Business And Management Research Journal
ISSN 2026-6804
Peter and Rachel, Volume (10) Issue (7): 143 – 149 September - 2020. RESEARCH PAPER

Empirical analysis of agricultural output performance and unemployment rate in Nigeria: An ARDL approach

***Peter Ego Ayunku[1] and Rachel Konyefa Dickson[2]**

[1]Niger Delta University, Faculty of Management Sciences, Wilberforce Island, Bayelsa State, Nigeria

[2]Niger Delta University, Department of Management, Wilberforce Island, Bayelsa State Nigeria

*Corresponding Author Email: peterayunku@yahoo.com

***Corresponding Author**

Peter Ego Ayunku[1]

[1]Niger Delta University, Faculty of Management Sciences, Wilberforce Island, Bayelsa State, Nigeria

*Corresponding Author Email: peterayunku@yahoo.com[1]

Abstract

This paper empirically examined the relationship between Agricultural output and unemployment rate in Nigeria using an annual time series data spanning from 2002-2018 sourced from CBN, National Bureau of Statistics (NBS) and the Word Bank. The study used ARDL approach. The ADF unit root test result suggested that the entire variables were stationary at first different and were integrated at order 1(1). The ARDL Bounds Test result indicated that there exists a long-run relationship between the variables as the F-statistics value of 9.16 is greater than the upper bounds at the 5% level of significance. Based on the findings, the study amongst other recommended that government should encourage agricultural production in the country as this would further boost employment rate in Nigeria.

Keywords: ARDL Bounds Test, Unemployment Rate, Stationary, Voluntary, Involuntary, Real Wage

Introduction

The issues of agricultural output performance and unemployment rate have been well documented in the body of literature. Kemi (2019) postulates that in terms of employment, agriculture is the most important sector of the Nigeria economy, engaging about 70 percent of the labour force. In Nigeria, agriculture was contributing nearly 60 percent of Gross Domestic of foreign exchange earnings, but today agricultural production shows a declining trend in the growth of export crop, and this is a reflection of the weakness in efforts of government to diversify the export base of the economy of non-oil export (NISER, 2000) and again, inadequate funding of the agricultural sector has been raised by experts to increase agricultural output.(CBN, 2010; Bernald, 2000; Ayunku & Etale,2015.)

Tombafa (2004), pointed out that agricultural sector is known to employ over 75 percent of the labour force in developing countries and also provides the purchasing power over industrial goods. CBN (2017) reported that the aggregate index of agricultural production has increase by 3.5 percent in 2017. According to them, this improvement was largely due to increase in output in all the sub sectors except fishery.

In spite of this development, the rate of unemployment in Nigeria is still very high and remains unabated. It has

been asserted that unemployment has been a persistent problem that faced most developing countries, Nigeria inclusive. Jhingan, (2010) argued that unemployment is not voluntary but involuntary and that people are prepared to work but are unable to find work throughout the year due to lack of complementary factors.

According to NBS (2018), the Nigeria's unemployment rate stood at 23.1 percent of the workforce up from 18.1 percent in 2017. It has been argued that the rate of unemployment in Nigeria might be worsen with the recent outbreak of Corona virus pandemic that is ravaging the whole world if adequate steps are not taken by relevant authorities.

Previous studies on the above have inconclusive results and thus, this study is carried out so as to fill the research gap in the body of literature (Ekine & Onu, 2018). Thus, the broad objective of this study is to examine the long-run relationship between agricultural output performance and unemployment rate in Nigeria. The paper is structured as follows; section two provides the review of related literature, section three prosecutes the methodology, section four deals with the empirical results and discussion while section five concludes the paper and recommendations are offered as appropriate.

Review of Related Literature

Conceptual Clarifications

Agricultural Output % of GDP

Agricultural output is the measure of individual crops and livestock output or is the value added by agriculture, fishery and forestry sector as a percentage of GDP in constant prices.

Unemployment Rate

Jhingan (2010) defined unemployment rate as people who are prepared to work but are unable to find work throughout the year due to lack of complementary factors. Similarly ILO defined unemployment rate as those who are currently not working but are willing and able to work for pay, currently available to work and have actively searched for work (ILO, http://www.ilo.org/public/english/bureau/stat/res/index.html)

Inflation Rate

Inflation rate is simply the sustained increase in the general price level of goods and services inflation can also be seen as a persistent increase in price level.

Theoretical Framework

This study is based on the classical theory of unemployment.

Classical Theory of Unemployment

The classical theory of unemployment as propounded by Pigou (1933) and Solow (1981) argues that the labour market is consists of demand and supply of labour and that demand for labour is a derived demand obtained from the declining portion of the marginal product of labour. They stated that the demand curve is a negative function of the real wage and that if wages increase the quantity demand for labour will decline and that the supply of labour according to them is derived from workers choice whether to spend part of the time working or not working. They pointed out that the supply of hours worked is a positive function of the real wage rises and workers supply more hours of work.

Empirical Review

Ewetan, Fakile Urhie & Oduntan (2017) examine the long-run relationship between agricultural output and economic growth in Nigeria for the period 1981-2014 using a time series data. The results from Johansen cointegration approach and vector error correction model support evidence of long-run relationship between agricultural output and economic growth in Nigeria.

Ogbanga (2018) examines agricultural development and employment generation with particular reference to Nigeria, using Error Correction and Granger Causality test to analyzed the variables such as Gross Domestic Production (GDP), Foreign Private Capital (FPC), Federal Government Expenditure (FEX) and Industrial Sector Output (INQ) on employment generation and the result revealed that agricultural sector and other explanatory variables contributes significantly to employment generation in Nigeria.

Similarly, Kamil, Sevin & Bekun (2017) examines the impact of agricultural sector on economic growth in Nigeria using time series data from 1981-2013 and the findings revealed that real gross domestic product, agricultural output and oil rents have a long-run equilibrium relationship. The vector error correction model result shows that the speed of adjustment of the variables towards their long-run equilibrium path was low, though agricultural output had a positive impact on economic growth. It was recommended that government and policy makers should embark on diversification and enhance more allocation in terms of budgeting to agricultural sector.

Also, Oguwuike (2018) examined the effect of agricultural output on economic growth in Nigeria for the period 1981-2016. The results showed that there exists cointegration amongst the variables in the model. And that the results of first and third lags of GDP are positively and significant related to current level of economic growth.

In the same vein, Ekine & Onu (2018) examined the impact of agricultural output on economic growth in Nigeria and the results showed a long-run equilibrium relationship between the dependent and independent variables but in long-run causality relationship.

Enilolobo, Mustapha & Ikechukwu (2019) examined the impact of agricultural sector growth on unemployment using annual time series data between 1981 - 2016. The result of ADF unit root test revealed that the variables were at different orders of integration, the ARDL bounds test reveal that there exist cointegration between the variables, the ARDL error correction model estimation revealed that changes in agricultural output in the current period is negative and significant for current unemployment level in Nigeria, while the change in one period lagged agriculture output was positive and significant for current unemployment level in Nigeria. Also the error correction term indicated that 74.10 percent of the disequilibrium in the system in previous year would be corrected in the current year. The granger causality test results revealed bi-directional casualty between agricultural output and unemployment level in Nigeria.

Methodology

The data used for this study were sourced from Central Bank of Nigeria (CBN) statistical bulletin and annual report and statement of accounts for various years, National Bureau of Statistical (NBS). The annual time series data spanning from 2002-2018 covering a period of seventeen years were used.

Model Specification

The model is specified functionality as follows;

AOP= f(UMP, INF)

(1)

The above model is further modified and specified using an ARDL model. The choice of this model is that it is more robust and perform more credibly well for small size of data and besides it has advantages of yielding consistent estimates of the long-run coefficients irrespective of whether the underlying variables or regressors are in order1 (0) or 1(1). Thus, the ARDL model is considered for this study and simply specified as:

$$yt = \alpha 1\ yt - 1 + \beta oxt\ +\ \beta 1xt - 1 + \mu t$$

(2)

Where:

Yt and Xt are the stationary variables

μt= is the white noise or error term that captures other variables

Thus, the ARDL Model can be rewritten as;

$$AOP_t = \propto_o + \sum_{t=1}^{a} \beta 1\ \mathrm{AOP}_{t-1} + \sum_{i=0}^{b} \beta 2\mathrm{UMP} + \sum_{i=0}^{c} \beta 3\mathrm{INF}_{t-1} + \mu t$$

(3)

Where;

$\propto_o = Constant\ term$
AOP= Agricultural output
Ump = Unemployment rate
INF= Inflation rate
μt = error term,
a, b, c, are the optimal lag length
$\beta_1 = \beta_2$ = are the coefficients

a priori expectations β, <o, β_2>o, β_3>o

Results and discussion

Unit Root Test Result

The ADF Units root test result is presented in table 1.

Table 1: Augmented Dicker Fuller (ADF) unit

Variables	ADF -statistic	Critical values at 5%	Order of integration
AOP	-2.519458	-1.966270	1(1)
UMP	-3.963633	-1.966270	1(1)
INF	-3.463681	-1.968430	1(1)

Source: Authors computation, E-views 9.0

From table 1 above, the ADF unit root test result indicated that all the variables were stationary at first difference and were integrated of order 1(1). Thus, meeting one of the conditions or assumptions for ARDL estimation.

Table 2: ARDL Estimation

Dependent Variable: AOP
Method: ARDL
Date: 04/15/20 Time: 15:37
Sample (adjusted): 2004 2018
Included observations: 15 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): UMP INF
Fixed regressors: C
Number of models evaluated: 9
Selected Model: ARDL(1, 0, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
AOP(-1)	1.072980	0.017514	61.26247	0.0000
UMP	75.60954	25.28357	2.990461	0.0152
INF	28.16266	38.43816	0.732674	0.4824
INF(-1)	-27.99064	24.47864	-1.143472	0.2823
INF(-2)	35.06464	24.59320	1.425786	0.1877
C	-769.1187	588.5081	-1.306896	0.2237

R-squared	0.998002	Mean dependent var	14598.72
Adjusted R-squared	0.996892	S.D. dependent var	6694.294
S.E. of regression	373.2046	Akaike info criterion	14.97131
Sum squared resid	1253535.	Schwarz criterion	15.25453
Log likelihood	-106.2848	Hannan-Quinn criter.	14.96829
F-statistic	899.0936	Durbin-Watson stat	2.351903
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.
Source: Authors computation, E-views 9.0

Table 2 above shows the result of the ARDL Model estimation, which was carried out to enable us perform the bounds test. The coefficient of one period lag on the dependent variable is 1.07 and it is statistically significant. Also the coefficient of UMP variable without a lag remains very high at 75.60 and it is also statistically significant.INF variable with one and two period lag had negative and positive influence of -27.99 and 35.06 respectively on agricultural output performance and not statistically significant.

ARDL Bounds Test

Table 3 presented the ARDL Bounds Test results. The result suggested that there exist a long –run relationship between the variables in the model as the calculated I-statistics value of 9.16 is higher than the upper bounds at the 5% level of significance. The critical bounds test values are 3.79 & 4.85respectively and thus suggesting that the null hypothesis of no cointegration is therefore rejected. In view of the above we conclude that the model is well specified see Pesarau, Shin & Smith (2001).

Table 3: ARDL Bounds Test Result

ARDL Bounds Test
Date: 05/09/20 Time: 12:23
Sample: 2003 2018
Included observations: 16
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	9.156930	2

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Source: Authors computation, E-views 9.0

We now, proceed to perform the ARDL cointegrating and long- run model. The result as presented in table 3 below suggests that there exist a long-run relationship between the variables. The coefficient of the ECM as represented by cointEq(-1) shows the expected correct negative sign and was statistically significant. The speed of adjustment to disequilibrium was about 0.0227 percent, which is quite low suggests that the disequilibrium in the previous year would be corrected in the current year though is slow.

Table 4: ARDL Cointegratings Long-run Result

ARDL Cointegrating And Long Run Form
Dependent Variable: AOP
Selected Model: ARDL(1, 0, 1)
Date: 05/09/20 Time: 13:17
Sample: 2002 2018
Included observations: 16

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UMP)	0.097008	0.049901	1.944017	0.0779
D(INF)	0.025396	0.056872	0.446542	0.6639
CointEq(-1)	-2.273046	0.051479	-44.154662	0.0000

Cointeq = AOP - (0.0427*UMP -0.1004*INF + 2.0940)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMP	0.042677	0.022321	1.911961	0.0823
INF	-0.100370	0.041589	-2.413416	0.0344
C	2.093964	0.448431	4.669536	0.0007

Source: Authors computation, E-views 9.0

Histogram Normality Test

The normality Test result indicated that the residuals are not perfectly distributed. The Jargue-Bera (JB) test indicated that the JB statistics test is about 11.44247 while the probability value is 0.003276 respectively.

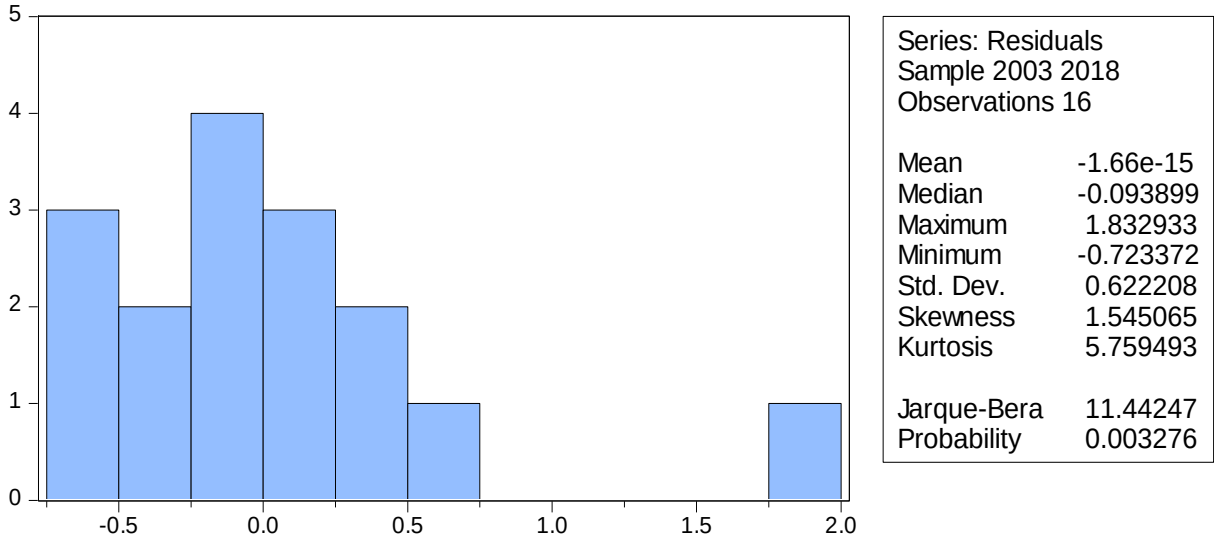

Figure 1: Histogram normality test result
Source: Authors computation, E-views 9.0

From table 5 below, the Breusch-Godfrey Serial Correlation LM Test result is suggesting that there is no evidence of autocorrelation in the model as the P values are greater than zero.

Table 5: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.610847	Prob. F(2,9)	0.5639
Obs*R-squared	1.912315	Prob. Chi-Square(2)	0.3844

Conclusion

The study was carried out to ascertain whether there is any relationship between agricultural output performance and unemployment rate in Nigeria using annual time series data for the period 2002 to 2018. The study employed ARDL approach to analyze the variables and the results suggests that there exist a long-run relationship between the variables as the calculated F-statistics of the bounds test was 9.16 and was higher than the upper bounds at the 5% level of significance. The results are partially consistence with studies by Enilolobo, Mustapha & Ikecchukwu (2019). The study therefore, recommended that government should encourage agricultural production in the country as this would further boost unemployment rate in Nigeria.

References

Ayunku, P.E., & Etale, L.M. (2015). Effect of Agriculture Spending on Economic Research Journal of Finance and Accounting. 6(2) 138-143

Bernard, O. A., (2009). Empirical Analysis of Credit Supply and Agricultural Output in Nigeria. Development of Economic, Kogi State University, Nigeria.

CBN (2010). Annual Report and Statements of Accounts.

CBN (2017). Annual Report and Statements of Accounts.

Ekine, D. I., & Onu, C. (2018). The Impact of Agricultural Output on Economic Growth in Nigeria. IOSR Journal of Economics and Finance 9(4) 10-14.

Enilolobo, O. S, Mustapha, S.A. & Ikechukwu, O. P. (2019).Nexus between Agriculture and Unemployment in Nigeria.Journal of Economics, Management and Trade 22(5) 1-13

Ewetan, O., Fakile, A., Urchie, E., & Oduntan, E,.(2017). Agricultural Output and Economic Growth in Nigeria. Journal of African Research in Business and Technology. 2017. P11

ILO, http://www.ilo.org/public/english/bureau/stat/res/index/html

Jhingan, M.L. (2010). Macroeconomics Theory 12th Edition in Vrinda Publication (p) Ltd, Delhi

Kamil, S., Sevin, U. & Bekun, F. V. (2017). The Contribution of Agricultural Sector on Economic Growth of Nigeria. International Journal of Economics and Financial. 7(1) 547-552.

Kenil, A. O., (2019). Reduction of Unemployment in Nigeria Through Agricultural, (A Case Study of FCT Poultry Farming) 6(2) 139-141.

NISER (2000) Nigeria Institute of Social and Economic Research, Review Development.
Ogbanga, A. (2018). Agricultural Development and Employment Generation in Nigeria International Journal of Advanced Studies in Ecology, Development and Sustainability. 5(1) 1-22
Oguwuike, W.T., (2018). Effect of Agricultural Output on Economic Growth in Nigeria. International Journal of Advanced Studies in Ecology, Development and Sustainability. 5(1) 39-53.
Pesarau, M.H., Shin, Y., & Smith, R.J. (2001).Bounds Testing Approach to the Analysis of Level Relationship Journals of Applied Economics.16 (3) 289-326.
Pigou, A.C. (1933). The Theory of Unemployment, London, Macmillan.
Solow, R.M (1981). "E.Malinvaud: Profitability and Unemployment; Book Review" Journal of Economic Literature (19) 572-573.
Tombofa, S. S. (2004). Development Economics: An Introduction Port-Harcourt. Pearl Publishers.