# AGRICULTURAL FINANCING, AGRICULTURAL OUTPUT GROWTH AND EMPLOYMENT GENERATION IN NIGERIA

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## ABSTRACT

This study investigates the impact of agricultural financing and agricultural output growth on employment generation in Nigeria from 1981 to 2017. The study adopts the framework of the Auto Regressive Distributed Lag (ARDL) Model for analysis. The empirical results show that while agricultural financing increases employment generation in both the short run and long run, the lag of agricultural output growth increases employment generation mainly in the short run. Other variables found to have significant effect on employment generation were price and agricultural output while labor force population, wages and aggregate expenditure were insignificant. The study concludes that policy makers should endeavor to see that every fund allocated for a specific agricultural schemes and interventions should be fully utilized for its purpose. To increase employment opportunities, there should be careful monitoring of the implementation of each scheme and policy to realize their specific objectives.

## KEY WORDS

agricultural financing, agricultural output, growth, employment

## JEL CODES

E24, J21, J43, O13, Q13, Q14

## 1 INTRODUCTION

Agriculture is the science of cultivation of soil for crops and the rearing of animals. Agriculture is as old as man himself as it was the first occupation of mankind. Even with the evolvement of modern civilization, it still remains an essential part of the growth and development of any extant economy (Anthony-Orji et al., 2020; Orji et al., 2019 and Ogbuabor and Nwosu, 2017). In Nigeria, the agricultural sector is a major sector that drives economic development and industrialization because of its importance in the provision of food for the increasing popu-
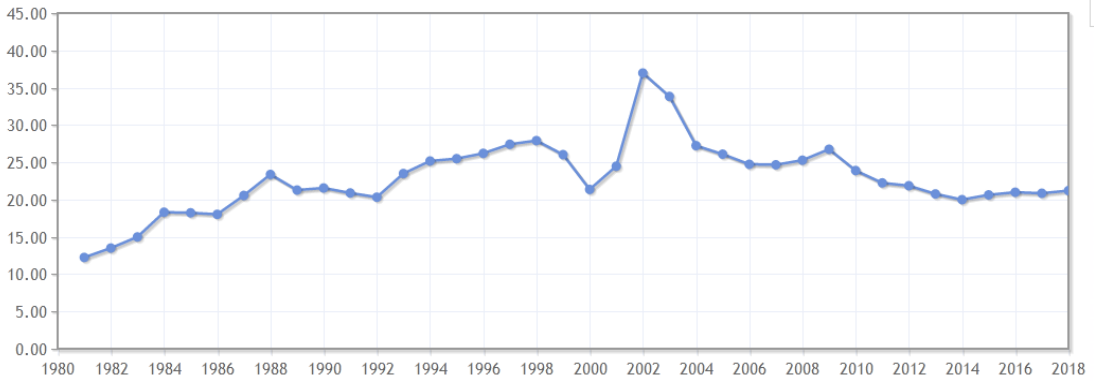
Fig. 1: Agriculture, value added (% of GDP) in Nigeria (1981–2018)
Note: The $Y$-axis represents agricultural value added as a percentage of GDP, $X$-axis represents the years.
(World Bank national accounts data, 2020)

lation, the supply of raw material to the growing industrial sector, generation of foreign exchange earnings, creation of employment opportunities, and provision of market for the product of the industrial sector (World Bank, 2016). Nigeria is endowed with large expanse of arable land and favourable climate for agriculture. As at 1990 the estimated arable land was 81 million hectares out of the Nigerian total land of 91 hectares of which 18 million hectares of this land was classified as permanent pasture for livestock production. This enables the production of a wide variety of crops, livestock, forestry and fishery products (Ewetan et al., 2017).

The 1962–1968 development plan was the first national plan of Nigeria post-independence and among its many objectives, the introduction of modern agricultural methods, agricultural extension services and the supply of better farm implements were greatly emphasized. This national plan was to a large extent achieved and Nigeria became the leading producer of export crops such as cocoa which was produced in the western region, palm oil which was largely produced in the southern region and groundnut which was produced majorly in the northern region. According to the Central Bank of Nigeria (CBN) reports, in the 1960's, agriculture contributed about 60 percent to the Gross Domestic Product (GDP) of the nation (CBN, 2016). The National Bureau of Statistics (NBS) reported that agriculture was the most important sector in terms of its contribution

to the to the country's output, employment and foreign exchange earnings (NBS, 2014). However the success of the sector was short-lived and its share of contribution to the GDP of Nigeria declined drastically to 25 percent between 1975 and 1979 and later rose up to 38 percent in 2002 but later fell again to 20 percent in 2010. There hasn't been a significant change in agriculture's share to the GDP since then. This fall in agricultural production was owed greatly to the oil boom the economy experienced in the 1970's. Fig. 1 shows the contribution of the agriculture to the GDP between 1980 and 2018. The $Y$ axis is the percentage contribution of agriculture to GDP while the $X$ axis is the years.

The 1970's brought about the emergence of the oil industry as the main driver of economic growth and since then, agricultural production has been progressively declining in terms of its annual contribution to Nigeria's GDP. The Nigerian economy became over-dependent on the oil sector and this caused the decline in the revenue generated by the agricultural sector overtime. The Nigerian government has recognized how detrimental the over dependence on only one sector can be to the economy and has recently started to seek for diversification of the economy through the development of other productive sectors aside from the oil sector. The government has brought into cognisance the importance and prospects of the agricultural sector and it is one the major

sectors it seeks to develop. There are other sources of generating employment and economic growth but only a few can be compared with agriculture in its ability to reduce poverty and enhance economic growth especially at the early stages of development. For example in Zambia and Nigeria, mineral wealth has not provided a platform for wide range of employment opportunities, poverty reduction and economic growth as agriculture has proven to have done. Without the increasing income and affordable food that a dynamic agricultural sector provides, economic transformation will be slow and economies will remain trapped in a cycle of low growth and poverty (Department for International Development, 2005).

However, it is a known fact that for the successful development of any sector, adequate financing is essential. Credit plays an essential role in the development of the agricultural sector of economy. The agricultural sector depends more on credit as a source of finance compared to any other sector in the economy due to the seasonal variation in the returns of farmers and a changing trend from subsistence to commercial farming (Abedullah et al., 2009). The provision of suitable financial policies and enabling institutional finance for both subsistence and commercial agriculture has prospects of enhancing agricultural development, hence, increasing the contribution of the sector in the generation of employment, foreign exchange earnings and increasing the income of economic agents engaged in agricultural practices (Olomola, 2010).

Since the 1970's the government has established and implemented several agricultural financing policies, some of the early agricultural policies established include, National Accelerated Food Production Program established in 1972, Agricultural Development Program Established in 1975 and Operation Feed the Nation established in 1976 among many others. A lot of these policies didn't last long to achieve its set objectives. Over the years,

inadequate finance has been identified to be a major limiting factor to the development of the agricultural sector in most developing countries including Nigeria (Orji et al., 2014, 2020).

The use of crude and obsolete tools, poor agricultural infrastructure such as poor transport facilities has been an obvious characteristic of the sector. These appalling characteristics are attributed to the lack of financial resources needed to acquire modern and improved farm implements, new farming methods and enhance the infrastructural facilities. The government sees this limitation and has since the 1970's introduced and implemented various agricultural financing policies in order to achieve an effective system of sustainable agricultural financing schemes, programs and institutions that can provide credit facilities to agricultural producers, processors and marketers at all level (Eze et al., 2010). Even with all these policies and strategies of the government and other institutions to broaden the framework of sustainable growth, the performance of the agricultural sector is still suboptimal.

Agriculture in Nigeria is dominated by small scale farmers and it is largely subsistent with low production capacity, stagnancy and over 90 percent of agricultural output is accounted for by farmers with less than two hectares of land available for crop production (Federal Ministry of Agriculture and Rural Development, 2008). Many of the policies have been ineffective either because of poor management or macroeconomic policies affecting exchange rates, inflation and cost of capital has drowned its impact. Against this background, the objective of this study is to estimate the impact of agricultural financing and agricultural output growth on employment generation in Nigeria.

The rest of the paper is structured as follows; section 2 focuses on the review of empirical literature, while section 3 dwells on the methodology. The results are presented and discussed in section 4, while section 5 concludes the study and makes some vital policy recommendations.

# 2   REVIEW OF EMPIRICAL LITERATURE

Majority of the existing literature on agricultural financing in Nigeria investigated its effect on agricultural productivity or economic growth as a whole. However there are very few empirical evidences on the impact of agricultural financing and agricultural output growth on employment generation, the few literatures that exist in Nigeria about the agricultural sector and employment growth were based on theory, logic and descriptive statistics at best. However, some researchers have examined the relationship between agriculture and employment in some other countries using mostly descriptive statistics. For example, Chandio et al. (2016) examined the impact of formal credit on agricultural output in Pakistan. The researchers used the ordinary least square method to estimate the impact and their result showed that formal credit had a positive significant relationship with agricultural output.

Briones (2013) did a study on the trends and patterns of agricultural growth, employment and inclusive growth in the Philippines, evidence from the study indicated that agricultural growth leads to non-agricultural growth because it is significantly connected with downstream manufacturing, contributes meaningfully towards the reduction of poverty and has a positive impact on the employment of unskilled labor. In another study, Gelan and Seifu (2016) examined the determinants of employment generation through urban agriculture using Bishoftu area of Oromia Region, Ethiopia as a case study. Data was sourced by both primary and secondary means. They applied both descriptive and multiple regression techniques to analyze the data, the results revealed that both small and micro enterprise farming and household level farming contributed significantly to employment generation in the region but the small and micro enterprise farming created more jobs. The researchers also found that the agricultural sector indirectly plays a positive role to the development of other sectors such as industries, trade, hotel and cafeterias through provision of inputs and raw materials and serves as an alternative sources of energy

(Biogas) thereby creating even more jobs. In an earlier study, Hayami et al. (1987) examined how agricultural processing and marketing affected employment generation and income using the case of soybean in Indonesia. The study cite for the research survey was an upland village in the Garut District in West Java. The researchers first estimated the income and employment generated through soybeans production then later estimated the additional income and employment generated that came from the processing the already produced soybean and marketing them to consumers. The estimation result showed that the processing and marketing of farm products played a significantly important role in generating income and employment in local communities in Indonesia.

Many scholarly works on Agricultural financing in Nigeria and some other developing economies are of the conclusion that Agricultural financing is positively related with agricultural output growth and economic growth. For instance, Obudah and Tombofa (2016), in their study on the effect of agricultural financing on output growth and macroeconomic growth in Nigeria collected data from CBN Bulletin and used the ordinary least squares method, co-integration and error correction technique to do the analysis. Their result showed that there existed a positive relationship between agricultural credit and agricultural output. They also found that agricultural credit has a positive effect on the real GDP over the period of study. They asserted that failure of borrowers to pay back credit had caused a reduction in lenders confidence and this is a serious limitation to the financing of the agricultural sector in Nigeria.

In a similar study, Egwu (2016) investigated the impact of agricultural financing on agricultural output, economic growth and poverty alleviation in Nigeria with the use of the ordinary least square regression technique. The study result revealed that the Credit Guarantee Scheme Fund Loan and the commercial banks credit to Nigeria's Agricultural sector has significantly impacted on agricultural output positively thereby reduced the poverty rate

and stimulated the economic growth within the study period. The result also predicts that in the long run, farmers should be able to apply their own funds for agricultural development even without loans from the Guarantee Scheme Fund. Udoka et al. (2016) got a similar result in the study of the effects of commercial banks' credit on agricultural output in Nigeria. The researchers sourced data from the central bank of Nigeria statistical bulletin and employed the ordinary least square regression technique for their analysis. Their results showed that, an increase in agricultural credit guarantee scheme fund, commercial banks' credit to the agricultural sector and government expenditure on agriculture could lead to higher agricultural production in Nigeria, however, the result showed a negative relationship between interest rate and agricultural production in Nigeria this negative relationship is due to the fact that an increase in the rate of interest charged farmers for funds borrowed discouraged many farmers from borrowing for agricultural purposes and this led to a reduction in agricultural investment. In a state specific study, Lawal and Abdullahi (2011) studied the impact of informal agricultural financing on agricultural production in the rural economy of Kwara State, Nigeria. Their source of data was mainly primary and was collected using structured questionnaire from sampled farmers in Kwara State who were participating in periodic savings, rotating savings and money lending. The researchers used ordinary least square regression technique to do the analysis and found that these three informal financing schemes have positive impact on agricultural production in Kwara State, though it was only rotating savings that had a statistical significance.

In another recent study, Olowofeso et al. (2017) investigated the relationship between agricultural sector financing and agricultural output growth using the non-linear auto-regressive distributed lag (NARDL) model. Their findings showed no evidence of asymmetry in the impact of agricultural sector credit on agricultural output growth in the short run but indicated different long run stability relationships between agricultural sector credit

and output growth in the agricultural sector. Ahungwa et al. (2014) also studied the pattern and contribution of agriculture to the Gross Domestic Product of Nigeria within the time span of 1960–2012. Data was collected from CBN statistical bulletin, among others. The trend analysis revealed that the share of agriculture to total GDP maintained a clear dominance over other sectors between 1960 and 1975, though it exhibited a downward trend. Further analysis from 1976 to 1989 showed a fluctuating trend, intertwining with the industrial sector. The regression analysis results showed that agriculture has a positive and significant relationship with GDP. Iganiga and Unemhilin (2011), investigated the effect of Federal government agricultural expenditure on agricultural output in Nigeria. They employed co-integration and error correction methodology to determine the nature of the relationship and the results showed that a positive relationship exists between government capital expenditure and agricultural output, however, it was also noted by the researchers that with a one-year lag period, the result shows that the impact of government expenditure on agriculture is not instantaneous. The results revealed negative effects from total credit to agriculture and population growth rate, this negative effect confirmed that it is not enough to give out credit facilities for agricultural practices without proper monitoring it. Nwankwo (2013) examined how the Nigerian Agricultural Co-operative and Rural Development bank as an agricultural financial institution have impacted in the economic growth of Nigeria. Using the least square regression technique, the finding revealed that there is a positively significant relationship between agricultural finance and Economic growth but the rate of loan repayment has over the years had a significant negative effect on agricultural production.

Conclusively, the bulk of existing literature on agricultural financing in Nigeria focused on the effects of agricultural financing or agricultural credit on economic growth as a whole or on agricultural productivity only. There is a dearth of empirical evidence on the impact of agricultural financing on the different

important components of the macro economy such as employment generation. There are also little or no such empirical evidences that show the impact of agricultural output growth has on employment generation in Nigeria. This is the gap this current study intends to fill.

# 3   METHODOLOGY

## 3.1   Theoretical Framework

This research work will be an extension of the Classical and Keynesian framework of employment. The Classical theory posits that the level of employment depends on real wage rate while Keynesian theory of employment expresses the level of employment in the short-run as a function aggregate effective demand for commodities.

The classical theory hold that real effective wage is a cost of labor, and an increase in real wage signifies an increase in the cost of labor, which in turn reduces the profitability of investment. This on the other hand will leads to a reduction in the level of employment generated by firms. The classical theory of employment's basic view is that the perfectly free market economy is self-regulating, if prices and wages are flexible, a free market economy will always operate at full employment level. In the labour market, employment for labour is determined by the interaction between the demand and supply for labour, where workers constantly supply labour and employers demand labour. The flexibility of price and wages makes the supply for labour to be always equal to its demand. This can be stated mathematically as:

$$E = f\left(\frac{w}{p}\right), \qquad (1)$$

where $E$ is the variable for employment, $w$ is wage, $p$ is the price level and $\frac{w}{p}$ is the real wage rate.

The Keynesian theory on the other hand holds that increase in effective demand will increase employment and a decrease in effective demand will bring about a reduction in employment level. According to the theory, effective demand is equal to the expenditure on consumption and investment which is equivalent to the national input and national output. However investment and consumption expenditure through the market forces alone cannot bring about equilibrium employment, the government needs to take necessary action in order to reduce unemployment, this leads to the inclusion of government expenditure as another component of effective demand aside from consumption and investment expenditure.

When the government intervenes by increasing its expenditure, income increases and the higher level of income will induce demand, to meet the new higher demand, production and output has to increase and for production to increase there will be a need to employ more workers (Mankiw, 2009).

Equation 1 assumes that wage and effective demand are positively related to employment and price is negatively related to employment. This model will be the bedrock for addressing the objectives. The times series data for this study spanned from 1981 to 2017 and the data was obtained from Central Bank of Nigeria statistical bulletin, world data index (2017) and the National Manpower Board.

## 3.2   Model Specification

The Auto Regressive Distributed Lag (ARDL) bounds test approach will be used to examine the impact of agricultural financing and agricultural output growth on employment generation in Nigeria.

The ARDL model was developed by Pesaran and Shin (1998) and Pesaran et al. (2001). The model is a dynamic model developed to test for the presence of long run relationship between variables. Analyzing the impact of a macroeconomic variable on another macroeconomic variable requires analyzing long-run relationships. The ARDL model incorporates both the lags of the dependent variable and the lags of the independent variables as part of the

regressors. The basic feature of a distributed lag model is that the effects of the independent variables on the dependent variable occur over time and not all at once. The ARDL model is useful especially when the variables are not are not of the same order of integration and it is also flexible with small sample study. The generalized ARDL $(p, q)$ model is specified as:

$$Y_t = \alpha_{0i} + \sum_{t=1}^{p} \beta_i Y_{t-1} + \sum_{t=0}^{q} \delta_i X_{t-1} + \epsilon_{it}, \quad (2)$$

where $Y_t$ is the dependent variable and the variables in $X_t$ are independent variables and are allowed to be purely $I(0)$ or $I(1)$ or cointegrated; $\beta$ and $\delta$ are coefficients; $\alpha$ is the constant; $i = 1, \ldots, k$; $p$ is the optimal lag order for the dependent variable while $q$ is the optimal lag order for the exogenous variables. The lag lengths of $p$, $q$ may not necessarily be the same; $\epsilon_{it}$ is the white noise error term. In this model, the dependent variable is a function of its lagged values, the current and lagged values of other exogenous variables in the model. The researchers' decision to use the ARDL bounds testing approach rather than other available econometrics models is because the ARDL bounds testing approach has both long-run and short-run dynamics and can be used irrespective of the order of integration of the series. The ARDL bounds testing approach has also been empirically proven to be superior with consistent results for small samples. (Wooldridge, 2013).

The model that will be used to examine the impact of agricultural financing and agricultural output growth on employment generation in Nigeria will take the form below. The model will be specified with agricultural financing and agricultural output growth as explanatory variables alongside other control variables using the ARDL bounds testing approach. When applying the ARDL approach, the long run and short run models are specified as shown below:

$$\Delta \ln \mathrm{EMP}_t = \alpha_0 + \beta_1 \ln \mathrm{EMP}_{t-1} + \quad (3)$$
$$+ \beta_2 \ln \mathrm{AGFN}_{t-1} +$$
$$+ \beta_3 \ln \mathrm{AOG}_{t-1} +$$
$$+ \beta_4 \ln \mathrm{AO}_{t-1} +$$

$$+ \beta_5 \ln \mathrm{LFP}_{t-1} +$$
$$+ \beta_6 \ln \mathrm{WG}_{t-1} +$$
$$+ \beta_7 \ln \mathrm{PR}_{t-1} +$$
$$+ \beta_8 \ln \mathrm{AGEX}_{t-1} +$$
$$+ \sum_{t=1}^{p} \alpha_1 \Delta \ln \mathrm{EMP}_{t-1} +$$
$$+ \sum_{t=0}^{q_1} \alpha_2 \Delta \ln \mathrm{AGFN}_{t-1} +$$
$$+ \sum_{t=0}^{q_2} \alpha_3 \Delta \ln \mathrm{AOG}_{t-1} +$$
$$+ \sum_{t=0}^{q_3} \alpha_4 \Delta \ln \mathrm{AO}_{t-1} +$$
$$+ \sum_{t=0}^{q_4} \alpha_5 \Delta \ln \mathrm{LFP}_{t-1} +$$
$$+ \sum_{t=0}^{q_5} \alpha_6 \Delta \ln \mathrm{WG}_{t-1} +$$
$$+ \sum_{t=0}^{q_6} \alpha_7 \Delta \ln \mathrm{PR}_{t-1} +$$
$$+ \sum_{t=0}^{q_7} \alpha_8 \Delta \ln \mathrm{AGEX}_{t-1} +$$
$$+ \Psi \mathrm{ECM}_{t-1} + \epsilon_t,$$

where ln refers to natural logarithm, $\Delta$ is the difference operator and $\mathrm{ECM}_{t-1}$ is the one period lagged error correction term. $\Psi$ is a coefficient that measures the speed of adjustment between the long run and short run disequilibrium and shows how fast equilibrium is restored in the event of shocks to the system The expression with summation sign k represents the short-run dynamics of the model, while the coefficients $\beta_k$ represents long-run relationship and $E_t$ is the serially uncorrelated white-noise error term with zero mean and constant variance, $\alpha_0$ is the constant term and $k = 1, \ldots, n$.

The hypothesis for the bounds test for cointegration is based on the $F$-statistic with non-standard asymptotic distribution under the null hypothesis that there is no long run relationship among the variables. The null hypothesis is tested using the joint significance test below:

$$H_0 : \; \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 =$$
$$= \beta_6 = \beta_7 = \beta_8 = 0$$

$$H_1: \quad \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq$$
$$\neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$$

The null hypothesis is saying that the coefficients of the long run equation are all equal to zero, and by that it implies that there is no co-integration against the alternative that these coefficients are not equal to zero. Pesaran et al. (2001) developed two bounds test of critical values, the lower bounds assumes that all regressors are $I(0)$ and the upper bounds assumes that all regressors are $I(1)$. If the null hypothesis is unable to be rejected, it means that the computed $F$-statistic for any chosen level of significance lies below the lower bound, then we can only specify the short run model which in this case denotes no co-integration but if we reject the null hypothesis in favor of the alternative hypothesis which means that the $F$-statistic lies above the upper bound, then we go ahead to specify an error correction model (ECM). However, if the $F$-statistic lies between the lower and the upper bounds then the inference will be inconclusive.

If there is a long run relationship among the variables of this study, the long run elasticity will be estimated with the equation specified below:

$$
\begin{aligned}
\ln \mathrm{EMP}_t = \ \alpha_0 + \ &\quad (4) \\
&+ \sum_{t=1}^{p} \theta_1 \ln \mathrm{EMP}_{t-1} + \\
&+ \sum_{t=0}^{q_1} \theta \ln \mathrm{AGFN}_{t-1} + \\
&+ \sum_{t=0}^{q_2} \theta \ln \mathrm{AOG}_{t-1} + \\
&+ \sum_{t=0}^{q_3} \theta \ln \mathrm{AO}_{t-1} + \\
&+ \sum_{t=0}^{q_4} \theta \ln \mathrm{LFP}_{t-1} + \\
&+ \sum_{t=0}^{q_5} \theta \ln \mathrm{WG}_{t-1} + \\
&+ \sum_{t=0}^{q_6} \theta \ln \mathrm{PR}_{t-1} + \\
&+ \sum_{t=0}^{q_7} \theta \ln \mathrm{AGEX}_{t-1} + \epsilon_t.
\end{aligned}
$$

Equation 4 above represents the long run relationship. All symbols are as defined in equation 3 and the $\theta$'s are the long run coefficients.

### 3.2.1  The Variables

EMP indicates employment level and it is the proportion of the labor force population who are willing and able to work and get work at the prevailing wage rate. In Nigeria, it is measured by the proportion of the population that worked productively for at least 40 hours in the past week. EMP is the dependent variable because the objective of the study is to find the impact of certain economic variables on employment generation.

AGFN refers to Agricultural Financing it is measured by government's expenditure on funding agriculture and agricultural activities. It is an independent variable in the model because the objective of the paper is to estimate the impact of agricultural financing on employment generation. The increase in this variable is expected to have a positive effect on employment generation and so the coefficient of AGFN is expected to be positive.

AO refers to Agricultural Output. It is the quantity of all from agricultural practices which includes all forms of crop cultivation and animal rearing at any given point in time.

AOG refers to Agricultural Output Growth. It is the annual increase in the total agricultural output in the country. This is included as an exogenous variable in the model because one objective of the study is to investigate the impact agricultural output growth on the dependent variable which is employment generation. An increase in agricultural output in the country is expected to increase employment in that country and so the coefficient of AGOG is expected to be positive.

AGEX refers to Aggregate Expenditure. It is the sum total of all expenditures incurred on consumer goods, planned investments and government expenditures undertaken in the economy. In the Keynes theory of employment which is one of the basic theoretical framework used as an underpinning for this study postulates that the level of employment

in an economy depends on the effective demand. By effective demand, Keynes meant the total demand for goods and services at the different levels of employment. The sum of consumption expenditure, investment expenditure and government expenditure constitute effective demand, in other words, the aggregate expenditure in an economy is the effective demand in that economy according to Keynes. Abdullah et al. (2011) and Abdelkader et al. (2017) studied the impact of public expenditure on employment in few countries in Asia and in Algeria. The two results showed that public expenditure in both regions was positively significant to employment generation. An increase in aggregate expenditure is means that there is an increase in the demand for goods and services and this is expected to increase the employment level. The coefficient of the variable AGEX is then expected to be positive.

WG is the wages. Wage is the cost of labor, it is the payment earned for work or services rendered. According to the Classicists, whose theory is bedrock of this study, employment is determined by the demand and supply of labor and this demand and supply of labour depends on the real wage rate. So, by increasing the wage rate, cost of production will reduce and this will lead to a decrease in the prices of products, this decrease in prices will cause the demand for product to rise, leading to an increase in the employment of labor and ultimately full employment will be reached. According to the theoretical framework of this study, the coefficient of WG is expected to be positive.

LFP is the Labor Force Population. It is the proportion of a country's total population ages 15–64 excluding stay-at-home parents, full time students, retired persons, the handicapped and those unable to work or not interested in working. A paper by Bloom and McKenna (2015) explained that the increase in global labor force population without a corresponding increase the number of jobs created will cause an increase in unemployment rate. The coefficient of LFP may be either positive or negative.

PR refers to Price Level and it is the average of all prices goods and services produced currently in an economy. According to the classicists' model of employment, the level of employment is determined by the demand and supply for labor which depends on the real wage rate. The real wage rate here is the ratio of money wage and price level. A fall in price level will lead to an increase in the real wage rate and subsequently an increase in employment level. The coefficient of PR is expected to be negative.

### 3.3 Model Justification

The ARDL bounds test procedure was developed by Pesaran et al. (2001) and it is useful when empirically analyzing the long-run relationships and the dynamic interaction among economic variables. For times series data with small and finite data size like the case of this present study, the ARDL bounds testing is more efficient when compared to other methods. It has been empirically proven that the results are consistent and the estimates of the long-run model are unbiased (Harris and Sollis, 2003). This testing procedure is simple and in contrary to other multivariate cointegration techniques such as Johansen and Juselius (1990), it allows the cointegration relationship to be tested using Ordinary Least Squares (OLS) procedure once the lag order of the variables of interest have been identified (Oteng-Abayie and Frimpong, 2006). The model is also preferred by the researchers because it can be applied regardless of the order of integration of variables, it eliminates the problem of the order of integration that is common with the Johansen likelihood approach, whether the variables are purely integrated of order one $I(1)$ or order zero $I(0)$, fractionally integrated or even mutually integrated, this testing approach can still be applied. The ARDL bounds testing approach is simple to implement and interpret because it involves just a single- equation set up. In the ARDL bounds testing approach, different variables can be assigned different lags as they enter the model and the t-statistics are valid even when some of the regressors are endogenous (Pesaran et al., 2001).

The models were estimated using the Eviews 9.0 software package because of its efficiency

and effectiveness in analyzing times series data using the ARDL model.

## 3.4 Pre-Estimation and Post-Estimation Hypothesis

**Unit Root Test**

$H_0$: the variables are non-stationary.

*Decision Rule:* reject $H_0$ if the absolute value of $\text{ADF}_{\text{cal}} > \text{ADF}_{\text{tab}}$.

**Breusch-Godfrey Serial Correlation LM Test**

$H_0$: there is no serial correlation.

*Decision Rule:* reject $H_0$ if the $F_{\text{cal}} > F_{\text{tab}}$, otherwise, do not reject. Or reject $H_0$ if the $P$-value is less than 0.05.

Note that the $F_{\text{cal}}$ is the computed $F$ statistic, while $F_{\text{tab}}$ is the level of significance or critical values.

# 4 RESULTS AND DISCUSSION

## 4.1 Unit Root Test

The unit root test is carried out to examine the order of integration of the variables. As it is generally known that variables that are not integrated of order zero will lead to imprecise result if used for estimation and therefore cannot be used to estimate short-run analysis. For the purpose of this research study, the Augmented Dickey-Fuller (ADF) test and the Phillip-Perron (PP) test for unit root was used to test if the time series is stationary or not at the chosen level of significance.

The results in the Tab. 1 indicates that $\text{ADF}_{\text{cal}} < \text{ADF}_{\text{tab}}$ at levels form both with trend and without trend meaning that agricultural output (AO), employment (EMP), agricultural finance (AGFN), aggregate expenditure (AGEX) and labor force (LF) variables were non-stationary at levels. But the ADF

cal> ADF tabat level for agricultural output growth (AOG) and wage (WG), showing that this variable is stationary at level. Moreover, the $\text{ADF}_{\text{cal}} > \text{ADF}_{\text{tab}}$ for AO, EMP, AGFN, AGEX and LFshowing that though these variables were not stationary at the level, they were stationary at their first difference which is a necessary condition to proceed with the regression. Thus, the variables were integrated of order zero $I(0)$ and one $I(1)$.

The Phillip-Perron (PP) unit root test in Tab. 2 shows that the variables AO and WG were stationary at level, that is, they are integrated of order zero – $I(0)$, whereas AGEX, AGFN, AO, EMP and LF were stationary after first differencing, which means they are integrated of order one – $I(1)$. The combination of $I(1)$ and $I(0)$ variables making it possible for the researcher to proceed with the cointegration and bound test approach.

Tab. 1: Result of Augmented Dickey-Fuller unit root test of the variables

| Variables | Level Form | | First Difference | | Order of integration |
|---|---|---|---|---|---|
| | 5% critical value | ADF test statistics | 5% critical value | ADF test statistics | |
| AGEX | −2.945842 | −1.598240 | −2.948404 | −5.143602 | $I(1)$ |
| AGFN | −2.945842 | −2.661838 | −2.951125 | −7.100106 | $I(1)$ |
| AOG | −3.540328 | −4.795090 | − | − | $I(0)$ |
| AO | −2.945842 | 8.287824 | −3.544284 | −4.821754 | $I(1)$ |
| EMP | −3.548490 | −0.827744 | −2.948404 | −6.308979 | $I(1)$ |
| LF | −3.540328 | 0.477181 | −3.544284 | −4.714395 | $I(1)$ |
| WG | −3.552973 | 3.677762 | − | − | $I(0)$ |

Source: Eviews 9 Output for the Result of Augmented Dickey-Fuller unit root test of the variables

### 4.2 Lag Length Selection Criteria using Akaike Information Criterion

The lag length for the autoregressive distributed lag model of objective one and two was done using Akaike Information. Since the study used Eviews 9 which gives chance for automatic selection of lag lengths, the variables selected maximum lag lengths of 2. At the end of evaluation, the study produced ARDL presented in Fig. 2.

The Autoregressive Distributed Lag (ARDL) model selection is presented in Fig. 2. The result of the lag length selection showed that after 20 evaluations, the system automatically selected ARDL $(2, 0, 2, 2, 2, 0, 2, 2)$.

Tab. 2: Result of Philips-Perron unit root test of the variables

| Variables | Level Form | | First Difference | | Order of integration |
|---|---|---|---|---|---|
| | 5% critical value | PP test statistics | 5% critical value | PP test statistics | |
| AGEX | −2.945842 | −1.826927 | −2.948404 | −5.144728 | $I(1)$ |
| AGFN | −2.945842 | −2.496547 | −2.948404 | −18.863670 | $I(1)$ |
| AOG | −2.945842 | −4.645456 | − | − | $I(0)$ |
| AO | −2.945842 | 7.470031 | −3.544284 | −4.748836 | $I(1)$ |
| EMP | −2.945842 | −2.320790 | −2.948404 | −5.304766 | $I(1)$ |
| LF | −2.945842 | 1.606316 | −2.948404 | −4.442421 | $I(1)$ |
| WG | −2.945842 | −2.994143 | − | − | $I(0)$ |

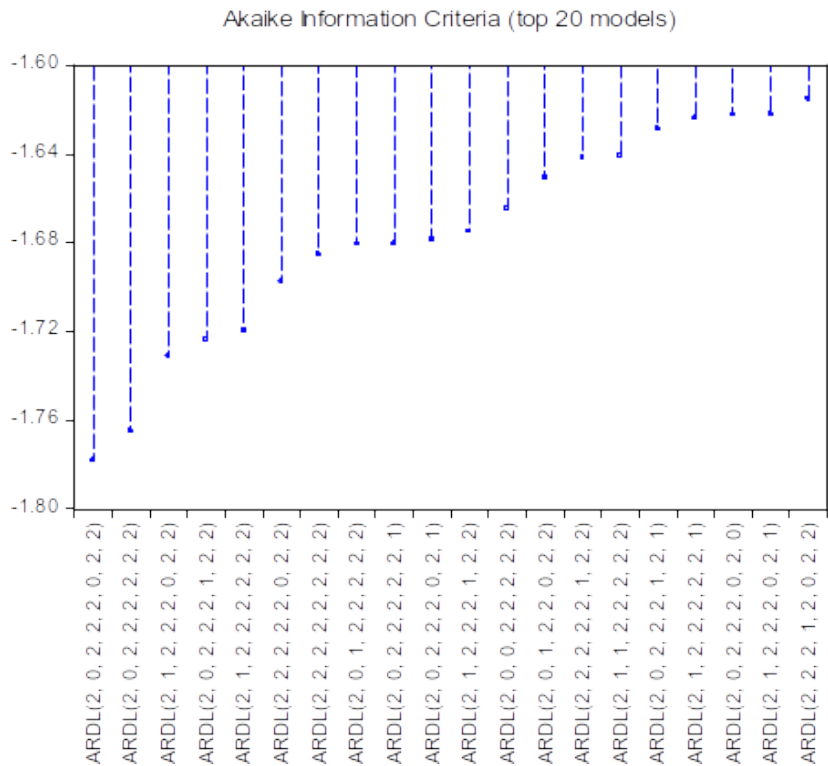Source: Eviews 9 Output for the Result of Philips-Perron unit root test of the variables



Fig. 2: Graph of lag ARDL lag length selection based on Akaike Information Criterion
Source: Eviews 9 Output for model selection based on Akaike Information Criteria

Tab. 3: Result of ARDL Cointegration and Long-run Form (dependent variable: EMP)

*Cointegrating Form*

| Variable | Coef. | Std. error | $t$-statistic | Prob. |
|---|---|---|---|---|
| D(EMP(−1)) | −1.050075 | 0.104999 | −10.000767 | 0.0000 |
| D(AO) | 0.000416 | 0.000034 | 12.127873 | 0.0000 |
| D(AOG) | −0.420065 | 0.100640 | −4.173952 | 0.0008 |
| D(AOG(−1)) | 0.162786 | 0.093229 | 1.746098 | 0.1012 |
| D(AGFN) | 0.000204 | 0.001664 | 0.122858 | 0.9039 |
| D(AGFN(−1)) | −0.004924 | 0.001902 | −2.588947 | 0.0205 |
| D(AGEX) | 0.000000 | 0.000000 | 0.725201 | 0.4795 |
| D(AGEX(−1)) | 0.000001 | 0.000000 | 2.706654 | 0.0162 |
| D(LF) | 0.000000 | 0.000000 | 4.271568 | 0.0007 |
| D(PR) | −0.068499 | 0.007454 | −9.190099 | 0.0000 |
| D(PR(−1)) | 0.040143 | 0.011245 | 3.569844 | 0.0028 |
| D(WG) | −0.000002 | 0.000003 | −0.762021 | 0.4579 |
| D(WG(−1)) | −0.000004 | 0.000002 | −1.596797 | 0.1312 |
| ECM(−1) | −0.287844 | 0.068209 | −4.220018 | 0.0007 |

ECM = EMP − (0.0014·AO − 2.5299·AOG + 0.0131·AGFN − 0.0000·AGEX + 0.0000·LF − 0.2741·PR + 0.0000·WG + 47.8290)

*Long Run Coefficients*

| Variable | Coef. | Std. error | $t$-statistic | Prob. |
|---|---|---|---|---|
| AO | 0.001446 | 0.000324 | 4.469113 | 0.0005 |
| AOG | −2.529894 | 0.826775 | −3.059953 | 0.0079 |
| AGFN | 0.013126 | 0.014514 | 0.904366 | 0.3801 |
| AGEX | −0.000004 | 0.000001 | −3.972934 | 0.0012 |
| LF | 0.000000 | 0.000000 | 5.325788 | 0.0001 |
| PR | −0.274078 | 0.055540 | −4.934784 | 0.0002 |
| WG | 0.000016 | 0.000014 | 1.178424 | 0.2570 |
| C | 47.828957 | 1.401911 | 34.116968 | 0.0000 |

Source: Eviews 9 Output for the result of the short run and long run model

## 4.3  Cointegration and Bounds Test

In order to test for the existence of long run relationship among the variables, the study used Bound test approach. This is because some of the variables in the model are integrated of order one while some or at least one of the variables is integrated of order zero. This result is presented in Tab. 4. The null hypothesis for this test is that no long run relationship exists and the decision is to reject the null hypothesis if the value of $F$-statistic from the bound test conducted is greater than the upper bound value of Pesaran test statistic.

Tab. 4: Result of bounds test (cointegration of the variables)

| $F$-statistic | 10.26539 |
|---|---|

*Critical Value Bounds*

| Significance | 0 Bound | 1 Bound | Decision |
|---|---|---|---|
| 10% | 2.03 | 3.13 | Cointegrated |
| 5% | 2.32 | 3.50 | Cointegrated |
| 2.5% | 2.60 | 3.84 | Cointegrated |
| 1% | 2.96 | 4.26 | Cointegrated |

Source: Eviews 9 Output for the Result of bounds test (cointegration of the variables)

The result of bound test presented in Tab. 4 shows that the value of $F$-statistic lies above the upper bound value of Pesaran test statistic. This is an indication that the null hypothesis that there is no long run association among the variables in the model is to be rejected. Therefore, there exists long run relationship among the variables in the model.

## 4.4  Post Estimation Test

The post estimation test that will be analyzed in this section includes the Breusch-Godfrey Serial Correlation LM test, white Heteroskedasticity test and other diagnostic tests such as dynamic stability Cusum test and specification error test will be conducted in this study so as to prevent mis-specification errors.

### 4.4.1  Breusch-Godfrey Serial Correlation LM Test

This test employed the Breusch-Godfrey Serial Correlation LM Test to examine the tendency of serial correlation in the error term. The result is presented below.

The result presented above shows that the probability of the $F$-statistics is greater than 0.05 (5%). Also, the observations times $R$-squared is less than the chi-square $P$-value. Hence, we accept the $H_0$ and conclude that the model has no serial correlation.

### 4.4.2  Diagnostic Test

Stability of the short run model was tested using CUSUM test. The idea behind this test is to reject the hypothesis of model stability if the blue line lies significantly outside the dotted red lines otherwise, the model is said to be stable. The null hypothesis for the test is that the model is stable. The result of this test is presented in Fig. 3.

The stability result as presented in the diagram above shows that the blue line lies between the dotted red lines which implies that the model is dynamically stable.

## 4.5  Interpretation of Long-Run and Short-Run Results

Tab. 3 shows the regression results for equation 3, the first column of the cointegrating form of the result presented above shows that an increase in the employment level of the previous year by one percent will cause the level of employment in the current year to decrease by 1.05 percentage point. The coefficient of Agricultural Financing (AGFN) in the short run is 0.000204, −0.004924 in the first-year lag and 0.013126 in the long run with $t$-values of 0.1228, −2.5889 and 0.9043 pectively. This result shows that the effect of agricultural financing on employment generation in both the short run and long run is positive but statistically insignificant. However, it is significant after one period lag in the short run. This result agrees with the findings of Ogbalubi and Wokocha (2013) that examined agricultural development and employment generation in Nigeria. The researchers concluded that even though various policies have been made towards food security and provision of agricultural raw materials to the manufacturing sector so as to create more employment opportunities and income, the results from these policies are yet to be discovered.

Agricultural Output Growth (AOG) has a coefficient of −0.420065 in the short run, 0.162786 in lag one and −2.529894 in the long run. The $p$-values were 0.0079 in the long run, 0.0008 in the short run and 0.1012 in lag one. In the long run and short run, the coefficients were negative and significant and this implies that an increase in agricultural output growth in Nigeria will cause a fall in employment generation. This negative relationship in both the short run and long run conforms to the findings of Ajakaiye et al. (2016) that examined the relationship that existed between growth and employment in Nigeria using the Shapley decomposition approach alongside the economic estimation of

Tab. 5: Breusch-Godfrey Serial Correlation LM Test

| $F$-statistic | 0.128923 | | Prob. $F(2, 13)$ | 0.8802 |
|---|---|---|---|---|
| Obs*$R$-squared | 0.680700 | | Prob. Chi-Square(2) | 0.7115 |

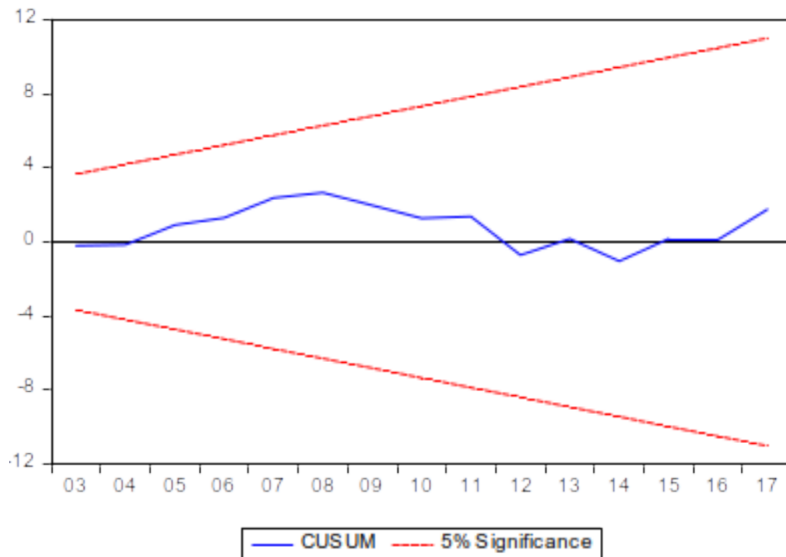Source: Eviews 9 Output for Breusch-Godfrey Serial Correlation LM Test

Fig. 3: CUSUM test
Source: Eviews 9 Output

the country's employment intensity of growth. The findings showed that Nigeria experienced steady rate of economic growth and within the same study period, unemployment was on the rise in Nigeria. Also, in Côte d'Ivoire, N'Zué (2001) examined employment and economic growth using the Engle-Granger co-integration test with data from 1975 to 1995, the result showed that economic growth and employment were negatively related during the time period of the study, implying that there was a jobless growth in Côte d'Ivoire which also confirms the result for Nigeria. Donnellan and Hanrahan (2016) also used the eurostat data to compare the performances of the primary agriculture and food processing of different European Union member states. Their findings showed that the agriculture and food processing sector have experienced output growth across the European Union, however even with this growth, employment has continued to decline in the sector.

For Agricultural Output (AO), the coefficient in the long run was 0.001446 with $t$-value of 4.4691 while in the short run the coefficient was 0.000416 with $t$-value of 12.1278. This result implies that the relationship that exists between agricultural output and employment generation in the long run and short run

is positive and highly significant because of the positive coefficients and significant $t$-values (greater than 2 in absolute values. The findings of Hayami et al. (1987) conform to this result. They examined how agricultural processing and marketing affected employment generation and income using the case of soybean in Indonesia. The estimation result of their work showed that the processing and marketing of farm products played a significantly important role in generating income and employment in local communities in Indonesia.

Aggregate Expenditure (AGEX) had a short run coefficient of 0.000000 and a $p$-value of 0.4795 indicating that the relationship between aggregate expenditure and employment generation in the short run is positive and insignificant whereas in the long run the relationship that exists is negative and significant given the negative coefficient of $-0.000004$ and a $t$-value of $-3.9729$. The aggregate expenditure of the previous year had a positive significant relationship with the employment generation of the current year as indicated by the lagged coefficient and $p$-value of aggregate expenditure. The positive relationship in the short run conforms partially to Keynes theory of employment, even though it is statistically insignificant.

In the short run, Prices (PR) has a negative coefficient of $-0.068499$ which indicates a negative relationship and the $t$-value of $-9.1900$ implies that the negative relationship that exists between price and employment generation in the short run is significant, similarly, in the long run, there also is a significantly negative relationship between price and employment generation which was indicated by the negative coefficient and the $p$-value of 3.5698. This validates the classical theory of employment which postulates that the increase in general price level of commodities overtime will cause a reduction in the level of employment generated.

The result showed that wages had a positive but insignificant relationship with employment generation in the long run, but in the short run the coefficient was negative ($-0.000002$). This negative relationship in the short run conforms to the classical theory of employment that premises that an increase in real wage which translates to an increase in the cost of labor will cause employers of labor to demand less labor.

## 5   CONCLUSIONS

In this study, the impact of government's agricultural financing and agricultural output growth on employment generation in Nigeria was estimated. The results from the estimation showed that, government's agricultural financing had a positive and insignificant relationship with employment generation in the long-run, the relationship was also insignificant and positive in the short-run while agricultural output growth only had a short-run insignificantly positive relationship with employment generation but the relationship was significant and negative in the long-run.

From the previous discussions, there is scarcity of conclusive literature on the impact of agricultural financing on employment generation in Nigeria. However, in this study it was found that government's agricultural financing has an insignificant positive impact employment generation in the long-run but has no significant impact in the short run while the lag of agricultural output growth has a positive impact on employment generation in the short run and a negative impact in the longrun. The labor force population and aggregate expenditure both have positive impact on employment generation in the long-run while wage has a positive impact on employment generation in both the short-run and long-run. However, price had a negative impact on employment generation in the short-run but insignificant in the long-run.

### 5.1   Policy Recommendations

As Nigeria attempts to diversify its economy in order to curb the appalling unemployment situations it is facing, it is imperative for policy makers in charge of finance to adequately provide finance for agricultural practices especially now that agriculture is seen as an important sector in reviving the economy. The following policy recommendations should therefore be considered. First, policy makers should endeavor to ensure that every fund allocated for a specific agricultural scheme and policy should be fully utilized for its purpose. To increase employment opportunities, there should be careful monitoring of the implementation of each scheme and policy to realize its specific policy objectives. Second, the agricultural financing model of the Central Bank should be re-evaluated to ensure that the targeted population of farmers actually gets the required funding to boost agricultural output. Third, there is need to educate more farmers on the need for mechanized farming. This will help reduce the belief that make people think that agriculture is a seasonal job. This will also help to provide more employment opportunities for skilled and technical workers in the agricultural sector.

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