Effect of agricultural development on unemployment reduction in Nigeria: An error correction mechanism approach

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Abstract

Background: Unemployment situation in Nigeria has defied many measures initiated of successive governments over time. The upward rise in unemployment index denotes a sharp divergent between the expected outcome of modelled economic development plan of the government, and the reality. Agriculture has the potential to address the lingering problem of joblessness.

Objective: The crux of the study was to examine the effect of agricultural development on unemployment reduction in Nigeria.

Methodology: The study adopted an ex-post research design, utilizing Error Correction Mechanism (ECM), and Error Correction Mechanism Granger causality test.

Results: The annual time series data utilized in the study were verified for unit root test using Augmented Dickey-Fuller test (ADF). The variables (Unemployment rate [UEMP], Public Expenditure on Agriculture [PEA], Bank Lending to Agriculture [BLA], Inflation Rate [INF], Exchange rate [EXR] and Share of Agriculture to Gross Domestic Product [SAG]) were found to be stationary at the same order of integration 1(1). This finding gives credence to the adoption of ECM approach. The parsimonious ECM result showed that PEA, INF and EXR exert negative effects on UEMP. Hence, the negative dimension of INF and EXR conforms to the apriori expectation, while PEA did not conform to the apriori expectations. On the other hand, the study also found that BLA and SAG exert positive effect on UEMP. The Granger causality result showed a bi-directional causation between UEMP and SAG.

Unique contribution: The study has established that the selected agricultural development indices (PEA, BLA, INF, & EXR) impact significantly on unemployment reduction in Nigeria.

Conclusion: The study concluded that current unemployment rate can be reduced through agricultural development in Nigeria.

Key recommendations: The study, therefore, recommends that monetary authorities should carefully and coherently pursue a policy that can control inflationary pressure in the economy, and at the same time, adopt friendly exchange rate policy that can stimulate investment in the sector.

Key words: Agricultural Development; Unemployment; Inflation; Exchange rate.

Introduction

For series of decades, unemployment situation has proven to be a chronic alien bedeviling any economic development efforts of the government in Nigeria. The upward rise in unemployment index denotes a sharp divergent between the expected outcome of modelled economic development plan (blue print) of the government, and the reality. Studies conducted by the World Bank (2017) revealed that one in every two Nigerians that constitute the hub of labour force is either unemployed or underemployed. Moreover, report published by Nigeria Bureau of

Statistics (2020) revealed that unemployment has increased to 27.1% in the first quarter of 2020, from 23.1% as at third quarter of 2018. The report also showed the underemployment status of those working below 40 hours per week or in jobs that underutilizes a person's skills, time, and or education, rose to 28.6%. Consequently, with an estimated labour force of about 80.2 million in Nigeria, 21.7 million are said to be unemployed. The unemployment rate of young Nigerian labour force between the age of 25 and 34 constituting the hub of labour force rose to higher than 30.7%. Regrettably, as the population index of Nigeria increases, unemployment also rises proportionately. Whereas in 2012, the data index of unemployment in Nigeria was 11.1 million, it has increased exponentially to 23.1% in 2018, and 27.1% as at the first quarter of 2020 (National Bureau of Statistics, 2012).

Though various governments, both past and present, have made impressive efforts by instituting policies with the hope of unravelling the unemployment situation in the country, however, it is difficult to ascertain policies that have yielded desired results in addressing unemployment in Nigeria, with respect to rising unemployment index. One of such programme is Structural Adjustment Programme (SAP). At a time in the military regime, youths were considered the focus of social policy. The then government responded by enlisting unemployed Nigerians into programmes like OFN (Operation Feed the Nation) and DIFRRI (Directorate of Food, Road and Rural Infrastructure) which provided instantaneous employment to those who wanted to venture into agriculture. However, with the introduction of democracy in Nigeria in 1999, it has witnessed a transition from military rule to civilian rule. This brought about a refocusing of unemployment programmes. Certain institutions were set up with a focal responsibility of stimulating employment. During the administration of Goodluck Ebele Jonathan, programmes like Subsidy Reinvestment and Empowerment Programme (SURE-P) and the Youth Enterprise with Innovation in Nigeria (YOU-WIN) were the front burner for stimulating employment. However, the coming of Muhammed Buhari to power in 2015 saw the establishment of Npower programme to address the problem of unemployment through engagement in agriculture and a host of others. Nevertheless, just like the series of other programmes, the impact of this programme is yet to be felt as it has failed to address the issue of unemployment in Nigeria. The table below presents employment in agricultural sector (% of total employment).

Table 1: Employment in agricultural sector (% of total employment)

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Number Employed	43.0	42.2	41.4	40.6	39.5	38.3	37.5	36.9	36.6	36.1	35.6	35.1

Source: ILO (2020)

The table above shows a diminishing trend in agricultural employment trend. Employment in the sector decreased from 43.0% in 2008 to 35.1% in 2019. Incidentally, the role agricultural sector plays in ensuring sustainable economic growth and development alludes to the fact that unemployment could be reduced through agricultural development. Moreover, agricultural sector has the capacity of engaging a large chunk of Nigerians that are currently unemployed (Max, 2013; Sudhir, 2013; John, *et al*., 2018), the nature of agricultural sector in Nigeria and enormous challenges facing farming diminishes the attraction of employment to the sector. It is often viewed as suffering expedition or endeavour to engage in farming (Chinsinga, & Chasukwa,

2018). Nonetheless, Nigeria is a country blessed with arable lands for competitive and high yield farming. Farmers on the other hand are faced with too many challenges such as poor funding, poor access to credit, high interest rate, lack of mechanized system of farming, poor seedlings, and a host of other challenges (Mohammad, 2010). It is against this background that the current study examined the effect of agricultural development on unemployment reduction in Nigeria. The hypothesis is stated in alternative form as:
H_1: Agriculture has the potential to reduce unemployment in Nigeria

Literature review

Unemployment

Unemployment arises in a situation where people who belong to the age bracket of working population, who are motivated, skillful, and able to work, are unable to find work. Unemployment can also occur in a situation where labour force takes up job that is below his skills and or specialization. Such situation is often referred to as under-employment. Nevertheless, the concept of unemployment has attracted various definitions from scholars in the field of economics. According to Udu and Agu (2005), unemployment is a state where capable persons that are disposed to work are not able to secure job. International Labour Organization (ILO, 2007) defined unemployment as a set of labour force who are not economically absorbed, though they are able and longing for job. Tejvan (2019) defined unemployment as a state in which a person who is of working age, is willing to be on full time job, but could not secure a job. According to Organization for Economic Cooperation and Development (OECD, 2020), unemployment is a situation where people who are enthusiastically and presently available to start work could not find job. Amongst the different types of unemployment, the one that is consistent with agricultural sector is Seasonal Unemployment; the reason is because farming activities is usually high during raining season as against dry season. As such, more labourers are required during such time to boost output in contrast with fewer workforce during dry season. Whereas mobility of labour increases structural unemployment, structural unemployment arises in a situation where certain industries decline due to market conditions (Tejvan, 2019). Consequently, agricultural sector in Nigeria has witnessed severe changes due to lack of attention by government and stakeholders; as well as insecurity (which is attributed to unemployment) occasioned by banditry and kidnapping, thereby causing decline in the ability of the sector to engage more labour force. As a result of this, unemployment has increased significantly due to labour immobility.

Theoretical literature

The Keynesian theory of Employment

The logical underpin of Keynesian theory of employment is anchored on the concept of aggregate demand. Though, Keynesian theory is traditionally a demand side economics, the theory showed that in a capitalist economy, the level of employment is a function of the level of aggregate demand. As unemployment is a consequence of deficiency in effective demand, the level of employment can be raised by increasing the level of effective demand; suggesting that as effective demand rises, investment will increase to bring about increase in employment and profit. Keynes denoted total demand for goods and services at several stages of employment as effective demand (Jhingan, 2003). Hence, divers' stages of employment epitomize different stages of aggregate demand (Marglin, 2018). Keynes inferred that levels of employment is a determinant of effective demand which through multiplier effects, determines aggregate demand

price and aggregate supply price (Marglin, 2018). The total sum of money income a firm expects to acquire from trading the output produced by the number of labour employed represents the aggregate demand price for the output of any volume of employment. Moreover, the Keynesian theory of unemployment is regarded as cyclical or deficient demand unemployment. The Keynesian holds that unemployment occurs once there is deficient demand in the economy to fuel employment. The Keynesian believed that capitalists engaged workers and invest to drive output when opportunities about the economy and profits are favourable (Mouhammed 2010). Hence, investment and employment will increase when anticipated favourable economy and expected profit are supported by reality. In the palace of Keynesian economics, equilibrium occurs when aggregate demand and aggregate supply meet, which denote the point of effective demand, which could be lesser than the full employment equilibrium. Whereas, capitalists will tend to invest and employ less when the anticipated favourable economy and expected profit are not supported by reality, the unemployment braising from this is due to deficient aggregate demand, particularly investment expenditures. Keynesian economics recommended government intervention as an imminent resolution to tackling unemployment. They opined that aggregate demand will stimulate employment through deficit spending by government (Obadan & Odusola, 2010).

The Phillips Curve Theorem

The Phillips curve theorem is based on the nexus amongst unemployment rate and inflation rate or money wage changes. The theory expressed a transposed correlation between the rate of unemployment and increase in money wages or inflation (Chaido & Melina, 2013). According to Phillip empirical relationship, a rise in unemployment is a decreasing function of money wage rates. That is, as unemployment is rising, increase in money wage decreases. This is because wage is seen as an inducement for productivity. Hence, at a lower wage rate, labour will be unwilling to lend their services at any wage lesser than the base (or minimum) wage rate. Consequently, at a lower unemployment rate, wage rate increases because the demand for labour is high with infinitesimal number of unemployed labour. As a result, the entrepreneurs will bid wage rate up above the minimum wage rate very quickly. More also, business activity is another factor that informs the inverse correlation between unemployment and wage rate. Chaido and Melina (2013) opined that in a period of booming business activity, demand for labour increases as a result of fall in unemployment and thus, in a quest to woo labour, employers will drive up the wage rate above the minimum wage rate. Equally, in a period of down turn in business activity, unemployment increases due to fall in demand for labour such that employers become hesitant to give wage increase and workers will be in an awkward position to demand for wage increase.

Empirical literature review

The subject of agricultural development and unemployment has received scholars' undivided attention from the domain of economics in particular over the years.

Guido (2005) examined the impacts of world agricultural trade liberalization on wages, employment, and unemployment in Argentina. Information from Labour force surveys and price indexes were used in the study. The data were sourced from Argentine Encuesta Permanente deHogares (EPH) and statistical institute in Argentina (INDEC). The findings from the study showed that 10 percent increase in the price of agricultural exports would stimulate the likelihood of employment by 1.36 percent. Thus, the probability of labour market participation

by about 0.61 percent would justify the increase, and a 0.75 percent decline in the likelihood of unemployment. Meanwhile, unemployment rate would diminish by 10 percent or 1.23 percent level, Guido holds that about 70 percent of this change would be brought about by a higher likelihood of securing a work. Ayinde *et al.*, (2011) investigated the impact of agricultural growth on unemployment and poverty in Nigeria from 1980 to 2011; the study utilized secondary data sourced from National Bureau of Statistics (NBS), Central Bank of Nigeria, International Monetary Fund (IMF) publications, and United Nations publications (UN). Autoregressive Integrated Moving Average (ARIMA) model, Granger Causality approach, and Co-integration techniques of data analysis were utilized in the study. The Granger Causality test revealed a unidirectional causation, implying that causality runs among the variables. Hence, the study concluded that agricultural growth and unemployment in Nigeria are contingent on poverty.

Bernard and Adenuga (2017) examined the contribution of agricultural sector to employment generation in Nigeria. The study adopted Error Correction Mechanism (ECM) and the Granger Causality Approach. In doing justice to this study, they factored in other independent indices such as gross domestic product (GDP), foreign private capital, and public expenditure. The study showed a positive association between agricultural output and employment generation in Nigeria. Hence, they concluded by supporting the Keynesian stance that increase in employment generation occurs by rise in aggregate demand. Ayinde (2008) analyzed agricultural growth and unemployment in Nigeria. T-test, Duncan Multiple Range test, Granger Causality test, and regression analysis were utilized in the study. The t-test was utilized to verify if a sizable variation exists between rural unemployment rate and urban unemployment rate while Granger Causality test was employed to examine the component and the connection between agriculture and unemployment. The study found that unemployment rate is significantly greater in the urban areas which may be attributed to rural-urban migration, as well as disengagement of workers by employers in order to adopt technology. Furthermore, the Granger Causality test revealed that a unidirectional causation runs from agricultural growth to unemployment and from urban unemployment to agricultural growth.

Enilolobo and Ohalete (2017) investigated the impact of inclusive growth determinants on agricultural output in Nigeria from 1981 to 2015. The annual time series data utilized in the study were exposed to unit root test using Augmented Dickey fuller (ADF) and Johansen co-integration test. Thereafter, the study adopted Error correction mechanism (ECM). The ECM finding revealed that as unemployment and poverty rates declines, Agricultural output increases and thus, per-capita income increases. This implies that agriculture offers a feasible measure to actualizing the anticipated inclusive growth. The study concluded by recommending that adequate focus should be given to growth of agricultural sector by the entire stakeholders.

Ogbalubi and Wokocha (2013) investigated agricultural development and employment generation in Nigeria. The study covered the interval of 1973 to 2002. Findings from the work showed that the agricultural sector is nevertheless at a very infinitesimal development stage and thus, the sector is yet to actively utilize the aptitudes of the good climate, arable land, and skilled human endowment in Nigeria.

Oluwafemi, *et al.*, (2019) examined the impact of agricultural sector growth on unemployment level in Nigeria. Annual time series data ranging from 1981 to 2016 were utilized for the study. The data were obtained from Central Bank of Nigeria statistical bulletin and World Bank data bank. The data were verified for unit root using Augmented Dickey Fuller test (ADF) while Autoregressive distributed lag (ARDL), Bounds cointegration test, ARDL-ECM (Error

Correction Mechanism) estimation, and Granger causality test were utilized in the study. The study outcome showed that current time variation in agricultural output is negative and significant for current unemployment stage while variation in one lagged agricultural output time was positive and significant for current unemployment stage in Nigeria. Whereas the ECM revealed that about 74.10% of the disequilibrium in the system in the previous year would be corrected in the current, the Granger causality test results showed a bi-directional causality between agriculture output and unemployment level.

1. Theoretical framework

The theoretical framework upon which this study is anchored is Malthusian theory of population growth. Thomas Malthus analyzed the nexus between population growth and resources employment. From this, Malthus opined that population growth increases exponentially or in geometric progression, whereas, growth of resources increases in a slow arithmetic progression, implying that resources grow only at a given point in time. This theory is fully applicable to Nigeria, given the challenging unemployment rate in Nigeria occasioned by: (i) high population growth of 2.64%, 2.62%, 2.6%, and 2.58% being increase from 2016, 2017, 2018, and 2019 respectively (World Bank, 2020); (ii) high poverty of 50%, 46.0%, 40%, & 40.1% being increase from 2016, 2017, 2018, and 2019 respectively (NBS, 2019); (iii) unemployment; as well as (iv) food shortage can be alluded to the fact that agricultural sector has been neglected by the government for series of decade. Thus, as Nigeria population keeps rising exponentially, resources availability continues to diminish. The resultant effect of this according to Malthus theory are: unemployment, poverty, and a host of others. Hence, in the palace of Malthus theory, population growth increases geometrically while food supply increases in a low arithmetic progression.

Methodology

The study adopted the model employed by Oluwafemi *et al.,* (2019) though, with slight modification to adequately address the aim of the study. Hence, the methodology followed the ex post factor research design. The study utilized annual time series data sourced from Central Bank of Nigeria (CBN) statistical bulletin on various issues. The scope of the study is between 1990 to 2019.

The functional form is stated as:

Unemployment Reduction =f (Agricultural Development) ……..……..…… (1)

The static model is further deduced from equation (1) as:

Unemployment =(Public Expenditure on Agriculture + Bank Lending to Agriculture + Inflation Rate + Exchange Rate + Share of Agriculture to Gross Domestic Product) …… (2)

Therefore,

UEMP = f(PEA, BLA, INF, EXR, and SAG) …… (3)

The Equation (2) is then transmuted into an econometric consummate to facilitate the analysis of the econometrics model. Consequently, the variables (Public Expenditure on Agriculture (PEA), Bank Lending to Agriculture (BLA), Inflation Rate (INF), & Exchange Rate (EXR)) constitutes agricultural development indices, which through multiplier effect, are assumed to stimulate positive impulse of unemployment reduction while Share of Agriculture to Gross Domestic Product (SAG) was added as a control variable. However, the variables were expressed in log modification as a means of standardizing the model coefficients.

$InUEMP_t = \alpha_0 + \alpha_1 InPEA_t + \alpha_2 InBLA_t + \alpha_3 InINF_t + \alpha_4 InEXR_t + \alpha_5 InSAG_t + \varepsilon_t$ …….. (4)

Where:
UEMP represents National unemployment rate
PEA represents public expenditure on agriculture
BLA represents bank lending to agriculture
INF represents inflation rate
EXR represents exchange rate
SAG represent agricultural share to GDP, a proxy for agricultural growth
ε represents stochastic error term
Therefore, the apriori expectations of the model are stipulated as: $\alpha_1 > 0$, $\alpha_2 > 0$, $\alpha_5 > 0$, $\alpha_3 < 0$, $\alpha_4 < 0$
The Granger causality test was employed to verify the dimension and the linkage between agriculture and unemployment.
The Granger causality model is expressed as:

$$UEMP_t = \sum_{i=1}^{n} \alpha_i \, LogSAG_{t-1} + \sum_{i-1}^{n} \gamma_i \, UEMP_{t-1} + \varepsilon_{1i} \quad \text{..... (5)}$$

$$SAG_t = \sum_{i=1}^{m} \varphi_i \, UEMP_{t-1} + \sum_{i-1}^{m} \delta_i \, SAG_{t-1} + \varepsilon_{2i} \quad \text{..... (6)}$$

Where:
UEMP represents National unemployment rate
SAG represents share of agriculture to GDP
In the equation (5) and (6) above, the subscripts t denotes time periods, while the stochastic term ε_{1i} and ε_{2i} are presumed uncorrelated. Consequently, to estimate the model, the study adopted Error Correction Mechanism (ECM) and Error correction model Granger causality test.

Presentation and Analysis of Regression Results

Table 2: Descriptive Statistics

	UEMP	PEA	BLA	INF	EXR	SAG
Mean	9.583667	23.29924	174.2788	18.31933	123.7160	24.33767
Median	9.400000	17.12250	60.97625	11.99000	127.2400	24.18500
Maximum	23.01000	70.27450	680.0255	76.80000	362.2000	36.97000
Minimum	4.900000	0.208700	4.221400	0.200000	8.040000	19.99000
Std. Dev	4.327636	21.93772	205.6384	17.62676	93.30539	3.893649
Skewness	1.944301	0.605242	1.128734	2.089722	0.767508	1.496995
Kurtosis	6.491774	2.132670	2.810498	6.444252	3.234942	5.539531
Jargue-Bera	34.14214	2.771915	6.415094	36.66328	3.014338	19.26649
Probability	0.000000	0.250084	0.040456	0.000000	0.221536	0.000066
Observation	**30**	**30**	**30**	**30**	**30**	**30**

Source: Authors computation, eviews 9, 2020

Table 2 above shows the result of the descriptive statistics. From the result, the mean measures the average value of each series while the maximum and the minimum show the values of the series in the present sample. The standard deviation is the measure of spread in the series. Consequently, the higher/lower the values, the higher/lower the series deviates from the mean.

The skewness examines the asymmetry of the series around the mean. A positive skewness denotes that the distribution spreads to the right while a negative skewness denotes also that the distribution spread to the left. A normal distribution has zero skewness. Kurtosis examines the flatness (peakedness) of the series. The kurtosis for normal distribution is 3; when it exceeds this value, it is assumed the distribution is leptokurtic (peaked), but when it is less than 3, the distribution is considered platykurtic (flat). Nevertheless, Jarque-Bera (is a test statistics for normal distribution), the null hypothesis states that series is normally distributed. For Jarque-Bera test, null hypothesis is accepted when the p-value is higher than 0.10%, otherwise, we reject.

Consequently, from the descriptive statistics results, UEMP, BLA, INF, and SAG are not normally distributed; the series has a long tail while PEA and EXR are normally distributed with zero skewness. More so, Jarque-Bera results further confirms that only PEA and EXR are normally distributed (normal distribution is a probability function that explains the arrangement of values around central maximum while abnormal distribution occurs in a situation where values of a variable are arranged at one end or the other of a distribution). The series UEMP, INF, and SAG are considered leptokurtic relative to the normal distribution since the distributions exceeded the value of 3 while PEA, BLA, and EXR are considered platykurtic relative to normal distribution since the they are less than the value of 3. The Jarque-Bera results showed that only PEA and EXR are normally distributed.

Table 3: Unit Root Test (Augmented Dickey-Fuller)

Variables	ADF Test Statistic	Critical Value			Trend and Intercept	Order of Integration	P-value
		1%	5%	10%			
In(UEMP)	-3.037034	-3.689194	-2.971853	-2.625121	Intercept	1(1)	0.0436
In(PEA)	-8.181005	-3.689194	-2.971853	-2.625121	Intercept	1(1)	0.0000
In(BLA)	-5.597466	-3.689194	-2.971853	-2.625121	intercept	1(1)	0.0001
In(INF)	-6.525760	-3.724070	-2.986225	-2.632604	intercept	1(1)	0.0000
In(EXR)	-3.724776	-3.689194	-2.971853	-2.625121	intercept	1(1)	0.0092
In(SAG)	-6.160107	-3.699871	-2.976263	-2.625121	intercept	1(1)	0.0000

Source: Authors computation, eviews 9, 2020

The results of the stationarity test in table 3 above revealed that all the variables (UEMP, PEA, BLA, INF, EXR, and SAG) were integrated of order one I(1) at 1%, 5%, and 10% critical value. The variables were found to be stationary at intercept alone. Thus, paving way for cointegration test.

Table 4: Engle-Granger Cointegration Test

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.969591	0.0004
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Source: Authors computation, eviews 9, 2020

The table above presents the result of Engle-Granger cointegration result. The Engle-Granger cointegration test structures residual based on the dynamic regression model. The Engle-Granger cointegration test utilizes the residuals to authenticate the presence of unit roots. Consequently, the residuals are envisaged to be stationary as long as the time series is cointegrated. Hence, the null hypothesis for Engle-Granger test is that no cointegration exists. To resolve the problem of cointegration, the residual generated from the dynamic model was exposed to unit root test through Augmented Dickey-Fuller (ADF) test criterion. The result estimation from the test indicated that ECM (-1) is statistically significant at all critical level (1%,5%, and 10%). Thus, not only does the result give credence to the existence of disequilibrium in the model, more so, it underscores the need that ECM(-1) should be factored into the econometrics model.

Table 5: Parsimonious ECM Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.720556	0.568203	-1.268131	0.2193
D(UEMP(-1))	1.189640	0.135380	8.787443	0.0000
D(PEA)	-0.015061	0.041571	-0.362307	0.7209
D(BLA)	0.065762	0.038225	1.720384	0.1008
D(INF)	-0.035983	0.033411	-1.076995	0.2943
D(EXR)	0.460326	0.108262	4.251967	0.0004
D(EXR(-1))	-0.533993	0.093888	-5.687561	0.0000
D(SAG)	0.142945	0.155898	0.916916	0.3701
ECM(-1)	-0.070687	0.018379	-3.846167	0.0010

R-squared	0.957449	Mean dependent var	2.199056
Adjusted R-squared	0.940429	S.D. dependent var	0.373234
S.E. of regression	0.091096	Akaike info criterion	-1.704677
Sum squared resi	0.165970	Schwarz criterion	-1.280343
Log likelihood	33.71781	Hannan-Quinn criter.	-1.571781
F-statistic	56.25311	Durbin-Watson stat	1.828962
Prob(F-statistic)	0.000000		

Source: Authors computation, eview 9, 2020

Table 5 above shows the result of the final ECM response for the long run equilibrium. According to Hendry (1987), to eliminate insignificant lags, the methodology of general-to-specific is required. This will help to avoid removing insignificant lags arbitrary. Consequently,

parsimonious ECM was conducted on the over parametrized ECM. As anticipated, the ECM term is negative and statistically significant at 5% critical value. The (ECM-1) revealed that once there is disequilibrium in the system, it takes an average speed of 0.7% to adjust itself back to long-run equilibrium. However, the speed of adjust of long-run equilibrium is infinitesimally low. The R^2 shows the predictive ability of the model. Hence, it indicated that 95% changes in UEMP were explained by the behaviour of PEA, BLA, INF, EXR, and SAG while the remaining 5% unaccounted variations were captured by the white noise error term. This goes further to reveal that the explanatory variables (PEA, BLA, INF, EXR, and SAG) exerted strong impulse on UEMP in Nigeria for the period under review. The overall significance of the model as measured by F-statistics revealed that the result is significant, as shown by the p-value at 5% critical value.

Table 6: Granger Causality test between unemployment rate and agricultural growth

Pairwise Granger Causality Tests
Sample: 1990 2019
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
SAG does not Granger Cause UEMP	25	0.51663	0.7596
UEMP does not Granger Cause SAG		3.30570	0.0353

Source: Authors computation, eviews 9, 2020

The results of Granger causality revealed that bi-directional causality runs between UEMP and SAG. Based on this, it is correct to conclude that employment generation through agricultural development enhances share of agriculture to GDP in Nigeria for the period under review.

Post Estimation Test

Table 7: Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.494501	Prob. F(2,15)	0.6195
Obs*R-squared	1.791035	Prob. Chi-Square(2)	0.4084

The Breusch-Godfrey LM test helps to determine if specification demonstrates autocorrelation problem. Hence, the hypothesis states that serial correlation is present in the econometrics model. Consequently, the F-statistic and the prob of Chi-square in the result indicates nonexistence of serial correlation in the model.

Table 8: Heteroskedasticity Test

Breusch-Pagan-Godfrey

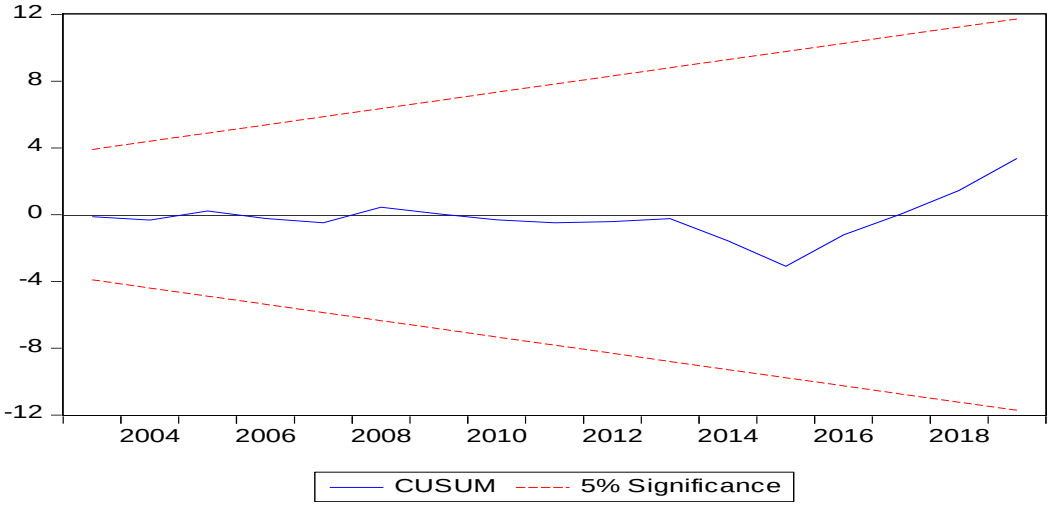
F-statistic	1.502594	Prob. F(12,16)	0.2203
Obs*R-squared	15.36543	Prob. Chi-Square(12)	0.2221
Scaled explained SS	10.51835	Prob. Chi-Square(12)	0.5706

Source: Authors computation, eviews 9, 2020

Breusch-Pagan test help to verify heteroskedasticity of errors in the model. The alternative hypothesis states that error variances are not uniform. Hence, given that the p -value of the chi square is more than 0.1, the null hypothesis is accepted.

Stability Test

Fig 1: CUSUM Test



The essence of CUSUM test is to determine the stability and suitability or correctness of the model. The CUSUM plot for this model is done under 5% significance level. The result, however, indicate that the parameters of the model are free from any structural instability for the period under study. Therefore, the entire coefficients of the ECM are very stable.

Discussion of findings and conclusion

The empirical results indicate that PEA, INF, and EXR exert negative effects on UEMP. Hence, the negative dimension of INF and EXR conforms to the apriori expectation while PEA did not conform to the apriori expectation. The reason for this could be a function of lopsidedness in policy implementation in Nigeria. With reference to Keynesian economic theory, positive effect is expected to result from government spending. Keynesian theory opined that government spending would stimulate aggregate demand and thus, high aggregate demand will through multiplier effect, induce employment. More so, the findings support the study outcome of Oluwafemi, *et al.*, (2019), Ogbalubi and Wokocha (2013). However, the study also found that BLA and SAG exert positive effects on UEMP. This finding is in-line with the study of Ayinde, *et al.*, (2011), Ayinde (2008), and Olanrewaju (2014).

The study examined the effect of agricultural development on unemployment reduction in Nigeria. Agricultural development is the bedrock of economic growth and development and thus, there cannot be any meaningful or sustainable growth without unemployment reduction in the economy. The current unemployed population constitutes the bulk of the labour force. As a result, per labour output is significant to the share of agricultural contribution to GDP. With massive participation of the government and stakeholders in developing agriculture, the share of agricultural contribution to GDP will improve significantly, which will in-turn enhance the attraction of unemployed to the sector. Consequently, this study has been able to establish that public expenditure on agriculture (PEA), inflation rate (INF), and exchange rate (EXR) exert negative impulse on unemployment reduction in Nigeria. For this reason, it is recommended that the monetary authorities should carefully and coherently pursue a policy that can control inflationary pressure in the economy, and at the same time, adopt friendly exchange rate policy

that encourages investment. Also, it is recommended that government should prioritize investment in agriculture and seek ways to attract both domestic and foreign investment to the agricultural sector. The study also established that bank lending to agricultural sector (BLA) and share of agriculture to GDP (SAG) is positive, though statistically not significant. In the light of this, it is recommended that central bank of Nigeria (CBN) and other stakeholders should keep driving the mechanisms that would continuously stimulate increased inflow of BLA and SAG for agricultural development.

Conflict of interest

Authors declared no conflict of interest.

References

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. Aina1 and S.O.Babarinde1 (2011). Effect of agricultural growth on unemployment and poverty in Nigeria (1980- 2012). A co-integration approach *Tropical Agriculture (Trinidad)* 94 (4), 434- 444.

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.

Central Bank of Nigeria (2019). Statistical Bulletin. Abuja.

Chaido, D. & Melina, D. (2013). Phillips curve inflation and unemployment: an empirical research for Greece. *International Journal of Computational Economics and Econometrics, 3*, (1/2), 27-42..

Chinsinga, B. & Chasukwa, M. (2018). Agricultural policy, employment opportunities, and social mobility in rural Malawi. *Agrarian South: Journal of Political Economy. https://doi.org/10.1177%2F2277976018758077*

Enilolobo, O. S. & Ohalete, E. E. (2017). Impact of inclusive growth determinants on agricultural output in Nigeria. *African Journal of Sustainable Development*, 7(2),153-174.

Guido, G. P. (2005). Agro-manufactured export prices, wages, and unemployment. *Development Research Group the World Bank*.

International Labour Organization (2007). *Resolution concerning statistics of the economically active population, employment, unemployment, and underemployment*. Retrieved from http://www.ilo-org/public/english/burearu/stat/download/res/ecacpop.pdf

Jhingan, M. L. (2003). *Macro-Economics theory*. Vrinda Publications.

John, C. O., Ikhimalo, O. P. & John, A. (2018). *Employment in the Nigerian agricultural labour market: Barriers and Forecast*. Retrieved from www.researchgate.net/publication/328200731

Marglin, S. (2018). Raising Keynes: A General Theory for the 21st Century. *Elsevier B.V.*

Max, R. (2013). *Employment in Agriculture*. Published online at www.ourworldindata.org

Mohammad, H., (2010). Crop agriculture of Bangladesh: Challenges and opportunities. *Bangladesh Journal of Agricultural Research*, 35(2), 235-245.

National Bureau of Statistics (2012). National unemployment rates. The National Bureau of Statistics, Lagos.

National Bureau of Statistics. (2020). Report on unemployment rates. The National Bureau of Statistics.

Obadan, M. I. & Odusola, F. A. (2010). Productivity and unemployment. *National Centre for Economic Management and Administration.*

Ogbalubi, L. N. & Wokocha, C. C. (2013). Agricultural development and unemployment generation: The Nigerian experience. *IOSR Journal of Agriculture and Vetinary Science.* 2(2):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),6-13.

Oluwafemi, S.E, Saidi, A.M & Onyeka, P.I., (2019). Impact of agriculture sector growth on unemployment level in Nigeria. *Journal of Economics, Management and Trade.* 22(5), 1-13.

Organization for Economic cooperation and development) (2020). *Labour Force Indicator*. Published on www.oecd.org: doi:10.1787/ef2e7159-en.

Sudhir, J. (2003). Agriculture and unemployment. *Economic and Political weekly*, 38 (15),1463-1466.

Tejvan P. (2019) *Definition of Unemployment*. Retrieved from www.economicshelp.org Oxford, UK.

Udu, E. & Agu, G. A. (2005). *New system Economics*. Africana First Publishers.

World Bank. (2017). World Bank annual report Retrieved from http://www.worldbank.org/en/country/nigeria