Nexus between Agriculture and Unemployment in Nigeria

1 2 3

4 Abstract

5 This study examined the impact of agriculture sector growth on unemployment level as well as 6 the direction of causality between agricultural sector output and unemployment level in Nigeria. Secondary annual time series data between 1981 and 2016 were used for the study. Data on 7 8 unemployment rate, agriculture sector output, public expenditure and industrial output were 9 obtained from the Central Bank of Nigeria's statistical Bulletin while data on FDI and population growth were obtained from the World Bank World Development Indicators. The data 10 were analyzed using ADF (Augmented Dickey Fuller Test) unit root test, Autoregressive 11 distributed lag Bounds test of cointegration, Autoregressive distributed lag error correction 12 model estimation and Granger causality. The results of ADF unit root test revealed variables 13 were at different orders of integration, the ARDL bounds test revealed cointegration between 14 variables, and the Autoregressive distributed lag error correction model estimation revealed that 15 change in agriculture output in the current period is negative and significant for current 16 unemployment level in Nigeria, while the change in one period lagged agriculture output was 17 18 positive and significant for current unemployment level in Nigeria. Also the error correction 19 term indicated that about 74.10 percent of the disequilibrium in the system in the previous year would be corrected in the current year. Granger causality test results revealed bi-directional 20 causality between agriculture output and unemployment level in Nigeria. The study recommends 21 that the Nigeria government should using strategic policies targeted at boosting agriculture 22 output such as increasing access to land for peasant rural farmers, investments in agricultural 23 24 research, and so on, seek to boost agriculture output in order to reduce unemployment in Nigeria. Further, the Nigeria government should ensure that agriculture sector development 25 policies are consistent with the objective of reducing unemployment in Nigeria. 26 27

28 Keywords: Agriculture output, unemployment, Nigeria

29 **1.0 Introduction**

30 The Nigeria agriculture sector is seen as a necessary sector in creating a framework for 31 the nation's economic growth. This was the view in the 1960s and in line with that agriculture was the dominant contributor to the Nigerian economy at the time. However since the 1970s 32 onwards, agriculture sector's contribution to the Nigerian economy has declined on account of 33 the oil boom of the 1970s which resulted in the neglect of the sector. Such Neglect of the 34 Agriculture sector is further illustrated by the fact that over the past 20 years, statistics on 35 36 Nigeria has shown that value added per capita in agriculture in the country was less than one percent per annum. This highlights concern for the Nigeria economy as the Nigeria government 37 seeks to use agriculture at present to bring about improvements in the fortunes of the economy. 38

Further, unemployment constitutes a major challenge for the Nigerian economy as 39 unemployment continues to rise with significant number of graduates completing tertiary 40 education in Nigeria every year with little prospect of finding employment. The National Bureau 41 42 of Statistics shows that Nigerian's unemployment rate increased to 25.64 percent in 2015 compared with 24.58 percent in 2014 and 23.52 percent in 2013. Also, NBS report (2016) 43 44 showed that unemployment rate at 25.09 percent. However, the agriculture sector, given its 45 labour intensive nature may act as a means through which the unemployed youths in Nigeria 46 may be absorbed towards contributing productively to the Nigeria economy. Thus the Nigeria Comment [A1]: U

Comment [A2]: a

agriculture sector may affect unemployment in Nigeria. Despite this though, a paradox may exist 47 whereby unemployment may affect agriculture in Nigeria. This is so as Agriculture is culturally 48 seen as an unskilled job and thus has little demand by university graduates compared with formal 49 occupations. Higher unemployment may work to the benefit of Nigeria's agriculture sector as the 50 unemployed living under poor living standards are encouraged to seek employment in 51 Agriculture in other to earn a livelihood and get out of their deplorable state of poverty on 52 account of their previous state of unemployment. The large population of youth in Nigeria is a 53 54 great advantage and asset only if they are empowered and encouraged to participate in 55 agriculture which has many advantages attached to it. Also the agriculture sector may experience a boost as its output increases, which will benefit the Nigeria economy as increased output may 56 address Nigeria's food sufficiency challenge, provide input for manufacturing sector, and enable 57 Nigeria diversify its present narrow line of exports. 58

The fact that unemployment rate in Nigeria remains unacceptably on the increase despite agriculture's high potential to promote diversified, inclusive and sustained growth, necessitates the need to look at the relationship between agriculture and unemployment in Nigeria in order to examine how linkages between unemployment and agriculture may be used to benefit the Nigeria economy.

Further while Agriculture sector can affect unemployment, there equally exists the 64 potential for unemployment to affect agriculture resulting in a two-way causality, otherwise 65 referred to as a Nexus between Agriculture sector and Unemployment in Nigeria. This Nexus 66 between agriculture sector growth and unemployment has generated considerable debate in the 67 agriculture and unemployment literature over the years. As a result of unemployment in Nigeria, 68 availability of labour for employment in the agriculture sector results. Further the Nigeria 69 agriculture sector has ample opportunities for absorbing the teeming unemployed graduates and 70 71 ultimately enabling their positive contribution to the Nigeria economy. But then again the effect 72 of unemployment on agriculture sector growth is yet unconfirmed and hence the persistence of the Agriculture sector-Unemployment Nexus debate. The questions from the foregoing thus: 73 Does Agriculture sector output have any impact on unemployment level in Nigeria? What is the 74 nature of causality between agriculture sector output and unemployment level in Nigeria? 75

77 2.0 Literature Review

76

Over the years in view of tackling unemployment, the federal government has since 78 independence organized and formulated different versions of development plans, policies, 79 processes, programs and practices to tackle unemployment and ensure jobs creation. Some of 80 these programs have been experiencing implementation, monitoring and sustainability crises. 81 Some of these programs include OFN(Operation Feed the Nation) by Obasanjo's regime, (1975-82 1978), Green Revolution (GB) by Shehu Shagari's administration (1979-1980), DFRRI 83 (Directorate of Food, roads and Rural Infrastructure) by Ibrahim Babangida (1986-1992), SAP 84 (Structural Adjustment Programme, 1988-1992), NEEDS(National Economic Empowerment and 85 Development Strategies, 1999-2007). 86

While the adoption of SAP in 1986 led to a drastic reduction in unemployment in Nigeria, with unemployment rates as low as 1.9 percent recorded by Nigeria in 1995, Nigeria's unemployment subsequently rose thereafter hovering between 2.8% and 13.1 percent between 1996 and 2000. Also the policy initiatives and development plans by Governments providing a blue print to tackling Nigeria's challenges were either prematurely abandoned or the administrations with the initiatives short-lived such as that of Shehu Shagari. Some of the national development plans from independence include NDP (Civil hostility era, 1962-1969), Comment [A3]: a

NDP (oil boom era, Murtala/Obasanjo (1975-1980), NDP (Obasanjo's public service reform era,
1999-2007), NDP(7 point agenda of Umaru Yar'Adua era and Jonathan Goodluck's 10 point
agenda, NDP (drive to vision 20:20). Most of these intervention programmes were implemented
as ad-hoc, poorly coordinated and marred by corruption and inefficiency. Instead of reducing
unemployment, the reverse seems to be the case. (Salami, 2011 and Mustapha, et al., 2013).

99 Olanrewaju (2014) employed the chi-square statistical method of data analysis to 100 establish if a relationship exists between youth participation in agriculture and unemployment, 101 using primary data. The findings shows that youth are ready to practice agriculture in the absence 102 of the scarce white collar jobs if government can provide enabling environment by funding and 103 developing the agriculture sector. The results gave the same outcome validating that agricultural 104 development/funding has positive effect on youth participation and thereby reducing 105 unemployment.

Ayinde (2011) examined the effect of agricultural growth on unemployment and poverty 106 in Nigeria over the period of 1980 to 2011. Data for the study was obtained from NBS, Central 107 Bank of Nigeria, IMF publications and United Nations publications. ARIMA model, Granger 108 Causality approach and Co-integration techniques of data analysis were used to analyse the data. 109 The results from the Granger Causality test showed there is a unidirectional causation from 110 poverty to agricultural growth change, unidirectional causation from poverty to change in 111 unemployment and unidirectional causation from change in agricultural growth to 112 unemployment rate meaning that agricultural growth and unemployment in Nigeria is dependent 113 on poverty. Unemployment rate depend on agricultural growth during the time frame. 114

Bernard and Adenuga (2017) employed the Error Correction and the Granger Causality 115 test to analyze the contribution of agricultural sector alongside other explanatory variables such 116 as GDP, foreign private capital, federal government expenditure on employment generation in 117 118 Nigeria. The study revealed that there is a positive relationship between agricultural output and 119 employment generation in Nigeria. Thus, Bernard and Adenuga (2017) supported the Keynesian view that increase in aggregate supply will increase employment generation of a country. Avinde 120 (2008) examined agricultural growth and unemployment in Nigeria The study employed t-test, 121 Duncan Multiple Range test, Granger Causality test and regression analysis. The t-test was used 122 to establish whether there exists significant difference in the unemployment rates of rural and 123 urban areas. The Granger Causality test was used to examine the dimension and the linkage 124 between agriculture and unemployment. The results revealed that unemployment rate is 125 generally higher in the urban areas which may be as a result of rural-urban migration and various 126 organizations laying off their members of staff for them to become more computerized and 127 mechanized. The Granger Causality test showed that there is unidirectional causation between 128 agricultural growth and national unemployment and between urban unemployment and 129 agricultural growth. This is a decade ago. What is the situation today? Ayinde (2008) 130 recommended that for unemployment rate in Nigeria to be curbed, there must be a huge 131 intervention in agricultural production and its sustainability in order to not let the 132 133 macroeconomic problem persist and recommending policies to alleviate poverty should focus on increasing agricultural growth. 134

Agbonlahor and Enilolobo (2013) investigated the factors that influence immigrants' decision to settle in rural areas as a way of ensuring sustainable food production and rural development using multi-stage stratified sampling method to select 218 immigrants from 72 rural communities in southwest Nigeria. A sample survey was used to collect data on household, migrants' social characteristics and community characteristics. The data gotten was analyzed using descriptive statistics and logit regression model. The study found that rural immigrants play significant roles in sustaining and developing rural non-farm economy and the agricultural Comment [A4]: et al.,

Comment [A5]: analize

sector through direct production, and as source of farm labour. Availability of farm land, proximity to high labour demand sources and presence of relatives in the rural community were found to be significant pull factors to rural communities. Household structure as well community related factors were found to influence propensity to settle in rural areas.

Enilolobo and Ohalete (2017) examined the impact of inclusive growth determinants on 146 agricultural output in Nigeria over the period of 1981 to 2015 employing four macroeconomic 147 variables: Agric GDP, Per Capita Income, Unemployment and Poverty Rates while Government 148 Expenditure on Education, Labour Force and Government Expenditure on Health were used as 149 150 control variables. Data were sourced from CBN statistical bulletin and World Bank and Augmented Dickey fuller (ADF) unit root test, Johansen co-integration test and Error correction 151 model (ECM) techniques of analysis were applied on the model. The ECM result revealed that 152 Agricultural output increases as unemployment and poverty rates fall and when per-capita 153 income rises meaning that agriculture serves as a viable means of achieving the much desired 154 inclusive growth. It was suggested that serious attention be paid at growing the agricultural 155 sector by all stakeholders (government, private initiatives, research institutions and individuals). 156

157 Ogbalubi and Wokocha (2013) examined agricultural development and employment 158 generation in Nigeria over the period of 1973 to 2002. The study revealed that Nigeria's 159 Agriculture sector is still at a very low level of development and the agriculture sector is yet to 160 take advantage of the potentials of the country in terms of climate, land and human resources.

Exploring the contributions of unemployed youths to agriculture in Sarduna local 161 government area of Taraba state, Nigeria, Musa, Istifanus, and Vosanka (2012) employed chi-162 square to test the hypothesis and examine the significant impact of agriculture to unemployment 163 and also used multiple regression analysis to analyze the data obtained from the study. Data was 164 gotten from primary sources using structured questionnaires which were administered to the 165 target respondents which were the unemployed youths with a sampling frame of 660 youths and 166 167 the use of multistage random sampling technique. The study revealed that unemployed youths' contribution had played a greater role in the uplifting of agriculture which can significantly help 168 them to be self-employed and can have great impact on them by providing income towards 169 improving their wellbeing and standard of living. 170

Evidence from Roehlano (2013) discussion paper suggested that the agricultural and rural 171 economy should be at the forefront rather than periphery, of the country's strategy for quality, 172 employment generation. Such a strategy completing an unfinished reform agenda for sustained 173 development of the rural economy which involves swift completion of the land reform program 174 post-2014. Suggestions were that liberalization initiatives be pursued in the area of market policy 175 and logistic, government should rationalize its role as a market regulator, support for agricultural 176 production should be oriented towards enhancing agricultural productivity and comparative 177 advantage based largely on the effective delivery of public goods and associated services such as 178 R&D irrigation and other infrastructure. 179

180 Guido (2005) estimated the impacts of world agricultural trade liberalization on wages, 181 employment and unemployment in Argentina, a country with positive net agricultural exports and high unemployment rates. Two sources of information were used which were labour force 182 surveys and price indexes. Data on individual characteristics and labour markets were taken from 183 the Argentine Encuesta Permanente deHogares, EPH (permanent household survey. Data from 184 1992 to 1999 on prices of agricultural goods were taken from the Statistical Institute in 185 Argentina (INDEC). The major claim of the study is that the bulk of the impacts of trade reforms 186 on the welfare of the population will take place through quantity adjustments in labour markets. 187 The study tried to fill a gap in which the impacts of trade may be blurred by the existence of 188 imperfections in labour markets, rigidities and adjustment costs. He found that a 10 percent 189

increase in the price of Argentine agricultural exports would bring about an increase of 1.36 190 percentage points in the probability of being employed. This change would be accounted for by 191 an increase of 0.61 percentage points in the probability of labor market participation, and a 192 decline in the probability of unemployment of 0.75 percentage points. The unemployment rate 193 would decline by almost ten percent or by 1.23 percentage points. Expected market wages would 194 increase almost one to one with export prices. More than 70 percent of this change would be 195 brought about by a higher probability of getting a job. This result confirms that the gains from 196 197 trade are not only revealed by higher market wages, but also by lower unemployment and 198 highlights the importance of employment and labor supply responses to trade policies in empirical trade work. I suggest that first order approximations will fail to capture an important 199 fraction of the total impacts and that the estimation of labor market responses is a critical 200 component of any serious welfare evaluation of trade reforms. 201

203 3.0 Methodology

202

214

222 223

The theoretical framework adopted in this study is the Neo-Malthusian theory of 204 population and unemployment which states that 'population tend to increase in geo-metric 205 progression (1, 3, 5...9) whereas, the output in food production increase only in time lagged 206 quantum of arithmetic progression (1, 2, 3...8)'. With a disproportionate growth in population in 207 relation to food production, there would be food insecurity, hunger, disease and mass-208 unemployment. The theory is applicable to Nigeria given Nigeria's unemployment challenge 209 which is attributed to neglect of the Nigeria agriculture sector by the Nigeria government and 210 Nigeria's large population size. According to the Neo-Malthusian theory of population, mass 211 unemployment amongst other challenges including food insecurity, hunger, and disease results 212 from disproportionate growth in population relative to food production. 213

215 3.1 Model Specification

The model employed is a modification of the model of Bernard and Adenuga (2017). The 216 model of Bernard and Adenuga (2017) is as in Equation (1) below: 217 218

Total Employment=f(Total Agriculture output, Real GDP, Foreign private capital, Public 219 expenditure, Industrial output) 220 221 (1)

The above model is modified for the purpose of this study as:

Unemployment = f(Share of agriculture in GDP, Foreign domestic investment, Public 224 expenditure, Industrial output, and Population growth rate) 225 (2)226

The above Equation (2) transformed into an econometric model for the purpose of econometric 227 analysis of data is as in Equation (3) below with all independent variables expressed in log 228 transformations in line with standard econometric practice so as to standardize the coefficients of 229 230 the model:

231
$$UNEMP_t = \beta_0 + \beta_1 Log SAGD_t + \beta_2 Log FDI_t + \beta_3 Log PEXP_t + \beta_4 Log INDQ_t + \beta_5 POPG_t + \varepsilon_t$$
 (3)

232 233 $\beta_5 POPG_t + \varepsilon_t$

- Where, 234
- 235 UNEMP= Unemployment Rate
- SAGD= Share of agriculture in total GDP 236
- FDI = Foreign Direct Investment 237
- 238 PEXP= Public expenditure
- 239 INDQ=Industrial output

240 POPG= Population growth rate

241 ε =Error term 242

The above model features a constant, β_0 providing the value of unemployment, the dependent variable in the model while all independent variables remain unchanged. The remaining coefficients, β_1 , β_2 , β_3 , β_4 , β_5 are the effects of a one percent change in the value of respective independent variables on the dependent variables with other independent variables held constant. The subscripts t, refer to the time period of observations which in the case of this study is 1981 -2016.

249

250 3.2 Justification of the variables inclusion

Share of agriculture in GDP: The higher the output of the agriculture sector, the higher its contribution to the economy. This contribution can be in form of employment opportunities for youths especially in rural areas.

Foreign direct investment: This is known as the acquisition by residents of a country of real assets abroad. This can be done by remitting money abroad to be spent on acquiring land, constructing buildings. This can have a positive impact of the country in terms of employment only if the foreign company employs indigenes of that country where it established the business.

258 Public expenditure: This is the spending by government at any level. This includes spending on

real goods and services purchased from outside suppliers, spending on employment in state services such as administration, defense and education, spending on transfer payments to the unemployed and pensioners, spending on subsidies and grants to industry etc.so the higher the public, expenditure, the lower the unemployment rate.

Industrial output: The greater the output of the industrial sector, the greater its contribution to not only GDP but unemployment as more employment opportunities are created for youths.

Population growth rate: The higher the rate of population growth, the higher the rate of unemployment as the job spaces is not enough to accommodate the rising population.

Therefore, based on economic theory, the following are the a-priori expectations of the independent variables specified in Equation (3): $\beta_0 > 0$, $\beta_1 < 0$, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 < 0$, $\beta_5 > 0$

To investigate the direction of causality between agriculture sector output and unemployment in Nigeria, the study specified Granger-causality test model as specified in equations (4) and (5): $UNEMP_{t} = \sum_{i=1}^{n} \alpha_{i} LOG SAGD_{t-1} + \sum_{i=1}^{n} \beta_{i} UNEMP_{t-i} + \mu_{1t}$ (4)

$UNEMP_t = \sum_{i=1}^n \alpha_i LOG SAGD_{t-1} + \sum_{i=1}^n \beta_i UNEMP_{t-i} + \mu_{1t}$	(4)
$LOG SAGD_t = \sum_{i=1}^m \lambda_i UNEMP_{t-1} + \sum_{i=1}^m \delta_i LOG SAGD_{t-i} + \mu_{2t}$	(5)

276 Where

277 UNEMP = Unemployment Rate

278 SAGD = Share of agriculture in GDP

279

275

270

The subscripts t refer to time periods and the disturbances μ_{1t} and μ_{2t} are assumed uncorrelated. The above equation (4) states that current values of Unemployment Rate are related to past values of Share of agriculture in GDP (proxy for Agriculture Output) and unemployment and equation (5) states that current values of Share of agriculture in GDP (proxy for Agriculture Output) are related to past values of Unemployment Rate and Share of agriculture in GDP (proxy for Agriculture Output) The reason for employing this model is to examine the direction of causality between Agriculture sector output and unemployment.

288 3.3 Measurement of Variables

The following are the definition of the variables employed in the respective models in this study.

291 Unemployment Rate (UNEMP): This is the percentage of the Nigeria Labour force that is not292 actively employed in productive occupation.

Share of Agriculture in GDP (SAGD): This is measured by the contribution to Nigeria GDP of the Nigeria agriculture sector in Billions of Naira.. This is the proxy for Agriculture sector output adopted for this study.

Foreign Direct Investment (FDI): This is measured by Net foreign direct investment inflow to Nigeria i.e. foreign direct investment inflow- foreign direct investment outflow. It is measured in

298 Billions of Naira.

287

304

309

317

Public Expenditure (PEXP): This is the sum of capital and recurrent expenditures by the Nigeria
 government. It is measured in Billions of Naira.

Industrial Output (INDQ): This is measured by the contribution to Nigeria GDP of the Nigeria
 industrial sector in Billions of Naira.

303 *Population Growth (POPGR)*: This is the growth rate of the population size in percentage.

305 3.4 Estimation Techniques

Augmented Dickey Fuller Unit root test, Autoregressive distributed lag (ARDL) Bounds test of cointegration and Autoregressive distributed lag (ARDL) Error correction model Granger causality test were used to estimate the models.

310 3.5 The Data

Data employed in this study is secondary data sourced from the Central Bank of Nigeria (2016) statistical bulletin and World Bank World Development Indicators (2016). In particular, time series data on Unemployment rate, Share of agriculture in GDP, Public expenditure and Industrial output was obtained from the Central Bank of Nigeria statistical Bulletin 2016. On the other hand, data on FDI and population growth were obtained from the World Bank World Development Indicators.

318 Table 1. Summary Statistics

Descriptive	Unemployment rate	Share of Agric in GDP (Billions of	FDI (Billions of	Public expenditure (Billions of	Industrial output (Billions of	Population growth rate
Statistics	(%)	Naira)	Naira)	Naira)	Naira)	(%)
Mean	11.24	5205.18	2.70	1525.34	4567.76	2.59
Median	9.45	1384.01	1.57	594.082	1242.82	2.59
Maximum	25.70	21523.51	8.84	5185.32	18402.19	2.72
Minimum	1.90	17.05	0.189	9.637	37.02	2.50
Std. Dev.	8.01	6716.33	2.64	1850.78	6058.16	0.069
Skewness	0.584	1.104	1.047	0.955	1.207	0.201
Kurtosis	1.94	2.824	2.783	2.323	2.952	1.764
Observations	36	36	36	36	36	36

319 320 Source: Author's computation (2018)

From Table 1 above, unemployment rate has a mean of 11.24%, a Median of 9.45%, a Maximum of 25.70%, a minimum of 1.90%, and a standard deviation of 8.01%. The maximum unemployment of 25.70% reveals that Nigeria has experienced of very high unemployment while the mean unemployment reveals that on the average unemployment has been high and Comment [A6]: u

Comment [A7]: s

needs to be reduced Further the distribution of unemployment rate is positively skewed with a 325 long right tail given skewness of 0.584, while the kurtosis of 1.94 is indicative that 326 unemployment has a flat distribution as the kurtosis is less than 3. With respect to Agriculture 327 output, it has a mean of N5205.18 Billion, a Median of N1384.01 Billion, a Maximum of 328 N21523.51 Billion, a minimum of N17.05 Billion, and a standard deviation of N6716.33 Billion. 329 The maximum agriculture output of N21523.51 Billion reveals that agriculture output in Nigeria 330 has been low despite the wealth of resources in Nigeria, and on average agriculture output has 331 332 been substantially low at N5205.18 Billion suggesting concerns for the state of agriculture in 333 Nigeria and the need for a boost in agriculture output. Further the distribution of agriculture output is positively skewed with a long right tail given skewness of 1.104, while the kurtosis of 334 2.824 is indicative that agriculture output has a flat distribution relative to the normal as the 335 336 kurtosis is less than 3.

Foreign direct investment (FDI), it has a mean of N2.70 Billion, a Median of N1.57 337 Billion, a Maximum of N8.84 Billion, a minimum of N0.189 Billion, and a standard deviation of 338 N2.64 Billion. The maximum FDI of N8.84 Billion is still rather low for a developing country as 339 Nigeria to benefit from the dividends of FDI inflow to an emerging economy as Nigeria, while 340 the mean FDI of N2.70 Billion is also very low indicating rather minimal FDI inflow on average 341 to Nigeria Further the distribution of FDI is positively skewed with a long right tail given 342 skewness of 1.047, while the kurtosis of 2.783 is indicative that FDI has a flat distribution 343 relative to the normal as the kurtosis is less than 3. 344

Public Expenditure (PUBEX) has a mean of N1524.34 Billion, a Median of N594.082 345 Billion, a Maximum of N5185.32 Billion, a minimum of N9.637 Billion, and a standard 346 deviation of N1850.78 Billion. The maximum public expenditure of N5185.32 Billion is quite 347 low for the Nigeria government to spend on the Nigeria economy in view of the significant 348 349 economic and social challenges facing the nation, and this is further illustrated by the low 350 average public expenditure of N1524.34 Billion. Further the distribution of public expenditure is positively skewed with a long right tail given skewness of 0.955, while the kurtosis of 2.373 is 351 indicative that public expenditure has a flat distribution relative to the normal as the kurtosis is 352 less than 3. 353

Industrial output (INDQ) has a mean of N4567.76 Billion, a Median of N1242.82 Billion,
a Maximum of N18402.19 Billion, a minimum of N37.02 Billion, and a standard deviation of
N6058.16 Billion. The distribution of industrial output is positively skewed with a long right tail
given skewness of 1.207, while the kurtosis of 2.852 is indicative that industrial output has a flat
distribution relative to the normal as the kurtosis is less than 3.

Population growth (POPGR) has a mean of 2.59%, a Median of 2.59%, a Maximum of 2.72%, a minimum of 2.50%, and a standard deviation of 0.069%. This further makes the average population growth rate of 2.59% high for Nigeria which will result in adverse implications for the Nigeria economy especially as regards unemployment and poverty. The distribution of population growth is further positively skewed with a long right tail given skewness of 0.201, while the kurtosis of 1.764 is indicative that population growth has a flat distribution relative to the normal as the kurtosis is less than 3.

366 367

The Trend This provides an overview of the patterns of agriculture output and unemployment inNigeria.

370

Comment [A8]: a

Comment [A9]: e



374

380

373 Figure 1. Agricultural GDP and Unemployment rate in Nigeria (1981-2016)

The graph (Figure 1) shows both the trend of agricultural output (proxied by agricultural GDP) and unemployment rate from 1981 to 2013 together. From the graph, it can be observed that there is no consistency in the flow of the two trends, although they move in the same direction. Both AGDP and unemployment increases over time, although there was instability in unemployment.

381 4.0 The Results

The results of econometric analysis of the data in line with the research objectives of this study are presented and discussed in this section. The econometric analysis techniques applied are unit root test, cointegration test, error correction regression and Granger causality test.

386 4.1 Unit Root Test of Variables

The results of Augmented Dickey Fuller unit root test of variables applied to the data employed in data analysis are presented in table 2.

ADE TEST	ADF TEST CRITICAL VALUES		SIGNIFICANCE	INTEGRATION	
STATISTIC	1%	5%	10%	OF ADF TEST	
STATISTIC				STATISTIC	
-7.135746	-4.252879	-3.548490	-3.207094	Yes***	I (1)
-4.099713	-4.252879	-3.548490	-3.207094	Yes***	I (1)
-5.661702	-4.356068	-3.595026	-3.233456	Yes***	I (0)
-4.603589	-4.262735	-3.552973	-3.209642	Yes***	I (1)
-3.885711	-4.262735	-3.552973	-3.209642	Yes**	I (1)
-3.817087	-4.339330	-3.587527	-3.229230	Yes**	I(0)
	ADF TEST STATISTIC -7.135746 -4.099713 -5.661702 -4.603589 -3.885711 -3.817087	ADF TEST STATISTIC ADF TEST 1% -7.135746 -4.252879 -4.099713 -4.252879 -5.661702 -4.356068 -4.603589 -4.262735 -3.885711 -4.262735 -3.817087 -4.393300	ADF TEST STATISTIC ADF TEST CRITICAL V -7.135746 -4.252879 -3.548490 -4.099713 -4.252879 -3.548490 -5.661702 -4.356068 -3.595026 -4.603589 -4.262735 -3.552973 -3.885711 -4.262735 -3.552973 -3.817087 -4.39330 -3.587527	ADF TEST STATISTIC ADF TEST CRITICAL VALUES 1% 5% 10% -7.135746 -4.252879 -3.548490 -3.207094 -4.099713 -4.252879 -3.548490 -3.207094 -5.661702 -4.356068 -3.595026 -3.233456 -4.603589 -4.262735 -3.552973 -3.209642 -3.885711 -4.262735 -3.552973 -3.229230 -3.817087 -4.339330 -3.587527 -3.229230	ADF TEST STATISTIC ADF TEST CRITICAL VALUES SIGNIFICANCE OF ADF TEST STATISTIC -7.135746 -4.252879 -3.548490 -3.207094 Yes*** -4.099713 -4.252879 -3.548490 -3.207094 Yes*** -5.661702 -4.356068 -3.595026 -3.233456 Yes*** -4.603589 -4.262735 -3.552973 -3.209642 Yes*** -3.885711 -4.262735 -3.552973 -3.209642 Yes** -3.817087 -4.339330 -3.587527 -3.229230 Yes**

Table 2: Augmented Dickey Fuller Unit Root Test Results With Intercept

***,**, indicate significance of ADF test statistic at 5% and 1% levels of statistical significance. Source: Author's computation (2018)

Table 2 reveals that the variables, UNEMP, Log SAGD, Log FDI, Log PUBEX, Log INDQ and

390 POPGR are integrated of various orders ranging from I(0) to I(1). While Log FDI and POPGR

are integrated of order zero, UNEMP, Log SAGD, Log PUBEX and Log INDQ are integrated of

Comment [A11]: Delete

Comment [A10]: `u

order 1. In other words Log FDI, and POPGR are on their own stationary and do not need to be
differenced, while UNEMP, Log AGQ, Log PUBEX and Log INDQ are non-stationary on their
own and need to be differenced once to be stationary. The variables in the above table 2 based on
their levels of integration may be employed in estimating the model as specified in equation (4),
only after performing a cointegration test.

398 4.2 Cointegration Test

On the basis of evidence from table 2 above, the variables employed in the model to be estimated (equation (4) are a mix of I(1) and I(0) variables and therefore warrants the use of ARDL bounds test to test for cointegration between the variables as listed in Table 2 above and which also constitute the model specified (Equation (4)) The results of ARDL bounds test performed are presented in Table 3.

Sample 19	81: 2016	uit		
Included Obse	ervations: 32			
F-Bound	ls Test	Null Hypo	othesis: No leve	ls relationship
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	7.783079	10%	2.26	3.35
К	5	5%	2.62	3.79
		2.5%	2.96	4.18
		10/2	3 /1	1 68

406 Source: Author's computation (2018)

407

413

397

404

The results of ARDL bounds test indicates the presence of cointegration between the variables in the model as the F-statistic of the bounds test of 7.78 is higher than the upper bound of the 5% Pesaran critical value bound for the test of 3.79. Therefore the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegation between all the variables as specified in Equation (4) of this study is accepted.

414 4.3 ARDL Error Correction Regression Model Results

The existence of cointegration between the variables as specified in equation (4) informs the estimation of the equation using ARDL Error Correction Regression Model and the result of the estimation of the model is presented in Table 4. Note that the chosen ARDL model of the form ARDL (2, 2, 3, 1, 4, 0) was determined based on Akaike information criterion and provides short run dynamic model estimates.

The results (Table 4) reveal that the estimated model is a parsimonious model on account
 of the R-squared of 0.856130, adjusted R-squared of 0.737080, Durbin-Watson statistics of
 2.048445 and the statistically significant F-statistic of 9.421992 (Prob =0.000012<0.01). The R-
 squared of 0.856130 indicates that 85.61% of changes in unemployment in Nigeria are explained
 by changes in the respective independent variables constituting the model. The Durbin-Watson
 statistics reveals absence of autocorrelation, while the significant F-statistic indicates that all
 parameters of the model are jointly statistically significant.
 Table 4. Autoregressive Distributed Lag Error Correction Model regression Results

Table 4. Autoregressive Distributed Lag Error Correction Model regression Results ARDL Error Correction Regression

Dependent Variable: D(UNEMPLOYMENT_RATE)

10

Comment [A12]: Table

Selected Model: ARDL(2, 2, 3, 1, 4, 0	0
Sample: 1981 2016	
Included observations: 32	

Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	8.077807	1.030478	7.838894	0.0000
D(UNEMP(-1))	-0.273414	0.120318	-2.272435	0.0394
D(LOG SAGD)	-5.786711	1.980943	-2.921190	0.0112
D(LOG SAGD(-1))	9.109295	2.312484	3.939181	0.0015
D(Log FDI)	-2.697070	0.795131	-3.391982	0.0044
D(Log FDI(-1))	-2.184372	0.780740	-2.797822	0.0142
D(Log FDI(-2))	-2.028611	0.646771	-3.136522	0.0073
D(Log PUBEX)	7.643613	1.495796	5.110063	0.0002
D(Log INDQ)	-0.274264	1.800090	-0.152361	0.8811
D(Log INDQ(-1))	-9.011830	1.694738	-5.317537	0.0001
D(Log INDQ(-2))	-3.526164	1.966446	-1.793166	0.0946
D(Log INDQ(-3))	-8.199127	2.193701	-3.737577	0.0022
CointEq(-1)*	-0.741010	0.093081	-7.960936	0.0000
R-squared	0.856130	Mean depende	ent var	0.590158
Adjusted R-squared	0.765265	S.D. dependent var		2.973747
S.E. of regression	1.440764	4 Akaike info criterion		3.859427
Sum squared resid	39.44021	Schwarz criterion		4.454882
Log likelihood	-48.75083	Hannan-Quinn criter.		4.056804
F-statistic	9.421992	Durbin-Watson stat		2.048445
Prob(F-statistic)	0.000012			

428 429

Source: Author's computation (2018)

Interpreting the coefficients of the estimated model, the constant, C of 8.077807 is statistically significant. Secondly, change in one period lagged unemployment, is negative and statistically significant for current unemployment in Nigeria at the 5% level with a coefficient of -0.273414 implying that a unit change in one period lagged unemployment level reduces current unemployment by 0.273414 units.

435 The coefficient of change in current period agriculture output (D(Log SAGD)) of -5.786711 is statistically significant at the 5% level. This implies that a unit change in current 436 agriculture output reduces current period unemployment level in Nigeria by 5.786711%. The 437 438 finding of negative relationship of agriculture with unemployment in Nigeria is consistent with 439 findings by Bernard and Adenuga (2017) and highlights that benefits to the Nigeria economy in terms of reduced unemployment if the huge potential of Nigeria's agriculture sector can be 440 achieved. Further the coefficient of change in one period lagged agriculture output (D(Log 441 SAGD(-1)) of 9.109295 is statistically significant at the 1% level implying that a unit change in 442 one period lagged agriculture output increases current period unemployment level in Nigeria by 443 9.109295%. reflecting the glut in the agriculture sector on account of excess production which 444 may contribute to current period unemployment as labourers are laid off as a result. 445

Change in Foreign direct investment (D(Log FDI)), is statistically significant at the 1% level with a coefficient of -2.697070. A unit change in current foreign direct investment results in a 2.69% decrease in unemployment level in Nigeria. Further one period lagged Foreign direct investment (D(Log FDI(-1)), with a coefficient of -2.184372 and two period lagged Foreign direct investment (D(Log FDI(-2))with a coefficient of -2.028611 are statistically significant in reducing current period unemployment level in Nigeria 452 Change in Public expenditure (D(Log PUBEX)), is statistically significant at the 1% level
453 with a coefficient of 7.643613. A unit change in current public expenditure results in a 7.64%
454 increase in current unemployment level in Nigeria.

Change in industrial output (D(Log INDQ)) with a coefficient of -0.274264 is 455 insignificant for current unemployment level in Nigeria. However one period lagged industrial 456 output (D(Log INDO(-1)) with a coefficient of -9.011830 and three period lagged industrial 457 output (D(Log INDQ(-3)) with a coefficient of -8.199127 are statistically significant in affecting 458 current unemployment level in Nigeria. This may be because there is excessive demand for 459 460 manufactured goods in Nigeria in one year lagged and three year lagged periods and therefore there is capacity for the sector to absorb the unemployed in Nigeria, which results in reduction of 461 unemployment in Nigeria in the current period. Two period lagged industrial output (D(Log 462 INDQ(-2)) with a coefficient of -3.526164 is statistically insignificant for current unemployment 463 in Nigeria. 464

Finally, the error correction model term (cointeq(-1)) captures the long-run equilibrium of the estimates. Evidence from Table 4 above, indicates that there exists a long run relationship between unemployment and the independent variables of the model. The coefficient of the error correction model term (cointeq(-1)) is -0.741010 and is statistically significant at the 1% level. The coefficient of the error correction model term indicates that about 74.10 percent of the disequilibrium in the previous year would be corrected in the current year.

471 472

4.4. Causality between Unemployment and Agriculture Output

Unemployment and agriculture output may have a causal relationship. However causality 473 may occur either in one direction or both directions and this must be established for informed 474 policy decision regarding unemployment and agriculture output. Testing the causality between 475 476 variables is performed in econometrics with the aid of Granger causality. Granger causality 477 requires choosing an optimal lag length to be applied for the test on the basis of selection criterion of Akaike information criterion, Schwarz criterion, and so on amongst a number of lag 478 479 selection criterion. To that effect Granger causality was applied to test the causality between unemployment and agriculture output as measured by agriculture GDP and the lag selection 480 criteria of 4 was chosen on the basis of the lag selection criterion determined by most of the lag 481 selection criteria. The null hypothesis of Granger causality test is "no causality" between 482 unemployment and agriculture output, while the alternative hypothesis is "causality" between 483 unemployment and agriculture output. The results of Granger causality test between 484 485 unemployment and agriculture output are presented in Table 5.

486

487 Table 5. Pairwise Granger Causality test between Unemployment rate and Agriculture Output

Pairwise Granger Causality Tests Sample: 1981 2016 Lags: 4			
Null Hypothesis:	Obs	F-Statistic	Prob.
UNEMP does not Granger Cause Log SAGD Log SAGD does not Granger Cause UNEMP	32	3.95909 2.88612	0.0138 0.0450

⁴⁸⁸

Source: Author's computation (2018)

489 The result of the test shows that there is two-way or bi-directional causality between 490 unemployment (UNEMP) and agriculture output (Log SAGD) as the null hypothesis of "No 491 causality" between unemployment and agriculture output are rejected in favour of the alternative 492 hypothesis. In particular the F-statistic of the Granger causality test testing whether 493 unemployment rate Granger causes Agriculture output (Log SAGD) of 3.959 is statistically 494 significant at the 5% level indicating that unemployment granger causes agriculture output in 495 Nigeria. Similarly, the F-statistic (2.586) of the Granger causes unemployment in Nigeria. 496 S% level indicating that agriculture output granger causes unemployment in Nigeria.

This finding may be explained by unemployment giving rise to agriculture output as the 497 498 agriculture sector grows in response to rampant unemployment in Nigeria. For the unemployed 499 due to their poor living standards, their unemployment acts as a catalyst for them to seek employment in Agriculture so as to earn a livelihood and get out of their deplorable state of 500 poverty and as they do so they will contribute to agriculture output in Nigeria. On the other hand, 501 agriculture output may cause unemployment in Nigeria as highlighted by Ayinde (2008) in the 502 sense that increase in production of agricultural production in excess of demand creates a glut. 503 504 Consequently in the subsequent production year it results into laying off of workers. Therefore bi-directional causality between unemployment and agriculture output indicates that both 505 unemployment and agriculture output cause each other. This finding and result however goes 506 against findings of unidirectional causality between agriculture sector output or growth and 507 unemployment going from agriculture sector output or growth to unemployment by Ayinde 508 (2008), Ayinde (2011) and Michael (2017). 509

511 5.0 Conclusion

510

530

532

537

538

Unemployment is a persistent challenge in Nigeria which has over the years not been 512 effectively addressed. However the Nigeria agriculture sector on the basis of the research 513 findings of this present study may be argued as a strategy to bring an end to Nigeria's high and 514 515 rising unemployment challenges. Further there exists the potential for a two -way causal 516 relationship between agriculture output and unemployment in Nigeria thus suggesting a nexus between agriculture output and unemployment. This present study using data from 1981 to 2016 517 explores the nexus between agriculture output and unemployment in Nigeria using Pearson's 518 correlation, ADF unit root test, ARDL bounds test of cointegration, ARDL error correction 519 model regression and Granger causality. The study reveals that agriculture sector output has a bi-520 directional causal relationship with unemployment, and agriculture sector output in the current 521 period and one period lagged are significant for reducing unemployment in Nigeria. Specifically 522 current period agriculture output is significant in reducing unemployment in Nigeria. The 523 findings indicate the possibility for the Nigeria government to address Nigeria's long standing 524 unemployment challenge by boosting agriculture output. Further Nigeria's unemployment level 525 causes agriculture sector output in Nigeria indicating that Nigeria's agriculture sector may 526 benefit from the unemployment situation in Nigeria. Thus the Nigeria agriculture sector has a 527 central role to play in effectively bringing an end to high and persistent unemployment in Nigeria 528 to the benefit of the Nigeria economy. 529

531 6.0 Policy Recommendations

The following are the policy recommendations arising from the findings of this study:

- The Nigeria government should engage in strategic policies targeted at boosting agriculture output such as increasing access to land for peasant rural farmers, investments in agricultural research, and so on, seek to boost agriculture output in order to reduce unemployment in Nigeria.
 - 2. The Nigeria government should ensure that agriculture sector development policies are consistent with the objective of reducing unemployment in Nigeria

The Nigeria government should use the prevailing unemployment situation in Nigeria
 to the benefit of Nigeria by strategically and optimally deploying unemployed
 individuals into the agriculture sector to the benefit of the agriculture sector and
 consequently the Nigeria economy.

545 **REFERENCES**

543 544

549

552

555

559

561

565

568

572

575

579

- Agbonlahor, M.U. & Enilolobo, O.S. (2013). Rural immigrants, agricultural labour supply and
 rural non-farm economy in south-west Nigeria. *Journal of Applied Agricultural Research*, 5(1), 3-17.
- Ayinde, O. E. (2008). Empirical analysis of agricultural growth and unemployment in Nigeria.
 African Journal of Agricultural Research, 3(7), 465-468.
- Ayinde, O.E. (2011). Effect of agricultural growth on unemployment and poverty in Nigeria
 (1980-2011).
- Bernard, O.A. & Adenuga, O. (2017). Agricultural sector development as a panacea for
 employment generation in Nigeria. *International Journal of Economics, Business and Management Research*, 1(2), 251-257.
- 560 Central Bank of Nigeria. (2016). Statistical Bulletin. Abuja: CBN.
- 562 Enilolobo, O.S. & Ohalete, E.E. (2017). Impact of inclusive growth determinants on agricultural
 563 output in Nigeria. *African Journal of Sustainable Development*. Vol. 7, No. 2, pg 153 564 174
- Guido, G.P. (2005). Agro-manufactured export prices, wages and unemployment. Development
 Research Group the World Bank.
- Gyimah-Brempong, K. (2014). Agricultural transformation and youth employment in Africa:
 Nigerian case study. Unpublished mimeo, Nigeria strategy support program International Food Policy Research Institute.
- Michael E.O (2017). Agricultural Sector Performance and Nigeria's Economic Growth. Asian
 Journal of Agricultural Extension, Economics & Sociology, 15(1): 1-13.
- Musa, Y.H. Istifanus, H. S. & Vosanka (2012). Contributions of Unemployed Youths to
 Agriculture in Sardauna Local Government Area of Taraba State, Nigeria. *Global Advanced Research Journal of Agricultural Science*. 1(6) pp. 136-142
- Mustapha, S. A., Akinkuotu, O., Shiro, A. A. and Yusuf, I. A. (2013). Can Non-Oil Exports
 boost Agriculture Sector Performance in Nigeria? A Tale for Oil Independency. *Research Journal of Finance and Accounting*, Vol 4, No. 19 Pp 144-156.
- 583 .
 584 Ogbalubi, L.N. & Wokocha, C.C. (2013). Agricultural development and unemployment
 585 generation: The Nigerian experience. *IOSR Journal of Agriculture and Vetinary Science*,
 586 2(2) pp. 60-69.

- Olanrewaju, T.J. (2014). Driving youth participation in agriculture through agricultural sector
 development and funding: panacea to unemployment in Nigeria. *International Journal of Economics, Commerce and Management*, 11(5) pp. 6-13.
- Roehlano, M.B. (2013). Agriculture, rural employment, and inclusive growth. PIDS Discussion
 Paper Series 2013-39.
- Salami, C.G.E. (2011). Entrepreneurship and youth unemployment in Nigeria: The missing link.
 Global Journal of Management and Business Research, 11(5).