

Agricultural Output Financing and Poverty Level in Nigeria

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Abstract

The study explores the dynamic relationship among Agriculture Financing, Agriculture output and the level of Poverty in Nigeria. This was done in order to establish empirical evidence regarding the linkages among agriculture financing, agriculture output and poverty level. Secondary data on agriculture financing (government expenditure to agriculture sector), agriculture output and real consumption expenditure per capita used to proxy poverty level were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and National Bureau of Statistics (NBS). Using the Vector Error Correction Mechanism (VECM) approach, the result revealed that a one per cent innovation in both agriculture output and poverty reduction resulted in a neutral response by agriculture financing in the initial period but the response to agriculture output increased to about 0.2 per cent at the 10th period but declined over time to 0.14 per cent at the 10th period. The neutral response of agriculture financing to an innovation to poverty level became negative over time. Also, agricultural output and real consumption expenditure per capita responded negatively to an innovation in agriculture finance over time. Interestingly, poverty level responded positively as a result of an innovation in agricultural output and agricultural finance over time. Consequently, policy implications are discussed.

Keywords: *Agriculture Financing, Poverty level, Cointegration, VECM, Agriculture output*

JEL Classifications: *E62, I38*

Introduction

Agricultural investment is an effective tool for the reduction of hunger, promotion of agricultural productivity and the enhancement of environmental sustainability which is the road towards poverty reduction. However, a positive impact of investment in agricultural production will be elusive without an investment in the

farm level capital formation hence the indispensable nature of government financing in the sector.

According to Food and Agriculture Organisation (FAO, 2006) agriculture has contributed immensely to the Nigerian economy over the years. However, the agriculture sector in Nigeria has a strong rural base; hence, the need for grass approach encompassing both rural and agricultural development. To a large extent agricultural sector development dictates the pace of growth and development at the national level (Iganiga & Unemhlin, 2011). More so, improving agricultural productivity through financial attention is perceived as a key to attain a sustainable reduction in poverty level (Diao, et al., 2010).

Rapid population growth coupled with increasing urbanization compelled the need for increased production, processing and marketing of agricultural products leading to increased income for farmers. The increases in farmer's income will gradually make farming more capital-intensive with the use of modern inputs such as improved seedlings, machineries, fertilizers and pesticides through government investment and interventions in the agriculture sector leading to increased productivity with potential for poverty reduction in the long run.

As evidenced from Table 1, government allocation to agricultural sector have been increasing over the years, however, these increases, decreases in relative to the total budget from 1990 till date with an exception of 2010 that shows an increase relatively to the total budget. Although, despite the decreases in relative to the total budget allocation, the sector output, has been increasing marginally with the exception of 2010 that recorded high output level.

Table 1: Federal Government Budget, Agriculture Expenditure, Agricultural Output and Poverty Level in Nigeria

Year	Federal Budget (FB) (M)	Govt. Exp. On Agric. Sector (GEAS) (M)	% of GEAS to FB	Agric. Output (M)	Poverty Rate
1990	60,268.2	2,712.1	4.5	97,464.06	44
1995	248,768.1	6,965.4	3.8	619,806.83	60
2000	701,100.0	10,596.4	1.5	1,126,693.12	80.9
2005	1,500,000	26,000.0	2.4	4,773,198.38	54.4
2010	4,100,000,000	148,000,000.0	3.9	10,273,651.99	69
2015	4,454,000,000	39,150,000.0	0.9	4,223,469.13	61

Source: CBN 2018 and NBS 2018

The high output level recorded in 2010 could have been as a result of significant percentage of 3.9 per cent of the total budget that was allocated to the sector. This may be justified with scenario that played out in 2015. However, it is difficult to conclude without an empirical study in supporting this claim.

Moreover, despite the increases in government allocation over the years with increases in agriculture output, poverty has been alarming. This can be traced to the fact that the agriculture sector has not been properly financed as a result of being neglected at the expense of oil exploration and production. More so, is the impending food security crisis in the face of its rapidly growing population which makes the country depends more on imported foods (Vanguard, 2016). Additionally, the food insecurity challenge was exacerbated by the problems of insurgence and farmer/herder clashes in the North East, hampering domestic food production, access to regional markets and has displaced farmers and their families.

Interestingly, there are vest of studies that have look into credit availability and agriculture productivity, such as (Olorunsola et.al 2017; Ogbuabor and Nwosu2017; Fankun and Evbuomuran 2017; Nnamocha and Eke 2015; Udoh 2011; Oboh and Ekpebu 2010; and Akinlola 2004 among others. However, these studies have failed in considering the end result and the main objective of government policies in attracting finances to agriculture sector considering his allocation without considering the issue of poverty in the country.

This study will fill the aforementioned gap by looking at the interactions among government agriculture financing, output and poverty reduction in Nigeria. The issues discussed above therefore calls for an inquiry into the dynamic relationship existing among agriculture financing, output and poverty reduction in Nigeria for the period 1990 to 2019 given the following objective

- (i) To investigate the interactive effect among agriculture financing, output and poverty reduction in Nigeria.

This becomes necessary since, financing agriculture sector is one of the main constraints facing the sector in attaining its potential output which could be a medium of poverty reduction in Nigeria. However, the current government sees

that solving this problem is necessary in order to guarantee food security, improve living standard of the people, and reducing the poverty level in Nigeria.

Literature Review

It has been established that public finance in the area of agricultural research, road network infrastructure education can contribute positively in varying proportions to the growth of the agricultural sector across regions and as a matter of fact investments in research based activities have exhibited stronger impacts on agricultural productivity and have proven to be an essential driving force of productivity in agriculture than the non-research based expenditures (Fan & Saurkar, 2006; Fischer, Byerlee & Edmeades, 2009). The impacts of research and development efforts in the agricultural sector has been found to be country specific hence public agricultural finance priorities would depend on local realities. Among the top drivers of development in the agricultural sector is public investment in infrastructural development at the rural areas (Fan, Hazell & Thorat, 2000; Fan, Zhang & Zhang, 2004; Mogues, 2011) with tendencies for poverty reduction. In Ethiopia, for example, access to good road network was found to have reduced poverty by 6.9 percent while increasing consumption growth by 16.3 percent (Dercon et al., 2009) this was also found to be the public investment with the highest rate of return in the economy (Mogues, 2011). While Uganda recorded a marginal returns from government expenditures on rural roads on agricultural output and poverty reduction that was three to four times larger than the returns to public spending on urban roads (Fan & Zhang, 2008).

Theoretical Review

Generally, there are in a broad sense, both micro and macroeconomic foundations of the theory of institutional economics. Theoretically, the function of public finance in the reduction of poverty can be viewed from two perspectives namely the classical perspective and the development school perspective (Lipton 1998).

In the classical perspective economic development is seen as the process of transferring factors of production, most especially labor from the traditional rural agricultural sector associated with low productivity and traditional technology to the modern industrial sector characterized by modern technology and higher productivity. Agriculture was perceived to contribute passively to economic development majorly in the area of food and labour supply. Agriculture role in sustaining economic transformation was limited to supply of food, stabilization of food prices and real wages thus providing support for industrial development. Also, agriculture helps to utilize the land in a way that it would not compete with

resources for industrial growth. Agriculture's contributions to economic growth can be seen through its impact on the total factor productivity or as an intermediate input in the production process of the industrial sector (Ruttan, 2000). According to the development school, agriculture is very important as it provides the needed funds for industrial sector development. Agricultural growth and expansion thus serve as an engine of growth to the aggregate economy, hence the inclusion of agriculture to the standard Solow-Swan growth equation as a link between the rural traditional sector and the urban industrial sector in an economy (Hwa, 1988).

Empirical Studies

Studies have empirically examined the relationship between public finance in agriculture and agricultural output in Nigeria some of which are reviewed in this section. Rhaji (2008) examined the relationship between agriculture and the Nigerian economy using the Ordinary Least Square regression technique and found that inadequate, inaccessible and unaffordable credit is a key factor that contributes greatly to the constant reduction in the contribution of agriculture to the Nigerian economy. This is a view shared by Udoh (2011), Imoisi *et al.* (2012), Ammaini (2012) and Onoja (2012)

Udoh (2011) explored the interaction between public expenditure, private investment and agricultural sector growth in Nigeria for the period 1970-2008 through the use of autoregressive distributed lag model (ARDL). The study found that increase in public expenditure has a positive impact on agricultural output growth while foreign investment exhibited an insignificant impact on agricultural output growth in the short run. Imoisi *et al.* (2012) in an examination of the impact of agricultural credits on agricultural output and productivity in Nigeria from 1970-2010 revealed the existence of a significant relationship between Deposit Money Banks loans and advances to the agricultural sector and output. Also, Ammaini (2012) studied the relationship between formal credit supply and agricultural production in Nigeria, revealing a positive and significant relationship between formal credit and crop, livestock and fishing production. Onoja (2012) examined the pre and post financial reform's credit to agriculture and its determinants. The study revealed an exponential rise in the supply of credit to the agricultural sector in the post reform era. The study also established that interest rates, immediate past volume of credit guaranteed by ACGSF and stock market

capitalization, are major determinants of the volume of institutional credit granted to the agricultural sector in the post reform periods.

Nnamocha and Eke (2015) examined the impact of banks credit on agricultural output in Nigeria using the Error Correction Mechanism (ECM) on annual data from 1970 to 2013. The study revealed that bank credit and industrial output exhibited a long run relationship with agricultural output while a short run relationship exists between industrial output and agricultural output.

Udoka *et al.* (2016) while examining the impact of commercial banks' credit on agricultural output in Nigeria established a positive statistically significant relationship between agricultural credit and agricultural output. The study also found a positive, statistically significant relationship between government finance in agriculture and agricultural production. Ogbuabor and Nwosu (2017) also studied the effect bank's agricultural credit on agricultural production in Nigeria with the use of the error correction model (ECM) from 1981 to 2014. The study established that deposit money bank's agricultural credit exhibited a positive and statistically significant relationship with agricultural production in the long-run, while the impact is quite negligible in the short-run. This was buttressed by Fankun and Evbuomuwan (2017) who examined financing of agriculture as a way of diversification of the Nigeria economy. The study appraised agricultural financing for diversification of the economy using review approach. The study maintained that agriculture plays a pivotal role in the growth and development of the Nigerian economy most especially before the discovery of crude oil in commercial quantity. However, Olorunsola *et.al* (2017) in an examination of the impact of bank credit to agriculture on the agricultural output in Nigeria from 1992Q1 to 2015Q1 using the nonlinear autoregressive distributed lag model (NARDL) found no evidence of asymmetry in the impact of credit to output growth in the agricultural sector in the short-run, while different equilibrium relationships exist in the long-run. The cumulative agricultural output growth is mostly attracted by the impact of the positive changes in credit to agriculture with a lag of four quarters of the prediction horizon.

Most existing studies in Nigeria have focused on the relationship between public finance in agriculture and agricultural output, while other focused on agricultural credit and agricultural output. However, little attention has be placed on role of agricultural financing and poverty reduction, hence a major reason for this present study.

Methodology

Model specification

In order to provide evidence with regards to how macroeconomic variables respond to exogenous impulses and to properly differentiate alternative model, a vector autoregressive model (VAR) shall be specified. This will engender a rich understanding of the dynamics of the time series engaged in the study this framework seems preferable since it provides credible and coherent method for making structural inference, meaningful forecast and appropriate interpretation of data and analysis of policy (Sims, 1980).

$$AQ = \delta_1 Q_{i-1} + \delta_2 Q_{i-2} + \dots + \delta_3 Q_{i-\rho} + e_i \quad (1)$$

$$Q_i = (Af_t, AP_t, PV_t) \text{ and } e_i = \sum u_i$$

Where

Af_t = Agricultural finance

AP_t = Agricultural output

PV_t = Poverty level

$\delta_1, \delta_2, \dots, \delta_\rho$ are the elasticities of government agriculture finance,

agriculture output and the level of poverty. Therefore, Q_t becomes:

$$Af_t = \delta_1 Af_{t-1} + \delta_2 AP_{t-1} + \delta_3 PV_{t-1} + u_{t1} \quad (2)$$

$$AP_t = \delta_4 AP_{t-1} + \delta_5 Af_{t-1} + \delta_6 PV_{t-1} + u_{t2} \quad (3)$$

$$PV_t = \delta_7 PV_{t-1} + \delta_8 AP_{t-1} + \delta_9 Af_{t-1} + u_{t3} \quad (4)$$

To obtain the estimates of the dynamic impacts among the variables, equations 1 – 4 were estimated using the Choleski Decomposition of the residual matrix of covariance. The implication is that the variables in the VAR are affected by the shock to itself and that of other variable.

Secondary data on the variables were obtained from the CBN statistical Bulletin (2018), World Development Indicator (2018) as well as the National Bureau of Statistics bulletin (NBS, 2018).

Empirical Analysis
Time Series Properties of the Data

Table 2 revealed that all the variables (Agriculture Finance (proxied by agriculture allocation by government), Agriculture output and the level of poverty (represented by the real consumption expenditure per capita) were all stationary at first difference implying an integration of the first order (I(1)) in the at 95 per cent level of confidence.

Table 2: ADF Unit Roots test for Variables in Model One

<i>Log(Af)</i>	-2.41	-3.74	I(1)
<i>Log(AP)</i>	-1.68	-3.76	I(1)
<i>Log(PV)</i>	-1.79	-3.88	I(1)

Critical Value at 5% = 2.99

Source: Author's Analysis (2019)

An optimal lag length would be specified in the determination of the cointegrating relationship among the variables as specified in the study objective. Table 3 contains the optimal lag length selection criteria used; Schwarz Bayesian Criteria (SBC), Akaike Information Criteria (AIC), and Hannan-Quinn Information Criterion (HQ); all criteria revealed two lag length as the optimal lag structure for the VAR estimation.

Table 3: Optimal Lag Length Selection

	LogL	LR	FPE	AIC	SBC	HQ
0	-112.319	NA	22.03451	10.4321	10.57612	10.58419
1	-42.5219	111.1097	0.052133	4.364741	5.712674	4.766483
2	-21.4526	21.21456*	0.017761*	4.111431*	5.100549*	4.273459*
3	-18.7122	5.61887	0.025678	4.513982	5.81619	4.847115
4	-14.3421	4.22261	0.05567	5.002398	6.870651	5.010367

**implies the lag order selected at 5 per cent level of significance.*

Source: Author's Analysis (2019)

The Johansen cointegration technique was employed using lag length 2 and the result showed evidence of cointegrating relationship among the macroeconomic variables employed in the model. To show the dynamic interaction among agricultural financing, agricultural output and poverty the study employed the

Vector Error Correction Model (VECM) impulse response approach through the estimation of the VAR models specified in equations 2-4.

Results of VECM Impulse Response Analysis

For each of the variables engaged in the model as revealed by Figure 4.1, the horizontal axis shows the number of periods that have passed after the impulse has been given, while the vertical axis measures the responses of the variables.

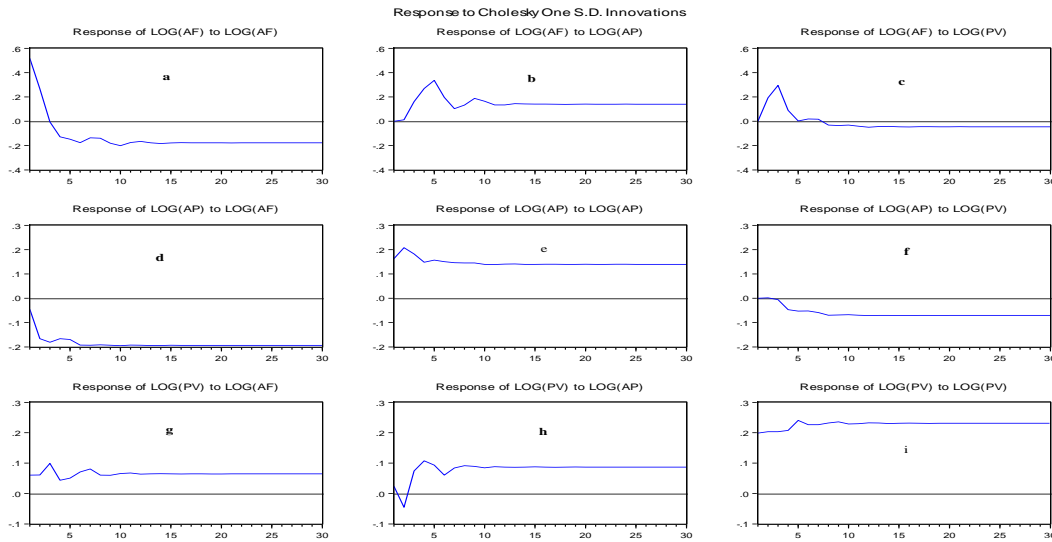


Figure 1: Impulse Response functions
 Source: Author's Analysis (2019)

Evidently from Figure 1 (Panel b and c) respectively, one per cent innovation to both agriculture output and poverty reduction brought about a neutral response by agriculture financing which is measured by government expenditure to agriculture sector at the initial period but the response to agriculture output increased to about 0.2 per cent at the 10th period but declined over time to 0.14 per cent at the 10th period. The neutral response of agriculture financing to an innovation to poverty (measured by real consumption expenditure per capita) became negative over time. Also, in (Panel d and f) agricultural output and Poverty responded negatively to an innovation in agriculture finance over time. Interestingly, poverty level responded positively to innovation in agriculture output and agriculture finance over time as shown in (Panel g and h).

Table 4(i): Variance Decomposition LOG (AF)

Period	S.E.	LOG (AF)	LOG (AP)	LOG (PV)
1	0.517362	100.0000	0.000000	0.000000
10	0.998090	52.09564	34.23116	13.67320
20	1.234586	54.52860	35.20821	10.26500
30	1.434385	55.73214	35.66314	8.604720

Source: *Author's Analysis (2019)*

Table 4(ii): Variance Decomposition LOG (AP)

Period	S.E.	Log (AF)	LOG (AP)	LOG (PV)
1	0.169162	7.054305	92.94570	0.00000
10	0.765324	52.10891	43.56725	4.323849
20	1.098048	56.42274	37.34769	6.229571
30	1.351219	57.81973	35.33331	6.846961

Source: *Author's Analysis (2019)*

Table 4(iii): Variance Decomposition LOG (PV)

Period	S.E.	LOG (AF)	LOG (AP)	LOG (PV)
1	0.208854	8.334037	1.306834	90.35913
10	0.771361	7.508192	10.52091	81.97090
20	1.116836	6.951834	11.08950	81.95866
30	1.378019	6.768191	11.26064	81.97117

Source: *Author's Analysis (2019)*

Forecast Error Variance Decompositions reveals the magnitude of the effect of shocks to innovations, that is, it shows the explanatory contribution of the shock to innovations in the variables, indicating the proportion of the forecast error in a given variable that is accounted for by innovations in each endogenous variable, while the impulse response functions are very useful in ascertaining the direction of the effect of a shock to innovations in a variable (Akinlo, 2003).

Table 4 (Panel i) show that shocks explained a large proportion of the variations in the variance of agriculture finance. This magnitude, which however decreases from a high value of 100 per cent to 52 per cent in the 10th period, later increases marginally over the periods. Other variables that are of importance are agriculture output growth and real consumption expenditure per capita. Although they explain a neutral proportion of variations in the variance of agriculture finance at the first period and this, increases from 0.00 per cent to 34.23, 35.21 and 35.66 (agriculture output) per cent in the 10th, 20th and 30th period. So also, a neutral

effect was observed at the initial stage by real consumption expenditure per capita increasing to 13.67 per cent in the 10th but this effect reduces gradually over time. Panel (ii) in Table 4 depicted the proportions of forecast error variance in agriculture output, explained by innovations to the endogenous variables being considered. Two variables appear crucial in the determination of the variance of agriculture output. The magnitude of agriculture finance, which is about 7.05 per cent in the first period, increases greatly to 52.11 per cent in the 10th period and this increase continues as it amounted to about 56.42 per cent and 57.82 per cent at the 20th and 30th period respectively. This was positive trend was also observed from the variation of agriculture output as a result of innovation to the real consumption expenditure per capita.

From Table 4 in Panel (iii), the innovation to agriculture finance makes the real consumption expenditure per capita variance to decompose by 8.33 per cent in the first period, reducing gradually to 7.51, 6.95 and 6.77 per cent in the 10th, 20th and 30th periods respectively. Moreover, the magnitude of agriculture output increases from 1.31 per cent in the first period to 10.52, 11.08, and 11.26 per cent respectively.

The empirical evidence from the IRFs indicated that agricultural output motivates the government to increase its spending on agricultural production; this was in line with study of Ogbuabor & Nwosu (2017), and Olorunsola *et al* (2017); however, government's decision to finance agriculture is not motivated by the poverty level. This a true picture of Nigeria government attitude in neglecting the sector over time. This is also buttressed by the negative response of agricultural output as observed. This may be as a result of corruption and non-channeling of resources to a more productive aspect of the agricultural sector.

Moreover, this could have resulted in the consistent increases in agriculture product prices which further reduce the real consumption expenditure per capita and lead to increases in poverty rate in Nigeria.

Conclusion and Recommendations

This study has been able to establish the fact that, public finance in the area of agricultural sector contributes positively in varying proportions to the growth of the agricultural sector in the country. However, as a matter of fact, investments in

research-based activities have exhibited stronger impacts on agricultural productivity and have proven to be an essential driving force of productivity in agriculture sector but this has not been able to reduce poverty level in Nigeria.

The agriculture sector had been the main stream of Nigeria economy over years, but the neglect of this sector as a result of oil surface in the 70s has reduced the ability of the sector in taking the economy to a greater height, most especially, in increasing the welfare of the people which is the main objective.

It can then be concluded that, the objective of government in pursuing poverty reduction in Nigeria, could be achieved through proactive resource allocation to agriculture sector which could bring about increased agricultural production leading to poverty reduction in Nigeria. Based on the findings of this study, the following policy recommendations are made;

The country should as a matter of urgency, divert their attention to agricultural sector at the expense of the oil and gas sector that have created more harms than good in the country, more importantly, considering the global falls in oil prices. For the Nigerian government to succeed in its poverty alleviation objective, government should allocate more of his resource to agriculture sector by shifting more attention to the sector. More so, government should make sure its allocation to agriculture sector is monitored to avoid diversion of the limited resource which could destroy is objective. Government should also, encourage availability of credits to farmers at no or low interest rate in order to motivate farmers in confronting some of their financial challenges. Research and innovations should be open to farmers at every point in time in order to follow global practices in farming system. Provision of adequate infrastructures should be government priority for easy movement of farm produce at a very low cost so that, the farms produce can get to the consumers at cheap prices, which could bring about poverty reduction in Nigeria.

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