

Agricultural Financing - Agricultural Sector Output Nexus: A Case Study of the Nigerian Economy

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Abstract

The study “Agricultural Financing -Agricultural sector output nexus: in Nigeria” investigated the effect of agricultural financing, both public and private on the outputs of two main sectors of agriculture: crop production and livestock production. Three objectives were formulated to provide guide to this study: examine the long and short run relationship of agricultural financing on crop production output and livestock production output, and to examine the causal relationship between agricultural financing and agricultural sector output. To achieve these objectives, the study employed two models, each using ARDL Test, Bounds Test, and Granger causality test using time series data from 1981 to 2019. Data was obtained from CBN and World Bank data base. Dependent variables were Crop Production output and Livestock Production output respectively and independent variables were Public Finance, Commercial Bank Credit to Agriculture, Inflation Rate and Interest Rate. The model was tested using descriptive statistics to analyse the significance of the relationship between the dependent and independent variables. The results show that both public and private finance were positive but insignificant in the short run. In the long run, public finance remained insignificant whereas private finance was positive and significant. Thus, private financing is more effective at improving agricultural output than public finance. The study also revealed a negative long run relationship between interest rate and the outputs of crop and livestock production during the period. It is therefore recommended that the government encourages private investment in agricultural activity, and puts measures in place to curb corruption and embezzlement. Government should also ensure that credit facilities are provided to farmers at low interest rate to reduce detrimental influences.

Keywords: Agricultural Financing, Agricultural Output, ARDL, Nigerian Economy

JEL Code: M0, M11, M12

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1. Introduction

Agriculture is the largest sector in many developing countries, Nigeria inclusive. More importantly, most of the world active but poor live in rural areas and are primarily engaged in agriculture in economic growth and development and this development cannot be over emphasized as it provides employment opportunities to its teeming youths in a country. Government intervention in the agricultural sector was primarily informed the need for national food security to ensure sustainable access to and availability and affordability of good quality food for all Nigerians (CBN, 2010).

Agricultural activity constitutes the mainstay of the rural population which account for two-thirds of Nigeria's population. It is the single most important activity and employs over seventy percent of the working population while contributing a range of thirty to forty percent of the Gross Domestic Product. The agricultural sector is the second largest sector after oil. It was once the primary sector but investment in the sector as more people rushed to the lucrative oil sector dropped significantly.

Agricultural productivity in Nigeria has largely been accounted for by resilient growth performances in four constituent sub-sectors: crops, livestock, fisheries and forestry (EBOH et al., 2012). While the agricultural sector may have in recent years contributed significantly to improved growth performance in Nigeria, its actual contribution appears to be much short of overall potential.

The subsectors of the agriculture sector in Nigeria have potentials that give the sector opportunity for growth. According to CBN (2012), between 1960 and 2011, an average of 83.5% of agriculture GDP was contributed by the crops production subsector making it the key source of agriculture sector growth.

Agricultural output has fluctuated widely and productivity has also declined. In terms of contribution to GDP, available statistics from the CBN shows that the agricultural sector's share of GDP increased from 28% in 1985 to 32% in 1988, dropped to 31% in 1989, rose to 37% in 1990 but fell significantly to 24% in 1992, it increased again to 37% in 1994. It was 32% in 1996 and rose to 40% in 1998, dropped again to 27% in 2000, increased to 37% and fell to 31% in 2002 and 2006 respectively. The percentage contribution of the agricultural sector to GDP fell persistently from 0.37 in 2009 to 0.22 in 2012 and to 0.20 in 2014

In today's world, the agriculture sector acts as a catalyst, accelerating the pace of restructuring and diversifying the economy that depends less on the supply of foreign agricultural products or raw materials to economic growth and sustainable development. The agricultural sector contributes mainly to the nation's development in the aspect of enhancing government revenue, expenditure and aspect of enhancing government revenue; infrastructural, living standards and

also contribution to Gross Domestic Product.

The sheer size of agriculture suggests that strategies designed to promote the early stages of economic growth cannot ignore agriculture. The promotion of the rural economy in a sustainable way has the potential of increasing employment opportunities in rural areas, reducing regional income disparities, stemming pre-mature rural-urban migration, and ultimately reducing poverty at its very source (Anriquez and Stamoulis, 2007).

2. Literature Review

Agriculture is the way of life that involves the production of food, livestock rearing through fishing, animal husbandry, systematic growing and harvesting of crops for production of commodities such as feed and fibre among others. Agricultural activity is integral to the survival of the human race. It was key to the development and the rise of primitive human civilisations and nurtured the growth and subsequent prosperity of these civilisations. Agriculture can be dated back thousands of years and marks man's transition from rudimentary hunter and gatherer communities to the societies that will birth the greatest civilisations.

2.1. Public Finance

Government financing are strong instruments introduced to remove market failure (tendency for an economy to produce too much of some goods and an insufficient number of others) and can launch an economy into achieving economic growth. Government finance or expenditure are the expenses which a government incurs for (i) its own maintenance (ii) society and the economy (iii) helping other countries (Bhatia 2002).

Government finance represents the total government spending to attain the predetermined macro-economic objectives. In the Nigerian economy public finance can broadly be categorized into capital and recurrent financing. The recurrent financing are government expenses on administration such as wages, salaries, interest on loans, maintenance etc., whereas expenses on capital projects like roads, airports, health, education., telecommunication, electricity generation etc., are referred to as capital financing (Obinna, 2003).

2.2. Agricultural Financing

Agricultural credit is often seen as any of several credit vehicles used to finance agricultural transactions, including loans, notes, bills of exchange and bankers acceptances. Agricultural credit enhances productivity and promotes standard of living by breaking vicious cycle of poverty of small-scale farmers. Credit has also been discovered to be a major constraint on the intensification of both large and small-scale farming. Agricultural financing refers to all efforts to provide easier access to such credit facilities.

Agricultural financing is crucial to agricultural and rural development in Nigeria. Approximately 70% of the population is concentrated in rural areas with agriculture not just as a means of income but also a lifestyle. Improvement in finance accruing to agriculture will greatly enhance its productivity.

2.3. Theoretical Review

John Maynard Keynes was the first proponent of government expenditure as instrument of fiscal

policy in 1936 after when classicalist's postulation stated that economy is regulated with the help of market mechanism and there is no government intervention has failed and led to the great depression of 1930. Keynesian (Modern Concept) view: this opines that Government must play a positive role in order to regulate the economy by government spending and taxes in the most desirable manner. This school of thought discredits the belief of classical that supply creates its own demand and the automaticity of the economic system to generate full employment and growth by itself without interference. Keynes believes that the propensity to consume reduces as income increase and the propensity to save increase as income increase. This will bring about disequilibrium in the economy as consumptions (aggregate demands) do not grow proportionally with savings when income is rising. Thus, to maintain income, employment and growth it is necessary to off-set the effects of reducing demand for outputs by a corresponding increase in public expenditure. Hence, if undesirable economic conditions are to be avoided the gap between the income and expenditure must be filled either by increasing propensity to consume in the economy or by increasing government expenditure.

2.4. Review of Empirical Studies

Yusuf and Mohammed (2017) assessed the effect of public expenditure on crop production in Yobe State using primary data. The study adopted survey research design and collected cross-sectional data. The study used Chi-square to test the hypothesis and found out that public expenditure does not have effect on the output of crops and therefore recommended that a policy framework needs to be instituted in the diversification of public expenditure. However, the study was carried out in Yobe State and include only capital expenditure and there is need for similar study to be replicated in Kogi State using both capital and recurrent expenditure.

Uremadu, Ariwa and Uremadu (2018) examined the effect of government agricultural expenditure on agricultural output in Nigeria using time series data from Central Bank of Nigeria from 1981 to 2014. Vector Error Correction model estimation technique was used and the study revealed that total government agricultural expenditure (TGEX) had a positive and significant effect on agricultural output (AGO) in Nigeria during the period studied. The major weakness of the work was that the independent variable was not disintegrated; the study used total government expenditure as the independent variable. Therefore, the current study will disaggregate the expenditure into capital and recurrent.

Rufus and Oyewole (2018) empirically evaluated the nexus between public spending on agriculture and Nigerian output growth. The findings show that agricultural sector output has positively impact on the economic growth in Nigeria over the period under study. The main weakness of the study was failure to test for long-run relationship between the variables using Johansen cointegration analysis.

Mgbanya, Onwumere, Eze, Nwokenekwu & Igwe (2018) assessed the impact of the national recurrent expenditure on Nigeria's agricultural growth from 1990 to 2017. The Wald test result showed that the F-statistics (23.126) was greater than the F-tabulated (4.32) at p-value < 5%, this implies that the recurrent expenditure on agriculture has a significant impact on the agricultural share of GDP from 1990 to 2017. However, this study overlooked capital expenditure on agricultural growth and also relied on only secondary data for data collection.

Brown and Ajayi (2015) in their study examined the effects of government spending on the

agricultural sector in Nigeria. The study revealed that total government expenditure had positive and significant impact on agricultural output in Nigeria during the period under study. Based on the above findings, the study recommended for an increase funding of the agricultural sector in Nigeria. However, the study fails to disaggregate the components of public expenditure.

Emmanuel (2008) carried out a study on the impact of macroeconomics environment on agricultural sector growth in Nigeria. The macroeconomic policies included in the model are:- credits to the agricultural sector, nominal interest rates on the loan, exchange rate, world prices of agricultural produce, foreign private invest-government expenditure and inflation rate. Here recommends that macroeconomic policies that enhance favourable exchange rates, make agricultural credit widely available at low interest rate, reduce the rate of inflation, increase foreign private investment in agriculture, would not fortify government investment in the sector but would be invaluable in supporting agriculture and agricultural output growth in Nigeria.

3. Research Method

3.1. Theoretical Framework

The model is anchored by the Keynesian theory of public expenditure which makes up a key component of public finance. It is a macroeconomic theory of the total expenditure Keynes believed in the use of public expenditure as a tool of fiscal policy to stimulate the economy and encourage increased productivity as well as economic growth. Public expenditure can be used to finance the agricultural sector and improve agricultural productivity.

3.2. Model Specification

The model incorporates public finance given to the agricultural sector and commercial bank credit to agriculture as major independent variables. Agricultural output broken down into crop production output and livestock production output are respective dependent variables. Inflation rate and interest rates are further included as control variables within the model. Following the above, the implicit forms of the models are:

Model 1 (one) is structured as thus:

$$CPO = f(PF, CCA, INFR, IR) \dots\dots\dots (1)$$

Model 2 (two) is structures as thus:

$$LPO = f(PF, CCA, INFR, IR) \text{-----} (2)$$

Where CP is crop production output

LP is livestock production output

PF is public finance to the agricultural sector.

CCA is commercial bank credit to the agricultural sector.

INFR is the annual inflation rate.

IR is the lending interest rate

The explicit forms of the models are specified as:

Model 1 (one):

$$CPO = \alpha_0 + \alpha_1 PF + \alpha_2 CCA + \alpha_3 INFR + \alpha_4 IR + \mu \dots\dots\dots (3)$$

Model 2 (two):

$$LPO = \alpha_0 + \alpha_1 PF + \alpha_2 CCA + \alpha_3 INFR + \alpha_4 IR + \mu \dots\dots\dots (4)$$

α_0 is the intercept, α_1 , α_2 , α_3 , and α_4 are coefficients of their respective variables. While μ is the error term.

3.3. *Apriori Expectation*

From the models specified, the a priori expectation is written as $\alpha_1 > 0$, $\alpha_2 > 0$, $\alpha_3 > 0$, $\alpha_4 < 0$. Public finance and commercial bank credit to agriculture are expected to have a positive relationship with crop production output and livestock production output respectively. Interest rates and inflation rates are expected to have a negative relationship with the crop and livestock production outputs.

3.4. *Estimation Techniques*

Unit root test, Autoregressive distributed lag, Bound's test and Granger causality were employed to estimate the model and to achieve the objectives.

4. **Result and Discussion**

Unit root test was conducted at level and at first difference, using 5% significance level as the criteria. Considering the results of the table below, it shows that all variables exempting inflation are stationary at first difference. Whereas inflation is stationary at level.

Table 1. Augmented Dickey Fuller (ADF) Test Result

Variables	ADF statistic	Probability value	Order of integration	Maximum lag length
CPO	-4.190273	0.0022	I(1)	9
LPO	-3.246824	0.0251	I(1)	9
PF	-8.570666	0.0000	I(1)	9
INT	-5.365600	0.0001	I(1)	9
CCA	-7.001994	0.0000	I(1)	9
INFL	-3.391148	0.0175	I(0)	9

Source: Author's computation, from EViews 9, 2021.

4.1. Results for Model 1 (one) the Bound's Test

From examining the findings, the existence of a co-integrating relationship can be inferred. The F-statistic has a value of 8.015397. This is greater than the upper bound value at 5% level of significance which is, 4.01. Therefore, it can be concluded from the results of the Bound's test, that the variables are indeed co-integrated which implies that there is existence of long-run equilibrium relationship existing between the variables.

Table 2. ARDL Bounds Test Result

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	8.015397	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Author's computation from Eviews 9, 2021.

4.2. ARDL Co-integrating and long Run Form Result

In light of the results displayed below, the R-squared has a value of 0.99. This shows that the independent variables explain changes in the dependent variable of crop production to the tune of 99%.

The co-efficient of the adjusted R-squared equals 0.99, which confirms the extent to which variation in the chosen independent variables explains variation in the chosen dependent variable.

The Durbin Watson statistic evaluates serial correlation within a model. The Durbin Watson has a value of 1.77, which indicates that there is positive serial correlation within the model.

The probability value of the F-statistic equals 0.0000 showing that the model is significant at the 5% level of significance.

ARDL result is to determine the variables that are responsible for short run shocks within the model. The errors are corrected by the magnitude of the R- squared that is after another regression have been carried out.

The dependent variable of this study is the output of crop production. The coefficient of public finance in the current year is 0.026146. The sign is positive, which indicates that public finance is positively related to the output of crop production. Public finance might have been expended in the provision of credit facilities to crop producers which had positive effect on the output. However, probability value of 0.4251 suggests that public finance of the current period is insignificant.

In the first lag, the coefficient of public finance is -0.006248. Public finance is found to be inversely related to the output of crop production, in the first lag. Public finance of the previous

year has negative effects on current levels of crop production output. This can be attributed to the embezzlement of public funds, rather than investment in crop production. Although government budgets show increasing levels of funding, this money does not meet its intended recipients. Therefore, a unit increase in public finance will decrease crop production output. The probability value of 0.8380 also indicates that public finance is insignificant to crop production output.

The coefficient of public finance in the second lag is -0.154746 also denoting a negative relationship between crop production and public finance in the second lag. This negative relationship is caused by the high level of corruption and fraud that occurs at high levels of government. Although, the probability value of 0.0000 suggests that public finance in the first lag is significant at 5% level of significance.

The coefficient of commercial bank credit to agriculture which is denoted by CCA is 0.042627 is positive. Thus, there is a positive relationship between commercial bank credit to agriculture and the output level of crop production in the current period. A unit increase in commercial bank credit to agriculture will result in a 0.04262 increase in the output level of crop production. The probability value of 0.3849 indicates that this is insignificant at the 5% level of significance.

The interest rate of the current period has a coefficient of -0.002114 which is negative. Therefore, interest rates have an inverse effect on crop production output. This conforms to apriori expectations. The probability value of 0.7447 also indicates that interest rate is insignificant.

The ARDL result overall is statistically significant and negative. The coefficient is -0.266230, which is negative and complies with apriori expectations. The probability value is 0.0009, which is statistically significant at the 5% level of significance.

The ARDL also specifies the nature of the long run relationship within the model. From the probability value of the long run coefficients, one can conclude if there is a significant relationship between the respective dependent variable and the independent variable in the long run.

The coefficient of inflation equals 0.449455 with a probability value of 0.0125. Thus, it can be concluded that in the long run, there is no co-integration between inflation and crop production output. Inflation does not affect crop production output in the long term.

Public finance has a coefficient of 0.682227 as well as a probability value of 0.0000. Considering the probability value, we conclude that there is no significant co-integrated relationship between public finance and the output of crop production. Plainly put, government financing geared towards the agricultural sector has no significant effect on the long term outputs of crop production.

The analysis also presents the long run coefficients of commercial bank credit to agriculture which has a value of 0.160114 and a probability value of 0.3301. There exists a positive long run relationship between commercial bank credit and crop production output. From the probability value, we can conclude that there is existence of co-integration between commercial bank credit to agriculture and crop production output. That is to say that commercial bank credit to agriculture affects crop production in the long run.

Interest rate has a coefficient of -0.007940 with a probability value of 0.7324. The negative coefficient indicates that there is an inverse relationship between interest rate and crop production output in the long run. This denotes the existence of co-integration and asserts that there is a significant long run relationship between interest rates and crop production output.

Table 3. ARDL co-integrating and long Run form Result

Dependent Variable: LNCP_OUTPUT

Co-integrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNINFL)	0.119658	0.030766	3.889304	0.0006
D(LNPF)	0.026146	0.032287	0.809787	0.4251
D(LNPF(-1))	-0.006248	0.030261	-0.206470	0.8380
D(LNPF(-2))	-0.154716	0.030639	-5.049703	0.0000
D(LNCCA)	0.042627	0.048266	0.883172	0.3849
D(INT)	-0.002114	0.006426	-0.328966	0.7447
CointEq(-1)	-0.266230	0.071512	-3.722872	0.0009
Cointeq = LNCP_OUTPUT - (0.4495*LNINFL + 0.6822*LNPF + 0.1601				
*LNCCA -0.0079*INT + 5.7251)				

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINFL	0.449455	0.167844	2.677805	0.0125
LNPF	0.682227	0.110646	6.165854	0.0000
LNCCA	0.160114	0.161429	0.991849	0.3301
INT	-0.007940	0.022978	-0.345552	0.7324
C	5.725123	0.611458	9.363071	0.0000

R-squared	0.998483	Durbin-Watson stat	1.773635
Adjusted R-squared	0.998033		
Prob(F-statistic)	0.000000		

Source: Author's computation from Eviews 9,2021.

4.4. Granger Causality

According to the results of the analysis below, granger causality runs uni-directionally from inflation to crop production output. It is evident that Inflation granger causes Crop Production output whereas, crop production output does not granger cause inflation. Hence, this relationship is one-sided in nature.

It can also be inferred that public finance does not granger causes crop production output and neither does crop production output granger causes public finance. Thus, there is no causal relationship existing between the two variables.

Similar to public finance, commercial bank credit to agriculture does not granger cause crop production output and neither does crop production output granger cause commercial bank credit to agriculture. There is also no causal relationship existing between the variables.

In a similar vein, interest rate does not granger caused crop production outputs and neither does crop production output granger cause interest rates. There is also no causal relationship existing between the variables.

Table 4. Granger Causality Test Result

Pair wise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
INFL does not Granger Cause CP	37	3.57924	0.0396
CP does not Granger Cause INFL		3.27420	0.0509
PF does not Granger Cause CP	37	2.65008	0.0861
CP does not Granger Cause PF		1.90134	0.1659
CCA does not Granger Cause CP	37	1.70278	0.1983
CP does not Granger Cause CCA		0.71198	0.4983
INT does not Granger Cause CP	37	2.66563	0.0850
CP does not Granger Cause INT		0.69595	0.5060

Source: : Author's computation from Eviews 9, 2021.

4.4. Residual Diagnostics

The Jarque-Bera normality test was conducted to test for the normal distribution of the variables within the model. The null hypothesis states that the variables are normally distributed within the model. The JarqueBera test has a probability value of 0.259560, thus is insignificant at 5% level of significance. Therefore, the null hypothesis is accepted and it is concluded that the variables within the model are normally distributed.

The Serial Correlation LM test was also conducted to check the existence of serial correlation, otherwise known as auto correlation within the model. The null hypothesis states that there is no serial correlation within the model. The Serial Correlation LM test has a probability value of 0.8570, therefore it is insignificant at the 5% level of significance. Thus, the null hypothesis is accepted and it is concluded that there is no serial correlation within the model.

Furthermore, the heteroskedasticity test was conducted to check the variance of the residuals. The null hypothesis states that there is no heteroskedasticity. The probability value of the heteroskedasticity test is 0.0418, therefore it is significant at 5% level of significance. The null hypothesis is rejected and we conclude that the variables are heteroscedastic.

The Ramsey RESET test was employed to check for specification errors within the model. The null hypothesis states that there are no specification errors. The Ramsey RESET test has a

probability value of 0.0843, which is insignificant at 5% level of significance. Therefore, we accept the null hypothesis and conclude that there are no specification errors.

4.4. Residual Diagnostics

Table 5. Residual Diagnostics Test Result

Residual Diagnostics Test	Statistics	Probability Value
Jarque-Bera Normality test	2.697537	0.259560
Serial Correlation LM test	0.155280	0.8570
Heteroskedasticity test	2.314727	0.0418
Ramsey RESET test	3.231881	0.0843

Source: Author's computation from Eviews 9, 2021.

5. Conclusion

The study concentrated on the agricultural financing –agricultural sector output in Nigeria. From examining the findings, it can be inferred that agricultural financing has an overall positive effect on agricultural productivity.

In the short run, the effects of public and private finance were largely insignificant due to the long-term nature of agricultural ventures. It often takes years to see the results of agricultural investment.

In the long run however, only private financing proved to have any relationship with crop production output and livestock production output. Public finance did not have any significant long run relationships with either crop production or livestock output. It can be concluded that public finance has no significant effect on crop production or livestock output

It can also be inferred that neither public nor private finance share a causal relationship with the outputs of crop production and livestock output.

In light of the findings of this study, application of suitable policies is necessary to ensure increase in agricultural sector output and all the benefits it affords. Such policies will also be beneficial to the nation's economy and achievement of economic growth through agricultural development.

As indicated by the above findings, the following policies are recommended

Firstly, the futility of public finance in improving agricultural sector output has been proven, due to the large amount of corruption and embezzlement. Discrepancies between the actual amount allocated to the sector and recorded funds exist. Government should put in extra measures to curb corruption and ensure that these funds reach their intended recipients. Establishment of necessary checks and balances as well as creation of devoted anti-corruption agencies are recommended, in order to curb fraud.

Secondly, the Nigerian government should focus more on encouragement of private investment through special directives to commercial banks among others. Governments should encourage financial institutions to make certain percentage of their credit facilities available to the agricultural sector. This will increase private investment and therefore increase the long run

outputs of crop production and livestock production.

Thirdly, interest rate has been proven to have an inverse long run relationship with the outputs of crop production and livestock production. High interest rates make it difficult for farmers to procure credit facilities and as a result, cause declines in productivity. Government should therefore regulate interest rates to ensure that credit facilities are provided to farmers at lower interest rates. This will encourage farmers to make use of credit facilities to improve agricultural yield.

Finally, in order to improve agricultural sector output, it is important to provide the necessary public goods that aid in conducting business and other economic activities. Infrastructural decay is a major issue faced by the agricultural sector, eliminating it will greatly help agriculture in Nigeria. Public funding should be geared towards providing adequate infrastructural facilities to create a more conducive business atmosphere. Facilities such as good roads, electricity, water etc should be concentrated in rural areas where the bulk of agricultural activity takes place.

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