \alpha_4 \Delta GFCF_{t-i} + \sum_{i=1}^{p} \alpha_5 \Delta CO2_{t-i} + \sum_{i=1}^{p} \alpha_6 \Delta FGSIS_{t-i} + \sum_{i=1}^{p} \alpha_7 \Delta PDST_{t-i} + \beta_1 GEXPA_{t-1} + \beta_2 AGSE_{t-1} + \beta_3 GFCF_{t-1} + \beta_4 CO2_{t-1} + \beta_5 FGSIS_{t-1} + \beta_6 PDST_{t-1} + ECM_{t-1} + \mu_t$$

V. RESULTS AND DISCUSSION

Regression analyses
The AutoRegressive Distributed Lag Model (ARDL)

Table 4.4: Summary of the ARDL Regression Results
Short-term and long-term direct relationships

Variables	Coef	SE	T-stats.	Variables	Coef	SE	T-stats
AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL ESTIMATES							
Short-run				Long-run			
D(GEXPA)	*0.010*	*0.032*	*0.32*	*GEXPA*	*0.092*	*0.144*	*0.638*
D(AGSE)	*-0.499*	*0.446*	*-1.118*	*D(AGSE)*	*-5.227*	*1.705*	*-3.064****
D(GFCF)	*-0.002*	*0.000*	*-4.623****	*GFCF*	*-0.002*	*0.001*	*-2.170****
D(CO_2)	*-29.665*	*9.665*	*-3.069****	*CO_2*	*7.777*	*15.723*	*0.494*
D(FGSIS)	*-0.017*	*0.012*	*-1.352*	*D(FGSIS)*	*-0.054*	*0.072*	*-0.752*
D(PDST)	*-0.000*	*0.000*	*-2.423****	*D(PDST)*	*0.001*	*0.000*	*2.233****
C	*-43.26*						
CointEq(-1)	*-0.52*						

Source: Author's computation using EViews 13.0

The suppositions detailed previously in this study stood tested using the combinations of ARDL and Granger causality models or econometric techniques. The outcome of the examination is the focus of discussion in accordance with the research objectives and in response to the research questions.

For objective I: Aggregate government expenditure on agriculture (GEXPA) was positive and statistically insignificant (P(t)= 0.7519 & 0.5389>0.05) in determining the agricultural value added in the short run and long run respectively. The

insignificant result is not surprising; it is expected given the heightened and damaging effects of various corrupt exhibitions of various political elites entrusted with the funds usually mapped out for agriculture every fiscal year (FY) in the domestic economy. The sign of the coefficient of GEXPA does meet *a priori* expectation both in the short run and long run models. The positive coefficient implied that there was a direct link between aggregate government expenditure on agriculture and AGVA (agricultural value added) in the short term and long term given, perhaps, the rising trends of private sector involvements in commercial agricultural activities in the country. A unit change in the GEXPA invariably augments agricultural value added by approximately 0.01 and 0.0.09 units in the short run and long run correspondingly. In other words, increasing government spending in agriculture triggers an increasing trend on the agricultural sector contribution to GDP growth rate of the country. This result corroborates the findings of Okorie, et al (2020) which investigated the effects of electricity consumption and government agricultural spending on agricultural output (AGOP) in Nigeria for the period 1981 to 2017, and showed that public agricultural spending indicates a weak positive lag effect on agricultural sector performance. This outcome was affirmed both in the short run and long run models of the current study.

For objective II: In the short term, total number of manpower employed in the agricultural sector (AGSE) exhibited an insignificant negative impact on agricultural value added, but a significant negative influence on AGVA in the long run. This is evident in the magnitude and probability value of AGSE, shown as (*p-values = 0.2921>0.05 & 0.0135<0.05*). The sign of the coefficient of AGSE does not conform to the *a priori* expectation in the short run and long run models. The negative relationship between AGSE and AGVA is indication that the number of employed created by the agricultural sector is not encouraging; thus the less percentage of the Nigerian population engage in agriculture annually. A change in AGSE leads to approximately 0.499 and 5.22 percentage decrease in agricultural value added in the short run and long run respectively.

For objective III: Federal government annual spending on internal security (FGSIS) exhibited an insignificant negative impact on agricultural value added both in the short run and long run respectively. This is evident in the magnitude and probability values of FGSIS, shown as (*p-values = 0.2093 & 0.4712>0.05*). The sign of the coefficient of FGSIS does not conform to the *a priori* expectation in the short run and long run models. A change in FGSIS leads to approximately 0.01 and 0.05 declines in agricultural value added in the short run and long run respectively. This is a clear indication that Nigeria is yet to practice a true democracy embedded on clearly defined security and welfare of her citizens. This is evident in the rising incidences of farmers-herders clash, kidnapping, raping, extra-judicial killings, etc.

For objective IV: In the short run, aggregate public debt stock (domestic + external) (PDST) was negative and statistically significant (P(t)= 0.0384<0.05) in determining the agricultural value added in the short run. The result is not surprising; it is expected given the heightened effects of the unwise or unreligious channeling of the borrowed funds to the non-productive or less productive sectors of the Nigerian economy—including rising recurrent spending and wastages in the form sympathies and dubious spending on countless cronies. However, the result further showed PDST to be positive and statistically significant in determining the fate of agricultural value added in Nigeria. The sign of the coefficient of PDST meets a priori expectation in the long run model only. The positive but significant coefficient implied that there was a direct relationship between aggregate public debt stock (domestic + external) and AGVA (agricultural value added), perhaps on the recurrent basis. A change in the PDST invariably increases agricultural contribution to GDP growth rate by approximately 0.00 percent in the long run.

On other explanatory variables: Gross fixed capital formation (GFCF) exhibited an insignificant negative impact on agricultural value added. This is evident in the magnitude and probability value of GFCF, shown as (*p-values = 0.0012 & 0.0580*), which do not exceed 0.05. The sign of the coefficient of GFCF does not conform to the a priori expectation in the short run and long run models. A change in GFCF leads to approximately 0.00 and 0.00 percentage declines in agricultural value added in the short run and long run respectively. This result is an indication of disinvestment in agriculture in Nigeria over time.

In the short run, carbon emission (CO_2) was negative and statistically significant (P(t)= 0.0134<0.05) in determining the agricultural value added in the short run. The result is not surprising; it is expected given the heightened effects of the damaging effects of various industrial and exploration activities in various arable spaces in the various regions of the Nigerian economy. However, the result further showed CO_2 to be positive and statistically insignificant in determining the fate of agricultural value added in Nigeria. The sign of the coefficient of CO_2 meets a priori expectation in the short run model only. The negative but significant coefficient implied that there was an indirect relationship between carbon emission and AGVA (agricultural value added). A change in the CO_2 invariably decreases agricultural contribution to GDP growth rate by approximately 29.66 percent in the short run. In other words, increasing industrial and crude oil exploration activities triggers a declining trend on the agricultural productivity cum GDP growth rate of the country.

For objective V: The results of the Granger causality test showed evidence of a one-directional causality relationship running from gross fixed capital formation to agricultural value added (that is, GFCF→AGVA) between gross fixed capital formation and agricultural value added, within the period under the study. This was evident in the probability value (*p-value = 0.0554)* which does not exceed 0.05. Contrarily, the result also presents with no significant causality relationship between GEXPA & AGVA, AGSE & AGVA, CO_2 & AGVA, FGSIS & AGVA, and PDST & AGVA. Hence, this study concludes that there is a strong and significant one-directional causality relationship between GFCF & AGVA in Nigeria during the period covered in the study.

The constant term is significantly and positively signed, with a value of 43.267425. By implication, the value of agricultural value added (AGVA) was approximately 43.26, assuming the explanatory variables affecting it are kept sine-die, judging from the ARDL model employed in the analysis.

The Cointeq coefficient (-0.526813) substantiates the long-run relationship among the variables and denotes that the speed of adjustment of the variables' convergence to equilibrium is approximately 52.68%. The probability value is statistically significant since the p-value is less than 5% (i.e. 0.0018<0.05). By extension, the result of the ECM suggests that it takes approximately 1 year and 9 months for the dependent variable to adjust to the long run equilibrium in the face of any shocks on the explanatory variables.

The coefficient of R-squared (0.952372) substantiates the goodness of fit among the variables and denotes that the rate at which the explanatory variables (GEXPA, AGSE, GFCF, CO_2, FGSIS & PDST) is approximately 95.24%. The result indicated that the explanatory powers of the independent variables employed in the study are relatively on the average. On the contrary, the result of the R-squared suggests that only approximately 4.76% of what happens to the dependent variable is being explained by the residuals.

For the Diagnostics Test results, the BG-LM depicts the test for higher autocorrelation. The insignificant p-value of the BG-LM test shows that there was no higher autocorrelation for the chosen ARDL model. HET (BPG) entails the test for heteroscedastic residuals. The insignificant p-value of the BPG (HET) test meant that the chosen ARDL model was without heteroscedastic residuals. The Regression Equation Specification Error Test (RESET) being insignificant implies that the ARDL model was without misspecification.

The Jarque-Bera Test of normality of the residuals, which had its probability value (0.187727) to be greater than 0.05 indicated that the residual maintained a normal distribution; otherwise, they were normally distributed.

Figure 1.1: Normality Test Result

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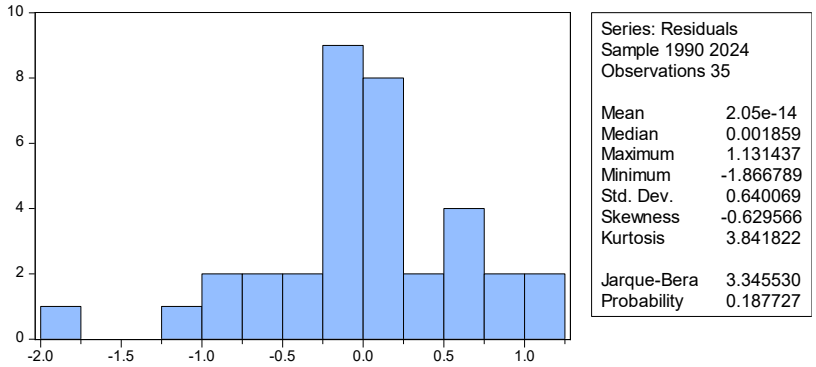


The CUSUM and CUSUM of Squares graphs which were helmed between two dotted red lines provides indication in courtesy of parameter firmness which showed that the CUSUM and CUSUM of Squares tests demonstrated that the models were stable as depicted in Figure 1.2 below;

Figure 1.2: Stability (CUSUM) Test Result

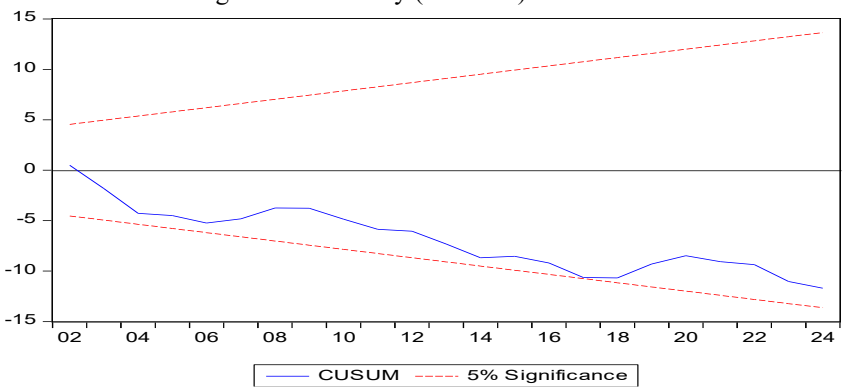
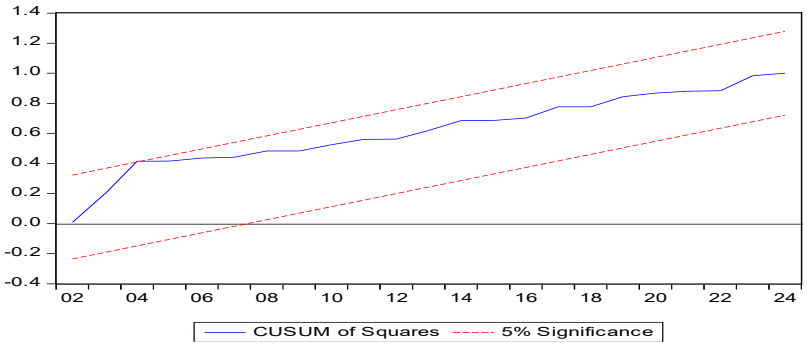


Figure 1.3: Stability (CUSUM of Squares) Test Result



In a nutshell, the models were best, linear and unbiased. This is due to the R^2 goodness test of fit. There was no higher autocorrelation, alluding the diagnostics tests, specifically the BG-LM test. The lack of heteroscedastic residuals in the outcome was demonstrated by the BPGs' insignificance.

VI. CONCLUSIONS AND POLICY RECOMMENDATIONS

The result of the Auto Regressive Distributed Lag (ARDL) regression model has shown that there was a positive and statistically insignificant relationship between aggregate government expenditure on agriculture and agricultural value added in the short run and long run in Nigeria over the period under review. Moreover, in the long run model, virtually all the other explanatory variables were significant except carbon emission (CO_2) and federal government annual spending on internal security (FGSIS). On this premise, economic interpretation can be made. The insignificant positive relationship that exists between aggregate government expenditure on agriculture and agricultural value added in the long run implies that for any increase in

the amount of spending for agricultural purposes in the economy, there is a corresponding but difficult to recognize economic gain in terms of multiplier-accelerator interaction. Thus, the policy implication of the above finding is that despite the increasing amounts of funds earmarked for the agricultural sector revamping, growth and expansion—meant for the benefits of the citizens in the forms of increasing infrastructural developments, increasing production and productivity, are rather being diverted and mismanaged for personal or selfish gains other than for the provision of the basic needs of ordinary Nigerians; the usual all-year-round budget deficits. On the other hand, these funds or resources have been seen to be compromised as it does not make for healthy economic growth nor provide the needed economic development outlook in the country. It, therefore, follows that government's special focus on agricultural sector activities is one of the major economic phenomena that affect the attainment of full employment in the economy, overall economy's productivity, growth and progress, as well as the overall performance of the economy. In reality, as the economy commits more attention into the mechanized aspect of the agricultural sector, this singular act of "*agricultural negligence*" approach has resulted to a *Cobra effect*. This is basically, in terms of mortgaging the future of the Nigerian citizens to the detriment of other highly promising and productive sectors of the economy, vis-à-vis services, manufacturing, construction, services, etc.

On the other hand, the increasing annual deficit budgets predicated on "*borrowing*" in the Nigerian economy impoverishes the welfare of the ordinary citizens (basically the dependent populations and the relatives or subjects of the Nigerians overseas) by mortgaging their happiness and standard of living via a reduced aggregate spending or consumption expenditure, as the bulk of the funds genuinely and statutorily mapped for agricultural funding are being spent on governance, public debts servicing, moribund and non-existing projects, and unrealistic national security issues, etc.

As evidenced by the revelations in the research, the under-listed policy recommendations are put forward:

From the result of the ARDL model, aggregate government agricultural spending was seen to exert an insignificant-positive influence on agricultural sector contribution to GDP in Nigeria in the short run and long run; implying that the effect of public spending in agriculture has not been felt in the Nigerian economy over time. This could be orchestrated by the imprudent and non-transparent cum corrupt practices amongst the top officials connected with the receipts, documentations and allocations of the agricultural funds. In the respect, it is expedient to the concerned actors in the accounting and allocation of agricultural funds—especially the Ministry of Finance, Budget and National Planning, Ministry of Agriculture, etc., to be fair and just in expending the resources (funds) mapped for the welfare of the citizens through the various agricultural programmes; so as to achieve the desired SDGs goal or response in the country. Such funds could meaningfully be channeled into the highly efficient, promising and productive agricultural subsectors of the Nigerian economy, which has high foreign exchange earning potentials—cocoa, rubber, livestock for leather works, and other various agro-allied programmes, etc.

As evidenced by the ARDL result, total number of manpower employed in the agricultural sector (AGSE) exhibited an insignificant negative impact on agricultural value added, but a significant negative influence on AGVA in the long run. It is suggestive; therefore, that the private sector be sensitized on the need and also be given the waiver to effectively commit the borrowed funds (which could be made readily through the agricultural credit schemes, etc) into meaningful and productive agricultural activities as emphasized in point (i) above. Thus, accrued oil revenues could be channeled into infrastructural developments including security facilities so as to guarantee the job-security of various agriculturalists. Moreover, there is the need for effective diversification of the export base of the Nigerian economy away from the domineering almighty crude oil, so as to strengthen the exchange rate.

Following the strong and significant one-directional causality relationship running from gross fixed capital formation to agricultural value added (that is, GFCF→AGVA) between gross fixed capital formation and agricultural value added, the study maintains that the government expedites tremendous economic diversification to enable the adequate resource accumulation for judicious investments in the agricultural sector.

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