DOI: https://doi.org/10.53555/ms2yf172 Publication URL: https://nnpub.org/index.php/BMA/article/view/1874

IMPACT OF THE AGRICULTURAL CREDIT GUARANTEE SCHEME FUND ON AGRICULTURAL PRODUCTIVITY IN NIGERIA 1981-2020

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Abstract

This study ascertains the impact of the Agricultural Credit Guarantee Scheme Fund on Agricultural Productivity in Nigeria 1981-2020. The ex-post facto research design was adopted for the study. Secondary data obtained from the Central Bank of Nigeria Annual Statistical Bulletin was used for the study. Jarque Bera test statistics was used to check for data normality while the Augmented Dickey Fuller test (ADF) was used to check the stationarity of the data. Johansen co-integration and error correction model was used to estimate the nexus that exists between the variables of the study. Findings from the study revealed that in the longrun, volume of funding to crop sector (FCP) has a positive effect on the output of crops and the effect is statistically significant. Volume of funding to livestock (FCP) is positively signed and in line with a priori expectation. Volume of funding to fishery (FFS) has positive effect on output of fishery within the period under study and this effect is in line with a priori expectation. Finally, volume of funding to forestry (FFT) is positively signed and in line with a priori expectation. The researcher concluded that quality credit to the agricultural sector is very important in both long and shortrun as agriculture plays a vital role in the life of people especially in developing countries such as Nigeria. It was recommended among others that more funding be dedicated by government to improve productivity while policy geared towards improving funding in the shortrun should be aggressively pursued by the government so as to achieve an equilibrium of positive effect of funding in both the long and shortrun period for the four sectors examined.

Keywords: *Agricultural Credit Guarantee Scheme Fund, Agricultural Productivity, Livestock, Fishery, Crop, Forestry*

1.0 INTRODUCTION

Agricultural productivity is measured as the ratio of agricultural outputs to agricultural inputs (Saxon, 1965). While individual products are usually measured by weight, their varying densities makes measuring overall agricultural output difficult. Therefore, output is usually measured as the market value of final product. This output value may be compared to many different types of inputs such as labour and land (yield). These are called partial measures of productivity (Saxon, 1965).The productivity of a country's farm is important for many reasons. Aside from providing more food, increasing the productivity of farms affects the nation's prospects for growth and competitiveness on the agricultural market, income distribution and savings, and labour migration. An increase in a nation's agricultural productivity implies a more efficient distribution of scarce resources. As farmers adopt new techniques and differences, the more productive farmers benefit from an increase in their welfare while farmers who are not productive enough will exit the market to seek success elsewhere (Manyong, 2005).

As a nation's farm become more productive, its comparative advantage in agricultural products increases, which means that it can produce these products at a lower opportunity cost than can other nations. Therefore, the nation becomes more competitive on the world market, which means that it can attract more consumers since they are able to buy more of the products offered for the same amount of money.Increases in agricultural productivity will lead also to agricultural growth and can help to alleviate poverty in poor and developing countries like ours, where agriculture often employs the greatest portion of the population. As farms become more productive, the wages earned by those who work in agriculture will also increase. At the same time, food prices decrease and food supplies become more stable. Labourers therefore have more money to spend on food as well as other products. This also leads to agricultural growth. People see that there is a greater opportunity to earn their living by farming and are attracted to agriculture either as owners of farms themselves or as labourers (Udoh, 2011). Furthermore, it is not only the people employed in agriculture who benefit from increases in agricultural productivity. Those employed in other sectors also enjoy lower food prices and a more stable food supply. Their wages may also increase.

Agricultural Credit Guarantee Scheme Fund (ACGSF) came into existence in 1977 to motivate financial institutions to increase lending to the agricultural sector in the country. The essence was to ameliorate the challenges encountered by farmers in their attempts to access credit which would eventually translate to increased agricultural productivity in the country. Financial institutions view agricultural sector as a high risk sector, also most of the farmers particularly the poor farmers do not have the collateral required to obtain credit from financial institutions. As a result of these, financial institutions are usually not interested in lending to agribusinesses (Enenche, *et al.* 2014). ACGSF in an endeavour to enhance farmers' access to credit has put in place a strategy that assures financial institutions the recovery of 75% of the defaulted amount (in case borrowers default).

Nwosu et al. (2010) observed that the ACGSF was created mainly to encourage financial institutions to lend financing to agricultural producers and agro-processors to boost exports and local consumption. This scheme aims to increase formal credit to the agricultural sector by awarding undertakings to banks that provide agricultural credit, as indicated in its guidelines. This was mainly to solve the issue of non-accessibility of credit for agricultural production to boost agricultural productivity in Nigeria. It is against this background that the study seeks to know the impact of the fund extended to farmers through the four major sub sectors of agriculture on the agricultural productivity in Nigeria.

1.1 Statement of the Problem

The Nigerian economy, the largest in Africa and ranked 31st globally with a GDP estimate of US$ 23.00 trillion as of 2021, has historically been heavily reliant on oil, constituting a major portion of its revenue (World Bank, 2022). However, economic instability resulting from depleted reserves, rising inflation, exchange rate challenges, and output contractions due to global oil price crashes and reduced oil production has prompted a crucial need for economic diversification, particularly towards agriculture (World Bank, 2022). Agricultural financing emerges as a pivotal instrument in this shift, aiming to address the insufficiency of capital, a significant constraint to agricultural productivity in Nigeria (Agu, 1998).

Access to finance in the agricultural sector is hindered not just by the lack of available funds but also by the hesitancy of credit providers to extend loans without a guarantee of repayment, leaving farmers underserved and limiting their ability to purchase modern farm inputs essential for productivity (CBN, 2010). In response to these challenges, the Federal Government of Nigeria introduced the Agricultural Credit Guarantee Scheme Fund (ACGSF) to support farmers. However, the impact of the scheme on different agricultural subsectors has been a topic of research and discussion, revealing varying impacts on crops, livestock, and fishery (Akaninyene and Sunday, 2017; Mafimisebi*et al.,* 2008).

This study seeks to expand upon existing research by analyzing the impact of the ACGSF across four agricultural subsectors: Crops, Livestock, Fishery, and Forestry. The inclusion of Forestry is crucial, given its potential to address social issues such as banditry and kidnapping through harnessing its benefits (CBN, 2010). By encompassing all four subsectors, this study endeavors to provide a comprehensive understanding of the relationship between the ACGSF and agricultural productivity, bridging gaps left by prior studies that focused on a subset of the agricultural subsectors (Akaninyene and Sunday, 2017; Mafimisebi*et al.,* 2008). Ultimately, the study aims to offer insights into the dynamics between the ACGSF and agricultural productivity across diverse agricultural activities in Nigeria.The study also covers the period of forty years (1981-2020) in order to have access to more recently released data by the Central Bank of Nigeria on the subject matter to enable the researcher to come up with a holistic, consensus, and concrete conclusion between the two variables. In doing this, the study attemptstouse simple linear regression analysis against multiple regression analysis used by most works reviewed, in analysing the impact of Agricultural Credit Guarantee Scheme Fund on Agricultural Productivity in Nigeria.

Objectives of the Study

The primary objective of this study is to examine the impact of the ACGSF on Agricultural Productivity in Nigeria. The specific objectives are;

1. To evaluate the impact of Agricultural Credit Guarantee Scheme Fund extended to agricultural cash crop sub sector on crop output in Nigeria.
2. To ascertain the impact of Agricultural Credit Guarantee Scheme Fund extended to livestock sub sector on livestock output in Nigeria.
3. To examine the impact of Agricultural Credit Guarantee Scheme Fund extended to fishery sub sector on fisheries output in Nigeria and
4. To access the impact of Agricultural Credit Guarantee Scheme Fund extended to forestry sub sector on forestry output in Nigeria.

Statement of Hypotheses

As a result of the research questions raised above, the hypotheses for this study are:

H_{01}: Agricultural Credit Guarantee Scheme Fund extended to crop sub sector does not reflect on the output of crop production in Nigeria.

H_{02}: Agricultural Credit Guarantee Scheme Fund extended to livestock sub sector does not have any significant impact on livestock output in Nigeria.

H_{03}: Agricultural Credit Guarantee Scheme Fund extended to fishery sub sector does not in any way reflect on the output of fishery in Nigeria.

H_{04}: Agricultural Credit Guarantee Scheme Fund extended to forestry sub sector does not have any positive impact on forestry output in Nigeria.

2.0 LITERATURE REVIEW

Classical theory of Political Economy and Development

This study adopts the classical theory of political economy and development in an attempt to understand the influence Agricultural Credit Guarantee Scheme Fund has on the productivity of the four major sub sectors of agriculture in Nigeria.The famous scholars projecting this theory are Adam Smith, David Ricardo, and Thomas Malthus in 1983. The theory stipulates that the banking sector plays an important role in channelling finance and investment to the productive agents like agricultural sector within the economy and therefore acts as a catalyst of economic growth and development. The main implication of this theory, therefore, is that banking policies such as credit schemes and other financial programmes which embrace openness and competition will promote agricultural productivity which will eventually leads to economic growth and development.

Classical political economy approach however is concerned with economic growth and the development of an economic system. The main focus of economic analysis for classical economist is on the conditions necessary for economic development and the factors that impede these in the prevailing social and economic relations. The theory stipulates with development finance in general and agricultural finance (ACGSF) in particular influences the pattern and process of agricultural and economic development. According to Shafi (1984) adequate capital such as finance, technology and machines are the major factors that enhanced agricultural, industrial and entrepreneurial growth and development. However, sufficient supply of finance and credit to agricultural sector expands farmers' inputs, output, potentialities, income, and employment. These would invariably expand an economy. Therefore, it is the accumulation of capital in form of finance or credit through capital lending program like agricultural credit scheme that leads to increase in agricultural productivity in every economy.The classical theory of political economy is linked to the study because it points out the importance of adequate financial assistance and credit from capital lending programme like agricultural credit scheme to the farmers' agricultural production, agricultural growth and development and of course economic growth and development of an economy. The study therefore anchored on this theory to carry out this work as it relates to Finance and agricultural productivity.

Conceptual Framework

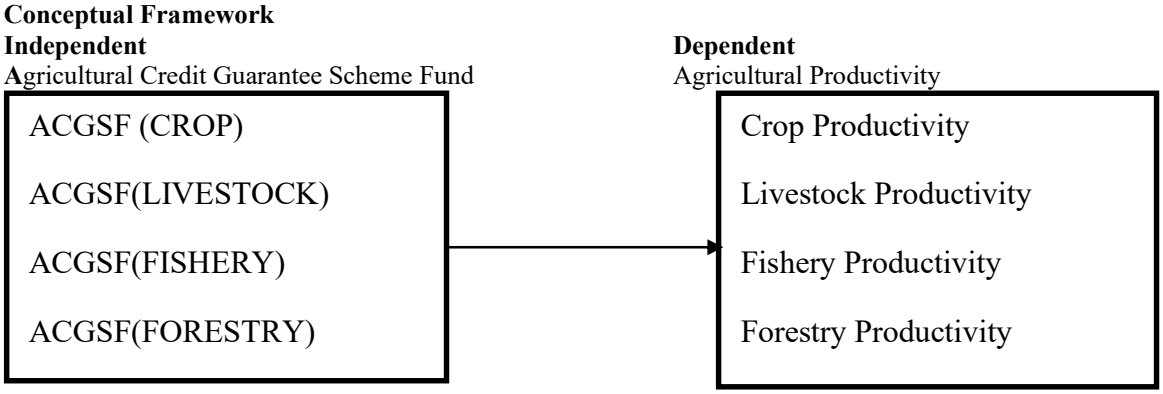


Figure 1: Conceptual framework

Agricultural Productivity

Agriculture productivity is the measurement of the quantity of agricultural output produced for a given quantity of input or a set of inputs. The key to improving agricultural productivity is efficient farm management. Agricultural productivity is a big concept with a global impact, but it starts with efficient on-farm management. How productive or efficient our global food production systems can become will significantly impact our future well-being.It is estimated that about 84 million hectares of Nigeria's total land area has potential for agriculture; however, only about 40% of this is under cultivation (FMARD, 2017). Productivity in the cultivated lands is also low due to small farm holdings and primitive farming methods. Nigeria has therefore become heavily dependent on food imports. In addition to diverse and rich vegetation that can support heavy livestock population, it also has potential for irrigation with a surface and underground water of about 267.7 billion cubic meters and 57.9 billion cubic meters respectively (Chauvin, Mulangu and Porto, 2012). Nigeria's large and growing population provides a potential for a vibrant internal market for increased agricultural productivity.

In spite of these opportunities, the state of agriculture in Nigeria remains poor and largely underdeveloped. The sector continues to rely on primitive methods to sustain a growing population without efforts to add value. This has reflected negatively on the productivity of the sector, its contributions to economic growth as well as its ability to perform its traditional role of food production among others. This state of the sector has been blamed on oil glut and its consequences on several occasions (Falola and Haton, 2008). In 1960, petroleum contributed 0.6% to GDP while agriculture's contribution stood at 67%. However by 1980, shares of petroleum had increased to 45.5% almost doubling that of agriculture which had decreased to 23.4% (Yakubu, 2008). It should be clarified that this pattern was not an outcome of increased productivity in the non-agricultural sectors as expected of the industrialization process (Yakubu, 2008); rather it was the result of low productivity due to negligence of the agriculture sector.

Crop Productivity

Crop productivity is the quantitative measure of crop yield in given measured area of field. The use of new crop varieties and the efficient application of agrochemicals, immensely contributed to increased crop productivity.According to CBN (2010), between 1960 and 2011, an average of 83.5% of agriculture GDP was contributed by the crops production sub sector making it the key source of agriculture sector growth. The food production role of the agriculture sector depends largely on this sub-sector as all the staples consumed in the nation comes from crop production, 90% of which is accounted for by small-scale, subsistent farmers. The major crops cultivated include yam, cassava, sorghum, millet, rice, maize, beans, dried cowpea, groundnut, cocoyam and sweet potato.

Livestock Productivity

Livestock are domesticated terrestrial animals that are raised to provide a diverse array of goods and services such as traction, meat, milk, eggs, hides, fibres and feathers. Another name for livestock production is animal husbandry. Livestock is the second largestsub-sector of agriculture contributing an average of 9.2% between 1960 and 2011. This sector is the largest source of animal protein including dairy and poultry products. The economic importance of the sub-sector is therefore evident through food supply, job and income creation as well as provision of hide as raw material. Recent estimates indicate that Nigeria's national herd comprises 18.4 million cattle, 43.4 million sheep, 76 million goats and 180 million poultry1 (FMARD, 2017). The majority of animals are raised in extensive production systems comprising smallholders and nomadic herders. Large commercial holdings are currently rare but expanding, especially in the poultry subsector. The total production of milk, meat, and eggs amounts to 0.5 billion litres, and between 1.4 and 0.6 million tonnes per year, respectively.

Fishery Productivity

Fish farming refers to the commercial production of fish in an enclosure or, when located in a body of freshwater or marine water, in an area that is penned off from then surrounding water by cages or pen nets. Fishery production refers to the output of fish by humans both from capture fisheries and aquaculture. In the fishery sub-sector, local production is inadequate for domestic demand and consumption. Nigeria imports 700,000MT of fish annually which is 60,000 MT more than total domestic production (Nzeka, 2013). However, the sub-sector has recorded the highest average growth rate of 10.3% (1961-2011) compared to the 6% recorded in crop production in the same period (CBN, 2015). With an average contribution of 4.3% to total agriculture GDP between 1960 and 2011 and provision of at least 50% animal protein, fisheries contributes to economic growth by enhancing food security and improving livelihood of fish farmers and their households.

Forestry Productivity

Forestry is the management of land for commercial wood production including the extraction of timber there from and the replanting of trees but does not include the milling or processing of timber. It is the smallest sub-sector in Nigerian agriculture contributing only 3.0% (between 1960 and 2011); however, the sub-sector plays a major role in providing industrial raw materials (timber), providing incomes as well as preserving biodiversity.In these sub-sectors, productivity is low and contributions to the economy are below expectation.

Agricultural Credit Guarantee Scheme Fund (ACGSF)

The interventions of the CBN in the agricultural sector started in 1977 with the introduction of the Agricultural Credit Guarantee Scheme Fund (ACGSF). The Fund was designed to encourage banks to lend to farmers. Under the scheme,

the CBN through the Fund, guarantees loans to farmers up to 75% of the amount in default net of any security realized. According to data from the CBN, the ACGSF since inception till March 2021, has facilitated 1.180 million loans valued N122.632 billion to farmers across the country.As a solution to the problem of farmers' access to finance, the ACGSF was established by the Federal military government of Nigeria in 1977 and commenced operations from 1978 to date. The intention of most conventional credit finance policies in Nigeria has been to subsidize interest rates for small farmers and rural people, but the irony is that subsidized interest rates causes loans to be expensive for borrowers because the interest rates become too low for lenders to cover high inflation rates as well cater for transaction costs. The ACGSF goes beyond subsidizing interest for farmers; rather, it considers critical issues in diversifying appropriate development strategies capable of providing the required finance for farmers and small and medium enterprises in Nigeria (CBN, 2009).

Review of Related Empirical Studies

In studying Agricultural Financing and Performance of the Agricultural Sector in Nigeria, 1981-2015, Udeorah and Vincent (2018), investigated the relative effect of government and deposit money banks financing in the Nigeria's agricultural sector performance adopted quasi experimental design where multivariate Johansen co-integration Test was used to analyze the presence of the long run equilibrium relationships between time series variables, using estimated error correction regression model. Findings from the study revealed that government financing through the agricultural credit guarantee scheme fund had a significant negative effect on the aggregate agricultural output and crop production output. The study recommended that the Nigerian government should commit more efforts and funds to the scheme, also a contradictory fiscal policy should be implemented when it comes to recurrent expenditure in the agricultural sector.The study is silence on other sub sectors of agriculture like livestock, fishery and forestry.

Oyeronke and Bolarinwa (2017), while studying the Analysis of Performance of Agricultural Credit Guarantee Scheme Fund in Nigeria (1981-2016) with a view to assessing the performance of the scheme in achieving the objective of providing a guarantee on loans granted by banks to farmers for agricultural production thereby develop the agricultural sector in Nigeria. Secondarydata was collected and analyzed using Descriptive statistics and the study found that there had been a significant increase in the supply of credit for food crop while supply to cash crop and livestock sectors still remain low. The study found that credit given out is mostly focused on food crop sector which is mostly grown by small scale farmers. They also found that large scale farmers benefited more from the scheme than the small scale farmers and recommended that there is an urgent need to improve the accessibility of small scale farmers to credit. More emphasis was laid on crop production than the remaining agricultural subsectors.

Akaninyene and Sunday (2017), used multiple linear regression of ordinary least squares to examine the relationship between the ACGSF and the output of the crop sector in Nigeria, livestock and fishery measured by respective gross domestic product. Findings revealed a positive and significant relationship between ACGSF and the agricultural sector development evaluated by the sustained rise in its contribution to GDP and that the scheme has given more funds and impacted more in the crop sector over the livestock and fishery sector. The study recommended that the scheme should be sustained and the government should invest more in agricultural development and measures should be put in place by the management of the scheme to reduce default in payment arising from borrowers. The study used only three (3) subsectors of agriculture (crop, livestock and fishery) and aggregated it without giving room for individual assessment which didn't show their individual impact on the agricultural productivity.

Onwumere, Imo and Ihegboro (2012) looked at the impact of ACGSF on the productivity of three agricultural sub-activities (i.e. Crops, livestock and fishing) and found out that, there exist a positive impact between the scheme and the productivity of the three sub-activities mentioned using multiple regression analysis. The study determined the effect of ACGSF extended to the three agricultural sub sectors on the output of crops, livestock, and fishing, leaving out forestry. Studies abound on the impact of agricultural Credit Guarantee Scheme Fund (ACGSF) extended to agricultural sub sectors on Agricultural productivity, but there is no consensus as regards the relationship between the two variables because most researchers have ascertained that the Scheme have impacted positively on the productivity of crop production only while having a negative impact on Livestock and fishery production.

Isiorhovoja and Chukwuji (2009), exploring the effects of the operations of the Agricultural Credit Guarantee Scheme Fund on cash crops using simple linear regression and auto-regression model, found out that cash crop output had a significant upward trend. Also, there were significant increases in the value of loans guaranteed to cash crop farmers but the number of loans showed no significant increase, suggesting that the number of cash crop farmers who have access to guaranteed loans may not be on the increase. Also, there was a general weak relationship between the values of ACGSF guaranteed loans and the productivity of cash crops; hence the study recommended that the Scheme should, through the deposit money banks (DMBs), foster a closer link with this category of farmers to facilitate their access to required technical services which may not have been embodied in the loan.

Mafimisebi, Oguntadeand Mafimisebi (2008) studied the impact of ACGSF on the performance of the agricultural sector using multiple regression analysis. The finding of the study shows that there is a long-run relationship between number and volume of loan guaranteed by ACGSF and the performance of agricultural sector. The study did not specify the performance on each of the four major sub activities of agriculture.

3.0 METHODOLOGY

Research Design

The research design adopted for this research is Ex-post facto. This is because according to Imoisili, (1996), the ex-post facto or after-the-fact research design also called causal comparative research is a category of research design in which the investigation starts after the fact has occurred without interference from the researcher, and it is used when the researcher intends to determine cause-effect relationship between the independent and dependent variables.

Population of the Study

The population of this study is the data on Agriculture productivity and Agricultural Credit Guarantee Scheme Fund for the period 1981-2020 which is 40 years. The whole of the population is used for the study.

Method of Data Collection

The data used for this research is secondary data which is obtained from the Central Bank of Nigeria annual statistical bulletin. The time series data is retrieved from the Central Bank of Nigeria Statistical Bulletin from 1981 – 2020.

Variable Identification

a. Independent Variable: ACGSF (FCP, FLS, FFS, FFT)

According to Olagunju and Ajiboye (2010), Agricultural Credit Guaranteed Scheme Fund is the fund guarantees credit facilities extended to farmers by banks up to 75% of the amount in default net of any security realized. The Fund is managed by the Central Bank of Nigeria, which handles the day-to-day operations of the Scheme. It is often considered as an effective policy instrument for improving the production and distribution of the agricultural commodities. The independent variable will be proxied by the Funds extended to Crop sub sector for crop Production (FCP), Funds extended to Livestock sub sector for livestock production (FLS), Funds extended to fishery sub sector for Fishery production (FFS) and Fund extended to forestry sub sector for forestry production (FFT).

b. Dependent Variables: Agricultural Productivity

Agricultural productivity (AP) may be defined as the "ratio of index of local agricultural output to the index of total input used in farm production" (Shafi, 1984). This will be proxied byAP

Variable Specification / Model Specification

The functional forms of the models are thus:

$AP = f(ACGSF)$

$AP_C = b_0 + b_1FCP + U_t$ ……(i)

$AP_L = b_0 + b_1FLS + U_t$ ……(i)

$AP_F = b_0 + b_1FFS + U_t$ ……(i)

$AP_R = b_0 + b_1FFT + U_t$ ……(i)

Where,

AP = Total agricultural output (output of crop, livestock, fishery, and forestry)

b_0 = constant

b_1-b_4= Coefficients of volumes of credits guaranteed by ACGSF to various agricultural sectors.

b_1FCP = Volume of credits guaranteed by ACGSF to Crop sub sector

b_2FLS = Volume of credits guaranteed by ACGSF to Livestock sub sector

b_3FFS = Volume of credits guaranteed to Fishery sub sector

b_4FFT = Volume of credits guarantee to Forestry sub sector

U = error term

$b_1<0$ implies that the independent variables (b_1FCP, b_2FLS, b_3FFS and b_4FFT) are expected to have an inverse relationship with Agricultural Productivity(AP) which is the total output of crop, livestock, fishery, and forestry, and which are the dependent variables.

Data Analysis Techniques

Data collected is analysed using descriptive statistics and linear regression with the aid of
E-views 10.0 Statistical Software for Windows. Unit roots test is also conducted with the use of Augmented Dickey Fuller Test.

Simple Linear Regression is a regression that involves one or two variables. It is used when predicting the value of a variable based on the value of one or two variables. The predictable variable is called the dependent variable or sometimes called the outcome, the target or criterion variable. While the variables used to predict the value of the dependent variable are called the independent variables or sometimes predictor, explanatory or regressor variables.

Unit Roots: in statistics, unit root test tests whether a time series variable is non-stationary and possesses a unit root. The null hypothesis is generally defined as the presence of a unit root and the alternative hypothesis is either stationary, trend stationary or explosive root depending on the test used.

Augmented Dickey-Fuller Test (ADF) tests the null hypothesis if a unit root is present in a time series sample. The alternative hypothesis is different depending on which version of the test is used, but it is usually stationarity or trend-stationarity. The augmented Dickey-Fuller (ADF) statistic is a basic test for the order of integration.

Johansen Cointegration

Once variables have been classified as integrated of order I (1), I (2) and so on, it is possible to set up models that lead to stationary relations among the variables, and where standard inference is possible. Testing for co-integration is a necessary step to modelling meaningful empirical relationships. If variables have different trends processes, they cannot stay in fixed long-run relation to each other, implying that you cannot model the long-run, and there is usually no valid basis for inference based on standard distributions. If co-integration does not exist at levels, it is necessary to continue to work with variables in differences instead.

Error Correction Model

The error correction model (ECM) is a time series regression model that is based on the behavioural assumption that two or more time series exhibit an equilibrium relationship that determines both short-run and long-run behaviour.The error correction term represents the long-run relationship. A negative and significant coefficient of the error correction term indicates the presence of long-run causal relationship.

4.0 RESULTS AND DISCUSSION

The result of the time series data collected for this study is presented here where the statistical assumptions earlier made with regards to the relationship between the variables of the study and the hypotheses upon which this study is anchored is tested. The data used for this study covered a period of 1981 to 2020 and are presented in the appendix. Descriptive statistics of mean, median standard deviation, skewness, kurtosis Jarque-Bera are presented this section while the results of the diagnostic tests are also presented. The analyses of the trend of the variables from one year to the other were also presented. The unit root property of the series was investigated to avoid spurious regression.

Descriptive statistics

Table 1: Summary statistics

	OUTCP	OUTLS	OUTFS	OUTFT	FCP	FLS	FFS	FFT
Mean	6791.683	572.1132	205.4940	78.77750	1861496.	510533.8	154591.9	183239.1
Std. Dev.	8848.018	715.6634	348.7730	95.54570	2350438.	708354.6	209674.5	302201.6
Skewness	1.330952	1.099250	2.629502	0.985749	1.125334	1.177668	0.997998	1.412688
Jarque-Bera	13.19071	8.187311	131.3599	6.842286	8.449485	9.247488	6.832570	13.40557
Probability	0.136700	0.160678	0.258000	0.342675	0.146629	0.95816	0.302834	0.155227
Observations	40	40	40	40	40	40	40	40

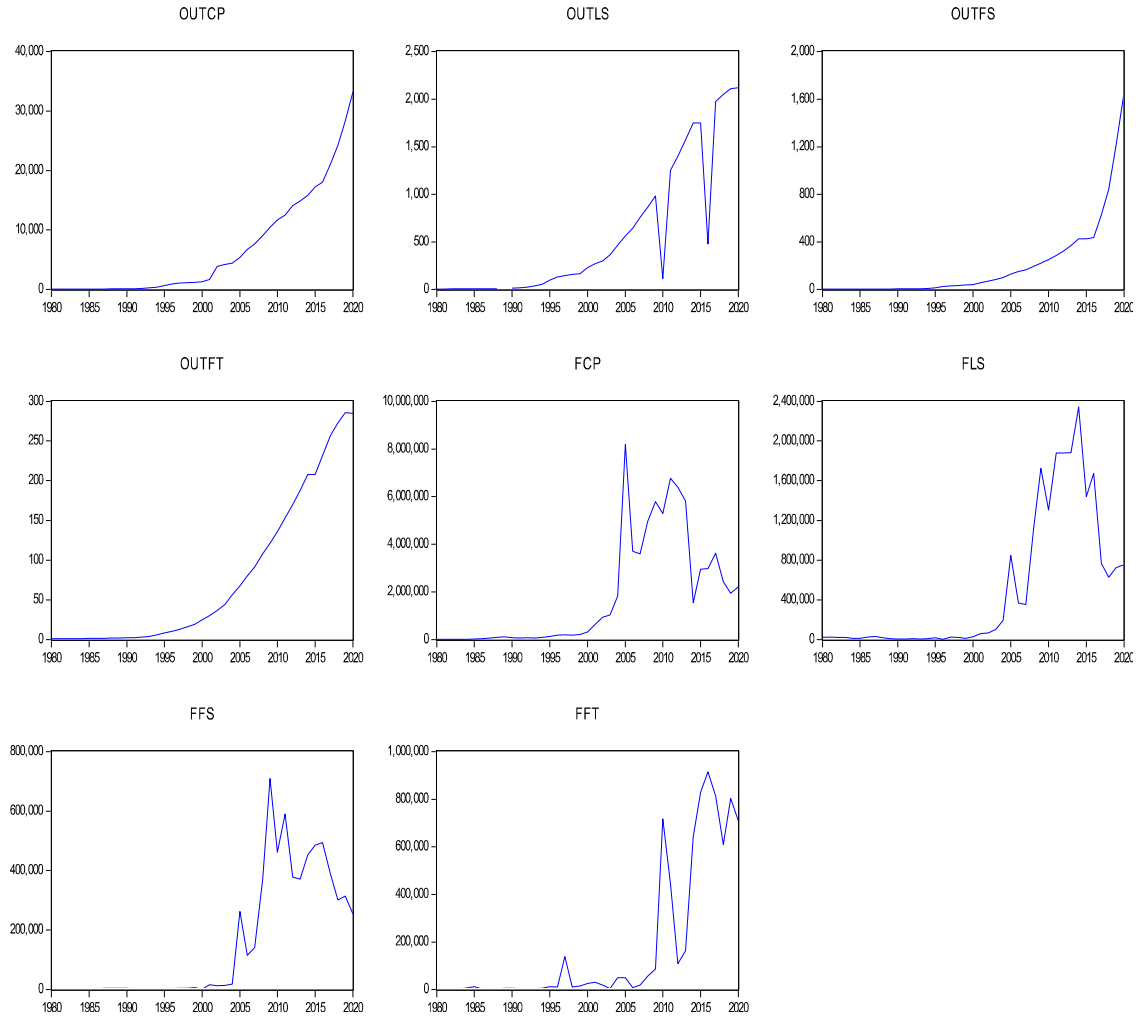
Source: *E-View 10.0 Output, 2021*

As shown from the result of the descriptive statistics above, Output of crops has a mean of 6791.683, with a standard deviation of 8848.018and a positive skewness of 1.330952. Output of livestock has a Mean of 572.1132, with a standard deviation from the mean of 715.6634 and a positive skewness of 1.099250. The output of fishery averages 205.4940 with a standard deviation of 348.7730 and a positive skewness of 2.629502. The output of forestry averages 78.77750 with a standard deviation of 95.54570 and a skewness of 0.985749. Volume of credit to crops sector has a Mean of 1861496 with a standard deviation of 2350438 and a positive skewness of 1.125334. Volume of credit to livestock sector has a Mean of 510533.8 with a standard deviation of 708354.6 and a positive skewness of 1.177668. The Volume of credit to fishery sector averages 154591.9 with a standard deviation of 209674.5 and a positive skewness of 0.997998. Finally, the volume of credit to forestry sector averages 183239.1 with a standard deviation of 302201.6 and a positive skewness of 1.412688.

Jarque-Bera test assesses model bias. The Jarque-Bera statistic indicates whether or not the residuals (the observed/known dependent variable values minus the predicted/estimated values) are normally distributed. The calculation of p-values for hypothesis testing typically is based on the assumption that the population distribution is normal. Therefore, a test of the normality assumption may be useful to inspect the data. Our results indicates that the Jarque–Bera test probability values are greater than 0.05 i.e (*p>0.05).* Hence, the dataset used for this study is normally distributed. The result of the Jarque Bera statistics for this study indicates that the sample data have the skewness and kurtosis matching a normal distribution. When the p-value (probability) for this test is large (i.e. greater than 0.05, the residuals is normally distributed

Trend analysis of the variables of the study

Trend analysis is the process of comparing data over time to identify any consistent results or trends. It helps in developing a strategy to respond to these trends in line with expected goals.



The graph of all the variables of the study shows a gradual rise from their various start point and either rise steadily or cascaded as a result of the factor that is affecting it. Output of crops, output of fishery, and output of forestry all showed similar pattern of a steady rise from origin to their final point. All the other variables showed a fluctuating pattern which is an indication of policy and policy reversal and inconsistency in factors affecting the variable within the period under study.

Testing for Unit Root (ADF-Test)

The unit root test is motivated by theory; it will be one test in combination with other tests. Testing for the order of integration is standard in applied econometric work.

Table 3: Augmented Dickey-Fuller Test (ADF) at Levels

Variables	ADF	5% Critical Value	Integration Order
OUTCP	-11.01474	-2.936942	I(1)
OUTLS	-3.519993	-2.971853	I(1)
OUTFS	-5.207322	-2.945842	I(1)
OUTFT	-0.831503	-2.957110	I(0)
FCP	-2.165330	-2.936942	I(0)
FLS	-1.491895	-2.936942	I(0)
FFS	-1.582117	-2.936942	I(0)
FFT	-1.271548	-2.936942	I(0)

E-views 10.0 result computation, 2021.

At levels, the unit root test using Augmented Dickey Fuller test (ADF) shows that the variables OUTCP, OUTLS and OUTFS were all stationary at first difference and are integrated of order zero [I (1)]. Other variables namely; OUTFT, FCP, FLS, FFS & FFT were all integrated of order one [I (0)] and stationary at levels. This implies that the null hypothesis of non-stationary for all the variables at levels is rejected as there are mixed integration and stationarity. Hence, the unit root will be performed at first difference.

Table 4: Augmented Dickey-Fuller Test (ADF) at First Difference

Variables	ADF	5% Critical Value	Integration Order
OUTCP	-1.338200	-2.941145	I(0)
OUTLS	-1.994021	-2.981038	I(0)
OUTFS	-3.105094	-2.948404	I(1)
OUTFT	-1.711892	-2.954021	I(0)
FCP	-8.336814	-2.938987	I(1)
FLS	-7.852996	-2.938987	I(1)
FFS	-7.623978	-2.938987	I(1)
FFT	-6.352758	-2.941145	I(1)

E-views 10.0 result computation, 2021

As shown in Table 4, at first difference, the unit root test using Augmented Dickey Fuller test (ADF) shows that only the variables OUTFS, FCP, FLS, FFS & FFT were all stationary at levels and are integrated of order zero [I (1)]. Other variables namely; OUTCP, OUTLS & OUTFT were integrated of order one [I (0)]. This implies that the null hypothesis of non-stationary for all the variables at first difference is rejected and hence, the unit root will further be performed at second difference.

Table 5: Augmented Dickey-Fuller Test (ADF) at Second Difference

Variables	ADF	5% Critical Value	Integration Order
OUTCP	-8.185881	-2.941145	I(2)
OUTLS	-3.098704	-3.029970	I(2)
OUTFS	-2.991258	-2.948404	I(2)
OUTFT	-2.957110	-1.760294	I(2)
FCP	-7.724754	-2.945842	I(2)
FLS	-4.082859	-2.967767	I(2)
FFS	-6.798040	-2.945842	I(2)
FFT	-5.130704	-2.960411	I(2)

E-views 10.0 result computation, 2021

As shown in Table 5, at second difference, the unit root test using Augmented Dickey Fuller test (ADF) shows that all the variables namely; OUTCP, OUTLS, OUTFS, OUTFT, FCP, FLS, FFS & FFT are stationary at second difference and are integrated of order zero [I (2)]. This implies that the null hypothesis of non-stationarity for all the variables at second difference is rejected and hence, the Johansen cointegration is to be performed to establish the level of cointegration among the variables of the study as they move from one year to the other.

Johansen co-integration test

The method used in this study is known as Johansen Full information maximum likelihood method. The unrestricted co-integration rank test (Trace) and the unrestricted co-integration rank test (maximum Eigen value) statistics results of the Johansen co-integration test are presented in the following tables:

Table 6: Unrestricted Co-integration Rank Test (Trace)

Sample (adjusted): 1982 2020				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.997263	617.9078	159.5297	0.0000
At most 1 *	0.980581	405.4704	125.6154	0.0000
At most 2 *	0.955947	263.5769	95.75366	0.0000
At most 3 *	0.861368	151.1719	69.81889	0.0000
At most 4 *	0.659521	80.03836	47.85613	0.0000
At most 5 *	0.476479	41.25188	29.79707	0.0016
At most 6 *	0.375354	17.95343	15.49471	0.0209
At most 7	0.027744	1.012887	3.841466	0.3142
Trace test indicates 7 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: *Researchers computation using E-views 10.0*

Table 7: Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.997263	212.4375	52.36261	0.0001
At most 1 *	0.980581	141.8934	46.23142	0.0000
At most 2 *	0.955947	112.4050	40.07757	0.0000
At most 3 *	0.861368	71.13356	33.87687	0.0000
At most 4 *	0.659521	38.78648	27.58434	0.0012
At most 5 *	0.476479	23.29844	21.13162	0.0244
At most 6 *	0.375354	16.94055	14.26460	0.0184
At most 7	0.027744	1.012887	3.841466	0.3142
Max-eigenvalue test indicates 7 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: *Researchers computation using E-views 10.0*

The result of the trace and maximum Eigen value test at Table 6 &7 shows that there are 7 and 7 co-integrating equations in the system respectively. This is indicated by six co-integrating equation found in the unrestricted co-integration rank test (Trace) the system (*) and 7 cointegrating equation in the maximum Eigen value statistics. This implies that the null hypothesis is of no co-integration is rejected. This further means that at 0.05 level of significance, they exists a long run relationship among the variables, as a result, trace statistics, and the maximum Eigen values converges to 1.012887in the table 3 and 4 respectively. Testing for co-integration is a necessary step to modelling meaningful empirical relationships.In the presence of co-integration, the long run relationship between the dependent and the independent variables of the study can be obtained from the shortrun equation of the vector error correction estimates as it contains both the longrun and shortrun equations. In the use of error correction model, inverse matrix applies to the results. Hence, when the coefficient shows a positive sign, the result is interpreted negative and vice versa. As a result, all the values for the independent variables of FCP, FLS, FFS & FFT are positive predictor of the dependent variable.

Table 8: Error correction model [Longrun equation]

Model	Variable		Coefficient	t-statistics	R^2
	Dependent	**Independent**			
I	OUTCP	FCP	0.001184	3.13688	0.832553
II	OUTLS	FLS	0.001395	3.67999	0.456200
III	OUTFS	FFS	0.000404	4.58269	0.902945
IV	OUTFT	FFT	0.000253	10.8825	0.590226

df = n-1
= 40-1
= 39

As shown by the result of the long-run relationship between the dependent variable and the independent variables for model I in Table 8, volume of funding to crop sector (FCP) has a positive effect on the output of crops (OUTCP) and the effect is statistically significant (as t_{cal} = 3.13688 is greater thant_{tab} =1.697at 39 df). It means that a unit increase in volume of funding to crop sector (FCP) will have a corresponding positive effect on the output of livestock (OUTLS) by a margin of 0.001184.

The result from the second model of the study indicates that volume of funding to livestock (FCP) is positively signed and in line with *a priori* expectation. The relationship is not statistically significant (as t_{cal} = 3.67999 is greater than t_{tab} =1.697at 39 df). It means that a unit increase in volume of funding to fishery sector (FFS) will have a corresponding positive effect on the output of crops (OUTFS) by a margin of 0.000404. The result of the longrun relationship between the variables of the study is shown by Model III of the study as captured by Error Correction Model coefficients in Table 7. The result indicates that volume of funding to fishery (FFS) has positive effect on output of fishery within the period under study and this effect is in line with *a priori* expectation. The relationship is however not statistically significant (as t_{cal} = 4.58269 is greater than t_{tab} =1.697at 39 df). It means that a unit increase in volume of funding to livestock sector (FLS) will have a corresponding positive effect on the output of crops (OUTFFS) by a margin of 0.001395. Findings from the fourth model of the study indicates that volume of funding to forestry (FFT) is positively signed and in line with *a priori* expectation. The relationship is statistically significant (as t_{cal} = 10.8825 is greater than t_{tab} =1.697at 39 df). It means that a unit increase in volume of funding to forestry sector (FFT) will have a corresponding positive effect on the output of forestry (OUTFFT) by a margin of 0.000253. The coefficient of determination R^2 for the study is 0.892203or 89.22% in Appendix I. This indicates that 83.26%, 45.62%, 90.29% & 59.02% of the variations in model I - IV can be explained by the explanatory variables of the model while 16.74%, 54.38%, 9.71% & 40.98% can be attributed to unexplained variation captured by the stochastic term.

Hypotheses Testing
The hypotheses testing are on the long-run estimation as it provides the basis for which most government policies are anchored.

H_{01}: Agricultural Credit Guarantee Scheme Fund extended to crop sub sector does not reflect on the output of crop production in Nigeria.
Using the t test criteria of the longrun equation of the first model (as t_{cal} = 3.13688 is greater than t_{tab} =1.697at 39 df), we reject the null hypothesis. That is, we accept that the estimate b_1 is statistically significant at the 5% level of significance. This implies that Agricultural Credit Guarantee Scheme Fund extended to crop sub sector does have a significant positive effect on the output of crop production in Nigeria.

H_{02}: Agricultural Credit Guarantee Scheme Fund extended to livestock sub sector does not have any significant impact on livestock output in Nigeria.
Using the t test criteria of the longrun equation for the second model (as t_{cal} = 3.67999 is greater than t_{tab} =1.697at 39 df)), we therefore reject the null hypothesis. That is, we accept that the estimate b_2 is statistically significant at the 5% level of significance. This implies that Agricultural Credit Guarantee Scheme Fund extended to livestock sub sector have significant positive effect on livestock output in Nigeria.

H_{03}:Agricultural Credit Guarantee Scheme Fund extended to fishery sub sector does not in any way reflect on the output of fishery in Nigeria.
Using the t test criteria of the longrun equation for the third model of the study (as t_{cal} = 4.58269 is greater than t_{tab} =1.697at 39 df), we therefore reject the null hypothesis. That is, we accept that the estimate b_3 is statistically significant at the 5% level of significance. This implies that Agricultural Credit Guarantee Scheme Fund extended to fishery sub sector has a significant positive effect on the output of fishery in Nigeria.

H_{04}:Agricultural Credit Guarantee Scheme Fund extended to forestry sub sector does not have any positive impact on forestry output in Nigeria.
Using the t test criteria of the longrun equation for the fourth model of the study (as t_{cal} = 10.8825 is greater than t_{tab} =1.697at 39 df), we therefore reject the null hypothesis. That is, we accept that the estimate b_4 is statistically significant at the 5% level of significance. This implies that Agricultural Credit Guarantee Scheme Fund extended to forestry sub sector does not have any positive impact on forestry output in Nigeria.

Vector Error Correction Model
Vector Error Correction Models (VECM) directly estimates the speed at which a dependent variable returns to equilibrium after a change in an independent variable. The error-correction parameters in our study E_{t-1}has the expected negatives sign.The linkage between co-integration and error correction models stems from the Granger representation theorem and it states that two or more integrated time series that are co-integrated have an error correction representation, and two or more time series that are error correcting are co-integrated as represented by the equation.
$Yt = \rho Yt{-}1 + \varepsilon_{t-1}$

Table 9: VectorError Correction model [Shortrun equation]

Model	Variable		Coefficient	t-stat	Error correction term
	Dependent	Independent			
I	OUTCP	FCP	-0.211498	-1.07946	- 0.130055
II	OUTLS	FLS	0.125763	0.63300	-0.175962
III	OUTFS	FFS	-0.067359	-0.36375	- 0.320811
IV	OUTFT	FFT	0.151766	0.85576	-0.030705

Table 9 shows the results of estimating the Error Correction modelling (ECM) of our research model. The short run coefficient of funding to Crop sector (FCP) and funding to Fishery sector (FFS) were negatively signed and against *a priori* expectation and they are not statistically significant (as t_{cal} = -1.07946 and -0.36375 areless than t_{tab} =1.697at 39 df). This indicates that policy geared toward increasing the funding to Crop sector (FCP) and funding to the Fishery sector (FFS) should be made effective to ensure that theyhave positive effect on various outputsof crops and fishery within the period under study. Funding to the Livestock sector (FLS) and Funding to the Forestry sector (FFT) were positively signed in line with a priori expectation. However, the effects are not statistically significant (as t_{cal} = 0.63300 and 0.85576 are less than t_{tab} =1.697at 39 df). This implies that policies towards improving funding to these sectors will have a positive but insignificant effect in the shortrun. The negative signs of (- 0.130055, -0.175962, - 0.320811 & -0.030705) of the error terms indicates that a long-run equilibrium characterized the relationship among the variables OUTCP, OUTLS, OUTFS, OUTFT, FCP, FLS, FFS & FFT. The coefficient for error terms (ε_{t-1}) - 0.130055, -0.175962, - 0.320811 & -0.030705 implies that the system corrected its previous disequilibrium period due to positive or negative shocks in one period at an adjustment speed of 13.01, 17.59, 32.08 & 3.07 percent annually for the four models of the study.

Discussion of Results

The result of the first model of the study indicates that volume of funding to crop sector has a positive and a significant effect on the output of crops. It means that a unit increase in volume of funding to crop sector will have a corresponding positive effect on the output of livestockby a margin of 0.001184. Using the t test criteria of the longrun equation of the first model, we reject the null hypothesis. This implies that Agricultural Credit Guarantee Scheme Fund extended to crop sub sector does have a significant positive effect on the output of crop production in Nigeria. This finding is in line with those ofUdeorah and Vincent (2018) who investigated the relative effect of government and deposit money banks financing in the Nigeria's agricultural sector performance 1981-2015 using quasi experimental design where multivariate Johansen co-integration test was used to analyze the presence of the of the long run equilibrium and error correction regression model. Findings from the study revealed that government financing through the agricultural credit guarantee scheme fund had a significant negative effect on the aggregate agricultural output and crop production output. Onwumere, Imo and Ihegboro (2012) also found similar result while Isiorhovoja andChukwuji (2009) found a weak association between funding to crop sector and increase in productivity.

The volume of funding to livestock for the second model is positive and statistically significant. It means that a unit increase in volume of funding to fishery sector will have a corresponding positive effect on the output of crops by a margin of 0.000404. The result of the hypothesis shows that at 5% level of significance, Agricultural Credit Guarantee Scheme Fund extended to livestock sub sector has a significant positive effect on livestock output in Nigeria. This finding is contrary to that of Oyeranke and Bolarinwa (2017) who carried out analysis of performance of Agricultural Credit Guarantee Scheme Fund in Nigeria (1981-2016). The researchers found that there had been a significant increase in the supply of credit for food crop while supply to cash crop and livestock sectors still remain low. Credit given out is mostly focused on food crop sector which is mostly grown by small scale farmers. The positive and significant effect of volume of funding to the livestock sector in the current study could be attributed to the level of utilization which the livestock farmers put the money disbursed to use.

The result of model three indicates that the volume of funding to fishery has positive effect on output of fishery within the period under study. The relationship is however not statistically significant. It means that a unit increase in volume of funding to livestock sector will have a corresponding positive effect on the output of crops by a margin of 0.001395. The result of the hypothesis shows that at 5% level of significance, Agricultural Credit Guarantee Scheme Fund extended to fishery sub sector has a significant positive effect on the output of fishery in Nigeria. This finding is in line with that of Akaninyene and Sunday (2017) who used multiple linear regression of ordinary least squares to examine the relationship between the ACGSF and the output of the crop sector in Nigeria, livestock and fishery measured by respective gross domestic product and found similar result. The funding has brought about agricultural sector development evaluated by the sustained rise in its contribution to Gross Domestic Product.

Findings from the fourth model of the study indicates that volume of funding to forestry is positively signed and in line with *a priori* expectation. The relationship is statistically significant (as $t_{cal} = 10.8825$ is greater than $t_{tab} = 1.697$at 39 df). It means that a unit increase in volume of funding to forestry sector will have a corresponding positive effect on the output of forestry by a margin of 0.000253. Using the t test criteria of the longrun equation for the fourth model of the study (as $t_{cal} = 10.8825$ is greater than $t_{tab} = 1.697$at 39 df), we therefore reject the null hypothesis. That is, we accept that the estimate b_4 is statistically significant at the 5% level of significance. This implies that Agricultural Credit Guarantee Scheme Fund extended to forestry sub sector does not have any positive impact on forestry output in Nigeria. This finding is in tandem with those of Mafimisebi and Oguntade (2008) who studied the impact of ACGSF on the performance of the agricultural sector using multiple regression analysis. The finding of the study shows that there is a long-run relationship between number and volume of loan guaranteed by ACGSF and the performance of agricultural sector of which the forestry subsector is one.

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

The error correction model results have shown the factors and the contribution of each of the funding to crops, livestock, fishery and forestry on the output of crops, livestock, fishery and forestry on agricultural production. It was found that in the longrun, the ACGSF extendedto crops, livestock, fishery and forestry had positive and significant impact on the output of crops, livestock, fishery and forestry within the period under study. In the shortrun however, ACGSF extended to crop and fishery have positive but insignificant impact on the output of crops and fishery while ACGSF extended to livestock and forestry have positive and insignificant impact on output of livestock and forestry in the shortrun. The negative impacts and the insignificant impactsof ACGSF extended to the agricultural sector in the shortrun could be attributed to instability in government policies on agricultural financing in the shortrun. The study has found that ACGSF has an influence on agricultural productivity as can be seen in our result where ACGSF extended to crop, livestock, fishery and forestry influences the outputs of the various agricultural subsectors.

Recommendations

The following recommendations emerged from the findings and conclusions of the study:

i. The Scheme should be sustained by government since the result of the study shows that funds released to farmers for the production of crops, livestock, fishery and forestry has influence on their output and agricultural productivity in

general. When the funding is increased, the farmers will be able to access more capital to invest in production which will invariably increase output. Policy geared towards improving funding in the shortrun should be aggressively pursued by the government so as to achieve an equilibrium of positive impact of funding in both the long and shortrun period.

ii. Empirical results have shown that attention has been drowned to crops more than the other agricultural subsectors. Hence, government should ensure that the authority in charge of disbursement of agricultural Credit Guarantee Scheme Fund also give priority to farmers who are into livestock, fishery, and forest sector in order to enhance agricultural productivity to both sub sectors.

iii. Government should fund more credit institutions so that their interest rate would be reduced for on-farm production families to obtain credit with ease to help in livestock, fishery, and forestry production.

iv. Since forestry sector is more of a government owned sector, a concerted effort towards investment in this sector will go a long way in increasing productivity in the sector. Government should acquire land and lease it to commercial farmers who may want to go into forestation. The funding intervention by the government is very important as it will spur several investors who hitherto would have been handicapped by fixed assets such as land among others.

Limitations of the Study

As to limitations of the study, the researcher experienced several problems common to many time series work. The most serious problem was data collection for the variables. This was mitigated by relying on the internet and visit to Nigeria Bureau of statistics for data collection.

Contributions to Knowledge made in this Study

i. This study adds to literature on the impact of Agricultural Credit Guarantee Scheme Fund (ACGSF).

ii. Secondly, the study introduced the new variable (Forestry) covering four major subsectors of agriculture as against three sub-sectors covered by previous studies.

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