AGRICULTURAL FINANCING AND OUTPUT IN NIGERIA: A DISAGGREGATED ANALYSIS

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Abstract

This study investigated the effect of agricultural financing on agricultural sector output in Nigeria from 1981 to 2021. The Autoregressive distributed lag (ARDL) model was used to analyze time series data from the statistical bulletin. The results unveiled that cattle rearing, grains, and roots and tubers hadsignificantlyand positively affected agricultural output. In contrast, cocoa, poultry and oil palm did not significantly affect agricultural output. Since agricultural credit guaranteed funding of cattle rearing, grains, and roots and tubers had significantly and positively affected agricultural output, the study recommends that government should increase its budgetary allocations on the sub-sectors in Nigeria. In so doing, the progress made in the agricultural sub-sectors productivity would be sustained with growth improvement in food security, supply of industrial inputs, income and reduced povertyachieved in the economy.However, since the agricultural credit guaranteed funding of cocoa, poultry and oil palm had a positive but insignificant impact on agricultural output, the study recommends that government should re-strategize and re-format its policies on these sub-sectors by effectively monitoring funds approved and disbursed to the agricultural sub-sectors. With this development, cocoa, poultry and oil palm performance will improve, contributing significantly to the sub-sector's agricultural productivity in the economy.

Keywords: Agriculture, Disaggregated, Financing, Output, Promotion

Introduction

Unlike the Western world where food-production cost is very exorbitant due to scarcity of land and inadequate human labour supply, in sub-Saharan Africa, Nigeria inclusive is endowed with abundant physical, human and natural resources (Mgbenka&Mbah, 2016). To fully harness these potentials, the agricultural sector assistance of the foreign donor community often focuses on developing economies; with the aids diversified away from only crop farming to incorporate other agricultural activities such as livestock, animal husbandry, cash crops and poultry farming activities. In particular, farming activities in Africa exhibit uniqueness, as the agricultural land is highly fertile, rich in vitaminsand very much accessible to farmers. Akinsuyi (2011) cited in Mgbenka and Mbah (2016) upheld that the land tenure system in operation in some parts of the African countries has put the continent on a better edge in terms of farming opportunities as lower cost structure in place would improve agricultural output in the economies if adequately harnessed.

Precisely, Nigeria has a total land area of 98.3 million hectares. Of these, 74 million hectares of land are for arable farming. Despite the vast arable land endowment, half of it has remained unexploited for the

production of crops and other farming activities which is capable of stemming poverty and hunger threats in the country (Opara, 2011 cited in Mgbenka&Mbah, 2016). However, research has shown that many opportunities abound in Nigeria's agricultural sector (Mgbenka&Mbah, 2016). Therefore, increased financing of agricultural activities, would improve agricultural output, increase food security and reduce poverty. This is because; agriculture has been accepted as the major supplier of food and raw materials to industries in the economy. More than 80% of the total farmers in Nigeria engage in small and medium-scale farming (Akinsuyi, 2011), and serve as the fulcrums of the agricultural sector, support food production, grow raw materials for industries, and contribute to food security.

At independence in 1960, the agricultural sector was the main anchor of Nigeria's economy, generating about 36.5% of the country's total labour force; and contributing adequately to the sustenance of the livelihood of the teeming population (Odili, 2022). Central Bank of Nigeria (2017) also revealed that agriculture accounted for about 25% of the total gross domestic product (GDP) of Nigeria, provides revenue to over two-thirds of the country's population; engages 62% of the workforce and supplies industrial inputs. This attractive economic performance suddenly diminished with the discovery of oil in commercial quantities and the subsequent oil boom of the 1970s. This resulted from the neglect of the thriving agricultural sector for the oil sector. However, when the unanticipated income from the oil boom drastically declined in the early 1980s, the Nigerian economy began to suffer numerous economic crises, including food insecurity, persistent depreciation in the exchange rate, balance of payment deficits, high inflation rates, unemployment and interest rate. Others include a high poverty rate and corruption profile, low per capita income, low standard of living among citizens, low growth rates of investments, economic growth, etc (Odili, 2022).

Given the aforementioned economic woes, the government shifted again to revamping the prosperous agricultural sector. This has since been associated with diversifying the economy away from oil exports and ensuring that value addition and income from agricultural activities remain high and contribute largely to the nation's gross domestic product (Odili, 2022). Meanwhile, farmers in Nigeria are predominantly smallholders who rely on a diverse range of fishery, cropping and livestock for their livelihood. These economic activities are very essential for Nigeria's domestic economy. However, the limitations in the agricultural sector's output production overtime imposed difficulty in expanding the scale and size of farming in the sector; as over 72% of the farmers live below the poverty line (USD1.9) a day (FAO, 2018).

According to Ejiogu and Palaniappan (2016), farming activities in Nigeriaare predominantly found in the rural areas with the greater proportion of them producing at the subsistence level, because they are financially excluded with little or no access to financial assets and services. In a study by Odili (2022), improved access to innovation and investible funds in farming techniques are the two main ways of reducing poverty that would, in turn, ensure growth improvement in the domestic economy. The demand for financial resources, financial assets and services sustainability in rural areas is high but the availability and supply of such resources for agricultural activities are very low (Odili, 2022).

Thus, the micro business and smallholding farmers in Nigeria have limited access to financial services and investment funds leading to high losses of agricultural output and income generation in the economy (Ewubare&Mefo, 2018). To secure high agricultural output, smallholder farming financing should be provided with different kinds of financial products and services, as it would ensure funds are available to support farming activities in the country. Against this background, this study investigates the effect of agricultural financing on the output of the agricultural sector in Nigeria.

Research Questions

The research questions focused by this study are as follows:

1. To what extent have cocoa farming credits affected agricultural sector output in Nigeria?
2. Do cattle rearing and poultry farming credits significantly impactagricultural output in Nigeria?
3. How much impact has grains farming credit affected agricultural sector output in Nigeria?
4. What is the degree of effect of roots and tubersfarming credits on agricultural sector output in Nigeria?

Objectives of the Study

The broad objective of the study was to examine the effect of agricultural financing on agricultural sector output in Nigeria. Specifically, the study focused on the following sub-objectives. They are to:

1 Investigate the extent to which cocoa farming credits affected agricultural sector output in Nigeria.

2 Examine if there is a significant influence of cattle rearing and poultry farming credits on agricultural sector output in Nigeria.

3 Determine the degree of impact of grains farming credits on agricultural sector output in Nigeria.

4 Ascertain if there is a significant impact of roots and tubers farming credits on agricultural sector output in Nigeria.

Literature Review

Odili (2022) researched the effects of agricultural sector funding on the productivity of the agricultural sector in Nigeria for the period 1981-2018, using a co-integration test and vector error correction model (VECM). Data on the ratio of the agricultural sector to GDP, agricultural credit guarantee scheme fund, commercial banks' credit to the agricultural sector, annual rainfall, government expenditure on agriculture and lending interest rate were obtained by the author from the statistical bulletin of the Central Bank of Nigeria, the National Bureau of Statistics and the International Monetary Fund (IMF). The results indicated that the agricultural credit guarantee scheme had a positive and significant effect on the ratio of the agricultural sector to GDP. More so, the results also showed that commercial banks' credit to the agricultural sector, government expenditure on agriculture and Lending interest rate had a negative and significant effect on the ratio of the agricultural sector to GDP in Nigeria.

Abbas (2021) investigated the effect of agricultural financing on the productivity nexus in Nigeria from 1981 to 2019, using the Autoregressive Distributed Lagged (ARDL) model and Granger causality test. The variables specified in the model included agriculture as a ratio of gross domestic product, bank credit to the agricultural sector, agricultural credit guarantee scheme fund, government spending on agriculture, inflation rate and interest rate. The result indicated that all the variables significantly influenced agriculture production in the short-run except bank private sector credit to agriculture and agricultural credit guarantee scheme fund found to influence agriculture production significantly in the long-run.

James et al., (2020) examined the extent to which financial inclusion affected productivity among smallholder farmers in Ghana from 2012 to 2017. The variables used in their study were access to credit, ownership of savings, insurance assets, and farmers' productivity. It was discovered that financial inclusion significantly impacted farmers' productivity. Furthermore, credit, savings and insurance products also significantly influenced productivity in the sector. Anthony, Jonathan, Onyinye and Jennifer (2020) investigated the causal linkage between agricultural financing and agricultural output growth in Nigeria using the Pairwise Granger causality test. The variables utilized in the investigation were agricultural financing and agricultural output growth. They observed no causal link between agricultural financing and agricultural output growth. This finding suggests inadequate massive education and enlightenment of farmers, especially in rural areas regarding the availability of agricultural financing. Thus, when smallholder farmers access such credits, they should be adequately monitored to ensure efficient utilization to improve agricultural output.

Brighy et al., (2021) studied the effect of government agricultural spending on agricultural output in Nigeria for the period 1981-2019, using descriptive statistics, unit root test, co-integration test, vector error correction test, VEC Granger causality test, impulse response function and variance decomposition. The variables modelled in the research were agricultural output, government agricultural spending, the interest rate on bank credit to the sector, the value of loans guaranteed by ACGFS to the agricultural sector, commercial bank loans to the agricultural sector and agricultural labour force. The study revealed that government agricultural spending positively and significantly affected agricultural output in the long run. Similarly, the results showed a bi-directional relationship between the two variables.

Egwu (2016) investigated the influence of agricultural financing on agricultural output, economic growth and poverty alleviation in Nigeria from 1980 to 2010 through the applications of the unit root test and co-integration test. The variables used in the study include the agriculture sector's contribution to GDP, commercial bank credit to the agricultural sector, and agricultural credit guarantee scheme loans to the agricultural sector. The finding indicates that the agricultural credit guarantee scheme loans to the agricultural sector and commercial bank credit to the agricultural sector contributed significantly to agricultural output, alleviating the poverty rate and causing economic growth in Nigeria.

Theoretical Framework

The theoretical framework of this study is anchored on the Cobb-Douglas production function, Musgrave Theory of Public Expenditure, Keynesian theory of public expenditure and Joseph Schumpeter's theory of finance and growth. The theories provide an adequate explanation of the relationship between financing agricultural households and the growth of an economy.

Cobb-Douglas Production Function

This theory relates to agricultural households, and it tries to adopt household production functions. It upheld that a household consumes goods it produces, and producing each good requires the input of household members' time and other purchased inputs (Becker, 1965). The Cobb-Douglas (C-Ds) production function is one aspect of the household production theory. Mathematically, the functional relationship of the production is specified as follows:

$$Q = AL\beta K\alpha \qquad 1$$

Where Q is the quantity of output production, L is the quantity of labour force employed in production, K is the capital input utilized in production, and A is the innovation employed in the production process in terms of technology, which is also referred to as multi-factor productivity, and it captures variables that account for effects in total farm output not caused by traditionally measured inputs of labour and capital; β is the output elasticities of labour while α is the output elasticities of capital. The above values are fixed and determined by available technology. The Cobb-Douglas production function unveils that farm output in an economy is a function of factors of production such as labour and capital in production processes.

Musgrave Theory of Public Expenditure

This theory of public expenditure was propounded by Richard A. Musgrave in the year 1997. The theoryargued that the effectiveness of public expenditure matters most in the growth of an economy (Musgrave, 1997). However, he postulated that if the productive category of public expenditure is ineffective, economic growth would negatively be affected. In propounding this theory, Musgrave (1997) found changes in the income elasticity of demand for public services in three phases of income per capita. These include one, at low levels of income per capita in which there is low demand for public services. At this level, income is devoted mainly to satisfying primary needs. Two, changes in the income elasticity of demand for public services occur when income per capita begins to rise above the low level of income at which the demand for services supplied by the public sector including transport, education, health and agriculture starts to rise, as government is compelled to increase its spending on them. Third, the high levels of income per capita, an example of developed economies in which the growth rate of the public sector tends to decline as more basic needs are getting satisfied (Ewubare & Eyitope, 2015).

Keynesian Theory of Public Expenditure

The Keynesian theory of public expenditure was postulated in the year 1936 by John Maynard Keynes. The theory postulated that government spending contributes positively to sectorial growth such as the agricultural sector (Keynes, 1936). Hence, a rise in government spending is expected to result in an improvement in investment, output, employment and profitability via multiplier effects on aggregate demand. Keynes (1936) as cited in Ewubare and Eyitope (2015) viewed public expenditures as an exogenous factor that can be employed as a policy instrument to accelerate output growth (Ewubare & Eyitope, 2015).

Schumpeter Theory of Finance and Growth

Schumpeter (1911), in the theory of finance and growth, explained thatthe financial system encourages output growth by allocating savings, innovation, and funding productive investments in the economy. It further asserts that funds from the credit market are essential in supporting output development by encouraging specialization in entrepreneurship and the adoption of new technology (Greenwood & Smith, 1997). Hence, both credit and stock market development improve the production growth of a country. The theories reviewed show that the theoretical models vehemently support the direct relationship between credit markets and the output growth of agriculture.

Methodology

The model specification of this study follows the Cobb-Douglas production function in specifying the relationship between agricultural financing and the output of the agricultural sector in Nigeria. The Cobb-Douglas production model recognizes output growth of the agricultural sector as a function of labour, capital and technological progress in production processes. The Cobb-Douglas production function is specified as follows:

$$Q = AL^{\beta} K^{\alpha} \quad 2$$

Where; Q = quantity of output produced, L = quantity of labour force engaged in production, K = capital input used in production A = technological progress, and it captures variables that account for effects in total farm output not included in the traditionally measured inputs of labour and capital; β is the output elasticities of labour while α output elasticities of capital. This model was used with modification by Abbas (2021) in its study of the agricultural financing and productivity nexus in Nigeria.

In modifying the above function and as well controlling financial inclusion, the study specified the total factor productivity function as follows:

$$A = f(FI, \pi) \quad 3$$

Where; FI = financial inclusion while π deals with the effect of household, individual and farm characteristics on productivity. In the same way, the Cobb-Douglas production function corresponding to equation 3 was expressed as:

$$Q = f(FI, AL^{\beta}, K^{\alpha}) \quad 4$$

To capture the objective of this study, equation 4 is further modified in functional form as follows

$$ASCGDP = f(COA, POUT, CAT, GRA, OP, TR) \quad 5$$

In linear function, the model is specified thus:

$$ASCGDP_t = \varphi_0 + \varphi_1 COA_t + \varphi_2 POUT_t + \varphi_3 CAT_t + \varphi_4 GRA_t + \varphi_5 OP_t + \varphi_6 RT_t + u_t \quad 6$$

In the logarithm function, the model is expressed as:

$$lnASCGDP_t = \varphi_0 + \varphi_1 lnCOA_t + \varphi_2 lnPOUT_t + \varphi_3 lnCAT_t + \varphi_4 lnGRA_t + \varphi_5 lnOP_t + \varphi_6 lnRT_t + u_t \quad 7$$

Where, ASCGDP = Agricultural sector contribution to the gross domestic product, COA = Cocoa, POUT = Poultry, CAT =Cattle, GRA = Grains, OP = Oil palms, RT = Roots and Tubers, = constant term, ut = error term and = parameters of the regression equations.

Theoretically, the study expects all the independent variables to positively affect the agricultural sector's contribution to gross domestic product (ASCGDP). The a priori expectation trends of the explanatory variables in terms of the behaviour of their coefficients to be estimated in the model are φ1>0, φ2>0, φ3>0> φ4>0, φ5>0, φ6>0. In the description of data, the variables used in the research are described below:

Agricultural sector contribution to GDP measures the performance of the agricultural sector in terms of its contribution to the total GDP of Nigeria. It is a key economic indicator in Nigeria's economy after oil. Nevertheless, agricultural activities provide a livelihood for many Nigerians, whereas the wealth generated by oil reaches a restricted share of people. This data is transformed by taking the logarithm of the time series data obtained from the Central Bank of Nigeria statistical bulletin, volume 32, 2021.

Cocoa (COA), Poultry (POUT), Cattle (CAT), Grains (GRA), Oil palm (OP), and Roots and Tubers (RT) are variables that measures agricultural credit guaranteed scheme funds for cocoa, poultry, cattle, grains, oil palm and roots and tubers in Nigeria to accelerate agricultural output in the economy. The time series data are transformed by taking the logarithm of the variables sourced from the statistical bulletin of the CBN, volume 32, 2021.

Estimation Procedure

Stationarity Test[n]The stationarity test is used to determine the order of integration among the variables by applying the Augmented Dickey-Fuller (ADF) unit root test. The ADF test would reject a null hypothesis of non-stationary if the ADF statistic is greater than the 0.05 critical value. The test would be conducted with or without a deterministic trend (t). The generalized model of the ADF unit root test is specified below.

$$\Delta yt = {}_0 + {}_1 y_{t-1} + \Delta y; + et \quad 8$$

$$\Delta yt = {}_0 + {}_1 y_{t-1} + \Delta y; + t + et \quad 9$$

Where; Y is a time series, t = linear time trend, Δ = first difference operator in a manner that Δyt-1 =yt - yt-1, $_0$ = constant term, n = is the optimum number of lags, and et is the stochastic variable.

Auto Regressive Distributed Lag (ARDL) Model

The autoregressive distributed lag (ARDL) technique is employed to estimate the short-run and the long-run coefficients of the variables used in the investigation. It becomes essential as the stationarity test showed mixed order of integration among the variables. That is, order one and order two, as recommended by Pesaran, Shin and Smith (2001), among others. The ARDL model is specified thus:

$$\Delta INF_t = \beta_0 + \Sigma \beta_i \Delta INF_{t-i} + \Sigma \gamma_j \Delta GEE_{1t-j} + \Sigma \delta_k \Delta GEH_{2t-k} + \theta_0 INF_{t-1} + \ldots. + \theta_{nCP2t-n} + e_t \quad 10$$

In equation 8, the generic ARDL model indicated that the equation is characterized by lags of the dependent variable and well as lags perhaps the current value of the regressors.

Results and Discussions

This section focused on the presentation and discussion of results obtained from the econometric techniques employed in the studyto find the impact of agricultural financing on agricultural output in Nigeria. Most essentially, data analysis is an important method utilized in any research to realize empirical results. This step follows data collection for the variables under consideration with the aid of relevant tools and methods. It also assists in the analyses and interpretation of data, primarily to recommend a workable solution to existing or new problems. Thus, the results and their discussion following the objectives of the study are captured under this section.

Unit Root Test

The Augmented Dickey-Fuller (ADF) unit root test was used todetermine the order of integration among the variables used in this investigation.

Table 1: Augmented Dickey-Fuller (ADF) **Unit Root Estimation**

Showing Trend and Intercept of Time Series

Level			First Difference			
Variables	**ADF Statistic**	**5% CV**	**ADF Statistic**	**5% CV**	**Remarks**	**Rank**
LNASCGDP	-1.821726	-3.526609	-5.926939	-3.529758	Stationary	I(1)
LNCOA	-3.947293	-3.526609	--------	-3.529758	Stationary	I(0)
LNPOUT	-1.826843	-3.526609	-5.590418	-3.529758	Stationary	I(1)
LNCAT	-2.359054	-3.526609	-7.157396	-3.529758	Stationary	I(1)
LNGRA	-0.980556	-3.526609	-5.751322	-3.529758	Stationary	I(1)
LNOP	-3.710701	-3.526609	--------	-3.529758	Stationary	I(0)
LNRT	-2.239659	-3.526609	-11.00740	-3.529758	Stationary	I(1)

Note: ADF Statistic greater than 5% Critical value indicates significance and stationary

The ADF unit root test revealed that except for cocoa and oil palm, all the variables used in the analysis were non-stationary at order zero at 5% level of significance; but at first differencing, the non-stationarity variables became significantly stationary ($p<0.05$) (Table 1). This finding suggests that all the variables for this study possess long-run properties; indicating that their covariance, variance and mean are constant over time.

Autoregressive Distributed Lag (ARDL) Estimate

The autoregressive distributed lag estimate is a test of coefficients and long-run equilibrium relationships among the variables under investigation. This test was conducted because of themixed order of integration outcome of the stationarity test conducted using the Augmented Dickey-Fuller (ADF) unit root test.

Table 2: Autoregressive Distributed Lag (ARDL) Bounds Test

F-Bounds Test		**Null Hypothesis: No levels of relationship**		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	4.532074	10%	2.12	3.23
K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43
		Finite Sample:		
Actual Sample Size	39	n=40		
		10%	2.353	3.599
		5%	2.797	4.211
		1%	3.8	5.643

Note: Signif. =Significance,F-statistic >5% Upper Critical Band indicates co-integrating eq

Table 2 shows the results of the test of equilibrium long-run relationship among the variables utilized in this study. From the analysis, the F-statistic was 4.532074 while the critical upper bound value at p = 0.05 is 3.61. Since the F-statistic of 4.532074 is greater than 3.61, it suggests a significant existence of co-integrating equations among the variables (Table 2).

Table 3: Autoregressive Distributed Lag (ARDL) Long-run Test: Log of Agricultural sector contribution to GDP

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNCOA	0.060524	0.056520	-1.070842	0.2937
LNPOUT	0.004898	0.056256	0.087069	0.9313
LNCAT	0.151574	0.056244	-2.694953	0.0120
LNGRA	0.198007	0.068362	2.896429	0.0074
LNOP	0.111491	0.054703	2.038126	0.0514
LNRT	0.160934	0.031570	5.097679	0.0000

Note: P-value < 0.05 Critical value indicates Significance

The coefficients test results of the ARDL long-run relationship between agricultural financing variables such as LNCOA, LNPOUT, LNCAT, LNGRA, LNOP and LNRT and agricultural sector contribution to gross domestic product (LASCGDP) are presented in Table 3. Agricultural credit guarantee scheme funds on cattle rearing (LNCAT), grains (LNGRA), and roots and tubers (LNRT) had a positive and significant influence on the agricultural sector's contribution to GDP. In contrast, agricultural credit guarantee scheme funds on cocoa (LNCOA), poultry (LNPOUT) and oil palm (LNOP) hada positive but insignificant (p>0.05) effects on Nigeria's agricultural sector's contribution to GDP. The study estimated on average a 1% rise in financing variables such as cocoa, poultry, cattle rearing, roots and tubers, grains, and oil palm would result in 0.1%, 0.05%, 0.2%, 0.2%, 0.2% and 0.11% increases in agricultural sector output, respectively, in Nigeria.

These results followed the theoretical framework of this study. In the framework, the Cobb-Douglas production function argued that agricultural sector productivity growth is a function of two-factor inputs (labour and capital). Hence, an increase in labour and capital quantities used in the production process would improve the economy's productivity including agricultural sector productivity. Our results are in agreement are with the findings of Odili (2022), Abbas (2021), James et al,, (2020), Anthony et al., (2020), Bright et al. (2021) and Egwu (2016) who investigated the effects of agricultural financing on agricultural output across countries and found a positive and significant relationship between the two variables.

Table 4: Autoregressive Distributed Lag (RDL) Error Correction Regression

Error Correction Model (ECM) Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.631094	0.254877	6.399521	0.0000
D(LNASCGDP(-1))	0.199783	0.116860	1.709588	0.0988
D(LNPOUT)	0.079647	0.018405	-4.327440	0.0002
D(LNPOUT(-1))	0.025732	0.016039	-1.604389	0.1203
D(LNCAT)	0.010084	0.010912	0.924102	0.3636
CointEq(-1)*	-0.291442	0.046804	-6.226910	0.0000

R-squared	0.602877	Mean dependent var	0.052419
Adjusted R-squared	0.542707	S.D. dependent var	0.072708
S.E. of regression	0.049168	Akaike info criterion	-3.046530
Sum squared resid	0.079776	Schwarz criterion	-2.790597
Log likelihood	65.40733	Hannan-Quinn criter.	-2.954703
F-statistic	10.01953	Durbin-Watson stat	2.014253
Prob(F-statistic)	0.000007		

Note: P-value < 0.05 Critical value indicates Significance

The ARDL error correction regression analysis revealed that agricultural credit guarantee scheme funds guaranteed on poultry farming had a positive and significant impact on agricultural sector productivity. In contrast, cattle-rearing activity exerts a positive but insignificant effect on the sector's productivity in the short run (Table 4).The coefficients of poultry (lnPOUT) and cattle-rearing (lnCAT) are 0.079647 and 0.010084, respectively whereas the corresponding p-values are 0.0002 and 0.3636, respectively (Table 4).Similarly, the result showed error correction term [ECT(-1)] value of -0.291442 and a p-value of 0.0000. The coefficient of the ECT term referred to as the speed of adjustment is fractional, negative and statistically significant. As expected, the coefficient borders between -1 and 0 for convergence. Hence, it implies that lnASCGDP adjusts to InCOA, InPOUT, InCAT, InGRA, InOP, and InRTin the long run. In other words, the system corrects its short-run disequilibrium at a speed of 29.1%, thereby restoring its equilibrium in the current period. This implies that the short-run disequilibrium corrected towards long-run equilibrium relationship is 29.1% annually.

Policy Implications of the Results

This study utilized one of the developed econometric techniques to investigate the impact of private sector credit to agriculture on agricultural output in Nigeria. Considering the mixed order of integration found among the variables under unit root test, the study employed a model of autoregressive distributed lag (ARDL). This approach captureslinear characteristic of creditsextended to agricultural sector

activities in the economy. Asymmetrically, the method captured both the short-run and long-run transmission mechanism between the variables simultaneously. The findings indicate that in the long-run, the agricultural credit guarantee scheme funds on cattle rearing, grains, and roots and tubers had significantlyand positively influenced agricultural sector's contribution to GDPwhile in the short-run, only cattle rearing and poultry significantly and positively affected agricultural output. In particular, the study found that agricultural credits are statistically significance at 5% level of significance in forecasting agricultural output with 29.1% of adjustment towards the long-run equilibrium relationship annually. These findings underscore the importance of employing ARDL technique in investigating the impact of agricultural credits on agricultural output. The results are line with the finding of Anthony et al., (2020) that studied the causal link between agricultural financing and agricultural output in Nigeria using the Pairwise Granger causality test. Although the variables were not disaggregated, it was discovered that no causal link existed between the variables.

These conclusions are consistent with Musgrave (1997) theory of public expenditure and Schumpeter (1911) theory of finance and growth. The theories argued that the effectiveness of government spending matters most in promoting output in an economy. However, if the productive category of government spending is ineffective, it could lead to a negative impact of the spending on growth. The theory specifically, is attributed to Musgrave as he found changes in the income elasticity of demand for public services in three categories of per capita income. That is, at low levels of per capita income in which demand for public services tends to be very low; when per capita income starts to rise above the levels of low income in which the demand for services supplied starts to rise as government is forced to increase its expenditure on the real sectors; and lastly, at high levels of per capita income of developed economies.

Based on the results, it would be worthwhile to increase access to agricultural credits to promote agricultural output, but with effective monitoring on the credits disbursed to ensure its optimal utilization in agricultural sector. Similarly, moratorium policy on credit administration should be re-formulated and extended to agricultural sector. In other word, beneficiaries of the credits to agriculture should be granted a one year period of grace before the commencement of repayment of such credits. This study has contributed to knowledge in literature in the earlier conclusions made about the predictive ability of private sector credit on agricultural output by discovering the impact of different component of agricultural credits on agricultural output in Nigeria.

Conclusion and Recommendations

Having shown that cattle rearing, grains, and roots and tubers affected agricultural sector productivity positively and significantly, the government must increase its budgetary allocations to smallholders' farming activities involving cattle rearing, grains, and roots and tubers in Nigeria. In so doing, the progress made in the sub-sectors would be sustained growth improvement in agricultural output in the economy. However, since agricultural credit guaranteed funding of cocoa, poultry and oil palm had positive but insignificant influence on agricultural sector output, the study recommends that government should re-strategize and re-format its policies on these sub-sectors by effectively monitoring funds approved and disbursed to the sub-sectors. With this development, cocoa, poultry and oil palm performance will improve, contributing significantly to the sub-sector's agricultural productivity in the economy. The agricultural sector performance will improve thereby standing the test of time, by improving food security, supply of raw materials, income and reduce poverty in the economy.

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