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Agricultural Financing and Unemployment Rate in Nigeria: A Cointegration Approach

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Abstract. In Nigeria, the level of agricultural productivity and farmers' income have been affected by inadequate financing, which invariably discourages job creation and increases unemployment rate. Therefore, the study examines the impact of agricultural financing on unemployment rate in Nigeria, using time series data collected from the Central Bank of Nigeria (CBN) and the World Bank database from 1981 to 2018. Using Johansen's cointegration, Error Correction Method (ECM), and Granger causality analytical techniques, our findings show that AGRIC_GDP, AGRICL_TL, GR, LR, and RUTP have a long-run relationship with UNEMPR and are statistically significant. Also, the ECM of about 57%, which is statistically significant, provides an indication of a satisfactory speed of adjustment and translates that about 57 percent of the errors are corrected in each period. The study recommends among others that government policy on agricultural credit should place more emphasis on strengthening banks' commitment.

Keywords: agricultural financing, agricultural production, financial markets, growth rate, unemployment rate
JEL Classification: E24, E44, G00, G20, O40, Q14

1. Introduction

Unemployment as a macroeconomic and social phenomenon occurs due to the inability of eligible workforce to get appropriate jobs. Imoisi, Amba, and Okon (2017) explained that the unemployment rate as one of the fundamental measures of economic growth and development has become a crucial issue in both developing and developed economies. Okun (1962) further explained that, theoretically, there is an inverse relationship between unemployment rate and economic growth. Raifiu (2017) observed that in Nigeria in the last few decades there had been tremendous growth in the economy, most especially with regard to the nation's gross domestic product and export trade performance. Despite these achievements, the nation

is still confronting many socioeconomic problems of which unemployment is a critical one.

Retrenchment in the banking sector, civil service retrenchment, and the fall in the output of companies have significantly added to the unemployment rate in Nigeria. These are also coupled with the fact that large-scale employment creation has not occurred in spite of the non-oil sector's impressive rate of over 7% since 2002 (Billetoft, Powell, and Treichel, 2008). As a result, there is a wide gap between job creation and population growth and, by implication, labour force.

Basically, higher productivity in agriculture is required to boost the growth and the subsequent development and sustainability of most developing countries. This becomes manifest by its effect on the growth of an economy through different channels such as employment potentials, export and financial impacts (Kareem et al., 2013; Kareem, Bakare, Ademoyewa, Ologunla, and Arije, 2015). In Nigeria, the agricultural sector occupied a prominent position in the national economy before the discovery of oil in commercial quantity contributing significantly to the overall performance of economy (Ayinde, Muchie, and Olatunji, 2011).

Despite the advent of oil exploration in large quantities which serves as the major source of foreign exchange earnings in Nigeria, agriculture still plays an important role in the job creation for the large adult population and also, improves the standard of living (Yusuf and Omonona, 2002; Olatunji, Omotesho, Ayinde, and Adewumi, 2012). Due to the importance of the agricultural sector to the economic growth of any nation, an adequate funding is required in this sector.

The Department for International Development (DID, 2005) observed that for the proper development of the agricultural sector there is a need to provide basic financial services, in the form of saving accounts, loans, and insurance: health, life, credit insurance products and leasing. Further, Aliero, Ibrahim, and Shuaibu (2012) attributed high unemployment rate in Nigeria to the lack of accessibility to financial services, especially in rural areas where agriculture is predominant. As the main agents of agricultural financing, the role of banks is evident in funding licensed buying agents, funding projects by corporate bodies, co-operative societies as well as groups of farmers (Ojiegbe and Duruechi, 2015).

Also, Olagunju and Adeyemo (2008) observed that agricultural financing is crucial in terms of procurements of agricultural input and the clearing of farmlands with a view to plantation, which may boost agricultural productivity and employment in the sector. But in Nigeria agricultural financing has been identified as a major deterrent to economic growth despite the fact that the country is favoured by nature with rich soil, warm temperature, and favourable well-distributed rainfall, which support agricultural production. This is the joint result of the absence of the government's agricultural credit policy and the inability of financial institutions to offer support to the farmers. Therefore, the effective productivity of farmers can only be achieved through the provision of adequate financial assistance.

In an attempt to address these challenges facing the sector, successive governments have formulated, introduced, and implemented numerous programmes and policies so as to make production in agriculture meet the consumption needs of the population. Despite these, the majority of rural farmers do not have access to credit facilities from financial institutions due to the following reasons: lack of collateral, non-cost effective, and high default rate (Jumare, 2006).

From the foregoing, it becomes necessary to carry out a study on this topic, because very few studies investigated the impact of agricultural financing on unemployment rate, and they only argue in favour of a trickle-down effect; however, the present study introduces three fundamental variables which were not included in the previous studies.

Subsequent parts of the study include section two that deals with literature review, section three on methodology, section four containing the analysis, and section five making conclusions and recommendations.

2. Review of Literature

Theoretically, agricultural financing reduces unemployment rate through many channels: for instance, the availability of finances to engage in mechanized farming increases real output, which in turn leads to increase in real income and employment. Also, it provides impetus for people to engage in agricultural production, which in turn serves as employment generation. Despite these, agricultural financial markets are locally monopolistic and full of asymmetric information in terms of high transaction (screening and monitoring) costs, but these attributes are not reflected by neoclassical models. Basically, some of the major reasons for market failure were attributed to stringent loan conditions, high interest rates, and taking control of borrowers' properties for loan repayment by lenders (Collender and Erickson, 1996). Further, Freshwater (1997) stated that local monopoly and asymmetric information between borrowers and lenders are closely connected to agricultural financial markets and can be used by the lenders (financial intermediaries) to review their agricultural loan during depressions. The endogenous growth model placed more emphasis on the importance of financial institutions and intermediation process due to their efficacy (Greenwood and Jovanovic, 1990; King and Levine, 1993; Pagano, 1993). Pagano asserts that a sound financial system development increases the amount of savings for investments as well as the efficiency of capital and determines the behaviour of savings rates. Also, the bank-based financial system's school of thoughts represented, e.g., by Allen and Gale (1999, 2003), Beck and Levine (2002), Ergungor (2004), or Levine (2005) provides in their various studies insights on how agricultural financing promotes rural economic development through employment generation among

others. Banks prefer to lend on long-term basis to co-borrowers (groups of farmers) with large stakes and not frequently changing ownership because they can be closely monitored – the attributes of typical agricultural producers. The assumption is that bank-based financial systems encourage agricultural financing, which may likely promotes growth through employment generation.

The relegation of agriculture to the background since the advent of crude oil exploration has deprived Nigerian farmers' access to financing facilities, which may boost their agriculture production that enhances self-employment. According to Olajide, Akinlabi, and Tijani (2012), in Nigeria, the agricultural sector that is critical for both the overall economic growth and the reduction of poverty accounts for the dominant share of GDP and employment. For the last four decades, this sector's performance has not been particularly robust due to various factors, particularly financing.

Accordingly, Asoluka and Okezie (2011) identified the rising trend in unemployment rate as one of the greatest problems facing the nation. Fadayomi (1992) and Osinubi and Olaleru (2006) stated that with vast human resources in Nigeria unemployment still persists due to underdevelopment and the underutilization of manpower resources, most especially in the rural areas which have adverse effects on the economy (Adebayo, 1999; Egbuna, 2001; Alanana, 2003; Okonkwo, 2005; Galadima, 2014).

Feyisetan (1991) defined labour force as a group of individuals that are ready and have made themselves available for gainful employment, while unemployed people are those who do not have any jobs at a particular time. Unemployment rate is the percentage of employable individuals in a country's workforce above 16 years of age who have no job or have been unable to find employment recently but are actively searching for work (Eze and Nwambeke, 2015). To put it briefly, unemployment is a measure within the purview of labour force.

Unemployment, which is one of the fundamental development challenges facing Nigeria at the moment, is a major cause of economic instability in many countries. Studying unemployment in Africa, Okonkwo (2005) observed three causes underlying it, including the educational system, the trends in labour market, and the development of skills (Billetoft, Powell, and Treichel, 2008).

The performance of agricultural sector in terms of agricultural output and its contribution to the overall economy requires the availability of finances and credit facilities (Aiyeomoni and Aladejana, 2016). The availability of financial resources may induce farmers to increase their agricultural output, which in turns contributes to the aggregate economy, even though some microfinance banks are offering financial services to rural people; however, most of the loans granted are not benefited by many farmers.

Typically, the absence of a sound credit policy and the low number of existing credit institutions have significantly and adversely affected the performance of

the agricultural sector and subsequently its contribution to the overall economy (Olagunju and Ajiboye, 2010). Agricultural financing, as according to Aladejana and Aiyeomoni (2016), is defined as how financial resources can effectively be utilized in order to increase the agricultural productive capacity. Dromel, Kolakez, and Lehmann (2010) argued further that agricultural financing has the potential to reduce unemployment and significantly ameliorate its persistence. In the same vein, Aliero and Ibrahim (2012) opined that easy accessibility to financial services, especially agricultural financing, has the tendency to reduce unemployment rate.

Arising from the perceived role of agricultural development in the economic performance of a nation, numerous studies have been conducted to examine the effect of the agricultural sector on economic growth. However, recent studies have concentrated much effort on trade openness and unemployment (Dutt, Mitra, and Ranjan, 2009; Felbermayr, Prat, and Schmerer, 2011; Kim, Chavas, Barham, and Foltz, 2012; Nwaka, Kalu, and Gulcay, 2015; Rafiu, 2017; Mohler, Weder, and Wyss, 2018), while studies on the effect of macroeconomic variables on unemployment were conducted by Magbool, Mahmoo, Sadttar, and Bhalli (2013), Oniore, Bernard, and Gyang (2015), and Nwachukwu (2017). Studies on agricultural credit and the economic growth nexus were carried out by Enoma (2010) and Ayeomoni and Aladejana (2016), while on determinants of loan demand and repayment policy among rural farmers were conducted by Bamisele (2006), Awoke (2004), Rhaji (2008), Bassey, Attaret, Nkeme, and Udoh (2014). As for agricultural growth rate and unemployment, Ayinde, Aina, and Babarinde's (2017) study showed an inverse relationship between agricultural growth rate and unemployment. Also, Enilolobo, Mustapha, and Ikechukwu (2019) found that changes in agricultural growth were causing unemployment during the period of their study. However, to the best of our knowledge, empirical evidence of how agricultural financing affects unemployment rate is not available in Nigeria. Given the facts that the studies which have examined the effect of agricultural financing on unemployment rate are few, it becomes imperative to investigate the relationship between agricultural financing and unemployment rate both in the short and the long run. Thus, the effect of agricultural financing on unemployment rate in Nigeria was examined.

3. Methodology

The data collected from CBN and the World Bank data base from 1981 to 2018 were subjected to Johansen's cointegration, ECM, and Granger causality tests. The variables of the study comprised of unemployment rate (UNEMPR), agricultural loan to total loan ratio (AGRICL_TL), rural population to total population ratio (RUTP), GDP growth rate (GR), agriculture to GDP ratio (AGRIC_GDP), and lending rate (LR). In line with the theoretical framework in this study, we follow Solow's

(1956) growth model, which centred on the neo-classical aggregate production function given as:

$$Y = A^{u}K^{\alpha} L^{1-\alpha}, \quad (1)$$

where: Y is the Gross Domestic Product, K is the stock of physical and human capital, L is labour, $1^{-\alpha}$ is the technology, A is the constant reflecting the initial static endowment of capability, and u is the technological change. The mechanism of increasing agricultural output occurs as a result of the capabilities of technology introduced because the quantity of the output depends on a given level of input. This is possible through the availability of finances to engage in mechanized farming, which increases real output, which in turn leads to increase in real income and employment.

Model Specification

The adopted production function model can be rewritten and specified in line with the major variables of the study as follows:

$$UNEMPR = f(AGRICL\_GDP, GDP) \quad (2)$$

The study model is based on the notion that agricultural financing has significant influence on unemployment rate in Nigeria. The formulated model is expanded and is based on the modified models of Ayeomoni and Aladejana (2016) and Ayinde, Aina, and Babarinde (2017). We included rural population to total population ratio (RUTP), GDP growth rate (GR), agricultural loan to GDP ratio (AGRICL_GDP), agriculture to GDP ratio AGRIC_GDP, and lending rate (LR), which were not included in their models.

Thus, the model is stated as follows:

$$UNEMPR = f(AGRICL\_TL, RUTP, GR, AGRIC\_GDP, LR) \quad (3)$$

Estimating Technique

The cointegration and error correction estimating techniques used in this study are based on Engle and Granger's methods:

$$X_t = \mu + \theta_{(t-\frac{T}{2})} + aX_{t-1} + E_t, \quad (4)$$

where X_t is time series, the null hypothesis: $a = 1$ and $\theta = 0$, and the T is the number of observations. The augmented Dickey–Fuller (*ADF*) test is used to determine stationarity of the data by applying the OLS method to estimate the coefficients as follows:

$$\Delta X_t = \mu + \theta_t + X_{t-1} + \sum_1^n \lambda_1 \Delta X_{t-1} + \mu_t \tag{5}$$

n is used to remove the autocorrelation problems. If a unit root exists, then $y = a - 1$ would be statistically different from zero. To conduct the test, t-value can be compared on the coefficient of X_{t-1} with critical values. The Granger representation indicates that if X_t and λ_t are integrated, their error correlation is as follows:

$$a(L)\Delta\gamma_i = a_0 - \lambda(y_t - a_i X_t) + b(L)\Delta\lambda_t + c(L)E_t \ , \tag{6}$$

where $a(L)$, $b(L)$, *and* $c(L)$ are stable and invertible polynomials. The models are suitable for the presentation and modelling of cointegrating series. The ECM combines both the short- and long-run ($y_t - aX_t$) dynamics. The second step of Engle and Granger's method is stated as:

$$\Delta y_t = a + \sum a^{\tau} \Delta y^{\tau}_{t-1} + \sum \beta_j \Delta X_{t-1} + bEC_{t-1} \ , \tag{7}$$

where a denotes the first difference and *EC* represents the error term. Therefore, equation (3) can be rewritten as:

$$lnUNEMPR = a + a_1 lnAGRICL\_TL + a_2 lnGR + a_3 lnAAAGRIC\_GDP + a_4 lnLR + a_5 lnRUTP + \lambda e_{t-1} + \varepsilon_t \tag{8}$$

4. Analyses

(i) Descriptive Statistics

In *Table* 1 below, all variables are normally distributed, except GR, which is statistically significant. AGRIC_GDP is the most normally distributed among the variables. For each of the variables, except GR, the standard deviation is lower compared to their mean. This explains a small coefficient of variation for all the variables, except GR with a large coefficient of variation. The range of variation between the maximum and minimum values for all the variables is too large.

Table 1. *Descriptive statistics*

	UNEMPR	AGRIC_GDP	AGRICL_TL	GR	LR	RUTP
Mean	10.38378	30.79649	8.340541	3.455405	45.07432	64.57405
Median	7.000000	32.27000	7.200000	3.800000	44.30000	65.70000
Maximum	27.40000	47.10000	19.60000	33.70000	65.10000	77.33000
Minimum	1.800000	19.99000	1.400000	-13.10000	28.30000	50.48000
Std. Dev.	7.807493	6.525056	5.471617	7.516888	9.831381	7.829776
Skewness	0.766157	0.026547	0.495517	1.250771	0.273956	-0.175393
Kurtosis	2.391711	2.648648	1.945404	8.905664	2.599435	1.935706
Jarque–Bera	4.190249	0.194661	3.228746	63.41580	0.710185	1.935982
Probability	0.123055	0.907256	0.199015	0.000000	0.701108	0.379845

Source: the author's computation, 2018

(ii) Correlation Results

Results in *Table* 2 below indicate that the association between all variables except GR and UNEMPR is negative. This implies that an increase in AGRIC_GDP, AGRICL_TL, GR, and LR decreases unemployment rate (UNEMPR) in Nigeria, while an increase in GR increases UNEMPR, which in turn implies that growth rate in Nigeria does not reduce unemployment rate and is not in line with theoretical postulations. In addition, there is absence of multicollinearity among the predictor variables.

Table 2. *Correlation matrix results*

	UNEMPR	AGRIC_ GDP	AGRICL_ TL	GR	LR	RUTP
UNEMPR	1.000000	-				
AGRIC_GDP	-0.481830	1.000000				
AGRICL_TL	-0.727740	0.265979	1.000000			
GR	0.289743	0.051280	-0.207688	1.000000		
LR	-0.067000	0.398992	-0.040294	0.174248	1.000000	
RUTP	-0.782877	0.529872	0.678675	-0.348638	0.275310	1.000000

Source: the author's computation, 2018

(iii) Unit Root Test

The unit root test in *Table 3* below shows that all variables are stationary at first difference integration, that is, of order I(1). Their probability values are less than 0.05 critical values at 5%, which indicates that these variables are significant and there is need to reject the null hypothesis. Therefore, Johansen's cointegration regression method of analysis is suitable for the study.

Table 3. *ADF Unit Root Test*

Variables	ADF Statistical Values	Order of Integration
UNEMPR	-6.6355*	I(1)
AGRIC_GDP	-6,5534*	I(1)
AGRICL_TL	-6.4294*	I(1)
GR	-8.8891*	I(1)
LR	-6.3801*	I(1)
RUTP	-6.4395*	I(1)

Source: the author's computation, 2018

*Note: *, **, *** denote the level of significance at 1%, 5%, and 10% respectively.*

(iv)a. Johansen's Cointegration Test

The cointegration test proved three and one cointegration equation(s) for Trace and Max.-Eigen statistics, respectively, at the significance level of 5%. Since the critical values of Trace and Max-Eigen are lower than statistical values, there is a long-run relationship between UNEMPR and other independent variables. So, the null hypothesis of no long-run relationship is rejected.

Table 4a. *Trace Unrestricted Cointegration Rank Test*

Hypothesized No. of Cointegration Equation	Eigen Value	Trace Statistic	Critical Value at 5%	Prob.**
None*	0.747894	125.3061	95.75366	0.0001
At most 1*	0.527929	77.07930	69.81889	0.0117
At most 2*	0.459169	50.80742	47.85613	0.0257

Note: the trace test indicates 3 cointegrating equations at the 0.05 level

Table 4b. *Maximum Eigenvalue Unrestricted Cointegration Rank Test*

Hypothesized No. of Cointegration Equation	Eigen Value	Trace Statistic	Critical Value at 5%	Prob.**
None*	0.747894	125.3061	95.75366	0.0001

Source: the author's computation, 2018

Note: the Max.-eigenvalue test indicates 1 cointegrating equation at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
** MacKinnon–Haug–Michelis (1999) p-values

(iv)b. Normalized Cointegration Test

Results in *Table 4c* show that 1% increase in AGRIC_GDP, AGRICL_TL, and LR reduced employment rate by 12.66%, 9.45%, and 1.26% respectively, while 1% increase in GR and RUTP increased the UNEMPR by 13.19% and 14.24% respectively. The implication of these results is that AGRIC_GDP, AGRICL_TL, and LR have correct signs in line with theoretical postulations, that is, they exhibited negative relationship with the UNEMPR. This shows that there is an inverse relationship between AGRIC_GDP, AGRICL_TL, LR, and UNEMPR. Also, the positive relationship between GR, RUTP, and UNEMPR makes it evident that growth rate and rural population increased unemployment rate in Nigeria.

Table 4c. *Normalized Cointegration Test*

UNEMPR	AGRIC_GDP	AGRICL_TL	GR	LR	RUTP
1.000000	-12.66160	-9.448969	13.18785	-1.257716	14.24189
	(1.91808)	(2.57332)	(1.89144)	(1.18965)	(2.28638)

Source: the author's computation, 2018

Note: normalized cointegrating coefficients (standard error in parentheses)

(v) ECM Test

The ECM of about -0.57 in *Table 5* below implies that the speed of adjustment of about 57% is corrected from its short-run and incorporated into the long-run equilibrium. It shows that about 57 per cent of the errors are corrected in each period.

Table 5. *ECM results*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.569346	0.164652	3.457868	0.0017

Source: the author's computation, 2018

(vi) Pairwise Granger Causality Test

The pairwise granger causality results show that unidirectional causality exists between AGRICL_TL and UNEMPR, UNEMPR and RUTP, AGRICL_TL and RUTP, and, since the probability values of the variables are lesser than 0.05 critical values, there is need to reject the null hypotheses.

Table 6. *Pairwise Granger Causality Tests*

Lag 2			
Null Hypothesis:	Obs.	F-Statistic	Prob.
AGRICL_TL does not Granger Cause UNEMPR	35	3.65159	0.0381
UNEMPR does not Granger Cause RUTP	35	3.59113	0.0400
AGRICL_TL does not Granger Cause RUTP	35	4.02765	0.0282

Source: the author's computation, 2018

5. Conclusions and Recommendations

(i) Conclusions

The study investigates the effect of agricultural financing on unemployment rate in Nigeria using Johansen's cointegration statistical method to analyse the data. Study results indicate the existence of long-run relationship between agricultural financing and unemployment rate in Nigeria. Furthermore, the results show that 1% increase in AGRIC_GDP, AGRICL_TL, and LR reduces employment rate by 12.66%, 9.45%, and 1.26% respectively, while 1% increase in GR and RUTP increases the UNEMPR by 13.19% and 14.24% respectively. The study concluded that the rate at which agricultural financing and agriculture to GDP ratio reduced unemployment rate in Nigeria is very high. This informed the study to suggest that these agricultural financing indicators should be incorporated into the formulation of the government's strategic policies aimed at boosting agricultural output, which will invariably reduce unemployment rate in Nigeria. Also, the government should ensure that the agricultural sector's development policies are consistent with the objective of reducing unemployment in Nigeria.

(ii) Recommendations

Based on the findings of this study, the following policies are recommended:

– The assistance of government, development, and financial institutions is required in the provision of adequate agricultural financing, promoting farm cooperatives, and the training of farmers in the application of new technologies.

– Rural developments and agricultural support strategies that will create more jobs in rural areas need to be put in place in order to reduce unemployment rate in Nigeria.

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