THE MACROECONOMIC EFFECT OF ACCESS TO CREDIT AND POPULATION GROWTH ON THE NIGERIAN AGRICULTURAL PRODUCTIVITY: AN EMPIRICAL STUDY OF 2000 TO 2021

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ABSTRACT: *The study investigates the macroeconomic impact of population growth and access to credit on the agricultural productivity Nigeria from 2000 to 2021 by employing OLS multiple regression analysis. The study ascertained the stationarity of the time series properties of the variables where Augmented Dickey-Fuller (ADF) was applied. The co-integration test result confirmed the presence of a long-run relationship among the variables, and the result of OLS multiple regression and stochastic production analysis showed a weak positive relationship between access to credit and agricultural productivity and also showed that population growth has a strong negative relationship with agricultural productivity in Nigeria. It was discovered that employment in agriculture decreases as population increases. The result also revealed that human capital and access growth to electricity have a strong positive impact on agricultural performance in Nigeria. The study therefore recommends not only an increase in the budgetary allocation to the agricultural sector but also the need to establish an efficient corrupt-free financial institutions to enhance easy access to credit by farmers and also improve the intellectual capacity of the populace through advanced technological trainings, as it will in turn lead to a higher achievement in the fight for food security and unemployment in Nigeria.*

KEYWORDS: *Agricultural Productivity, Access to Credit, Population Growth, Human Capital Growth, Inflation and Unemployment.*

INTRODUCTION

Agricultural productivity is one of the major determinants of the overall productivity and well-being of an economy globally. It is being identified as a means to end extreme poverty, boost food security, and feed a projected 9.7 billion people by 2050 (World Bank, 2023). Development in the agricultural sector is several times more effective in increasing incomes among the poorest compared to other sectors of the economy as their population increases. Population growth has been one of the major determinants of economic growth with respect to agriculture and other sectors in Nigeria, and with the rapid increase in Nigeria's population growth, agricultural production will tend to increase.

Agriculture, as the act of farming, including the tilling of soil for crop growth and animal rearing, necessitates the use of human resources, who manage the activities in the overall productivity both directly and indirectly. Thus, it contributes 4% and more than 25% of global GDP in poor developing nations, respectively (World Bank, 2023). As seen in Table 1 below, agricultural productivity contributed 24% of Nigeria's GDP on an average from 1990 to 2021, greater than the oil and industrial industries. This is enough to claim that agriculture is Nigeria's largest source of revenue. So, in order to meet the needs of a world population that is predicted to reach nine billion by 2050, agricultural production must increase.

Aside from food security, agriculture serves as a major source of raw materials for processing and manufacturing industries, which produce about 80% of all manufacturing industries' raw materials used in the production of finished goods in most economies globally (Janet R., Richard W., Tim S., & Craig H., 2018). It is also a known fact that the easiest means through which mankind can get out of poverty and into a condition of relative material affluence is by increasing agricultural productivity. Productivity improvements create wealth that can be used to meet the needs of the future.

Table 1: Descriptive Statistics of Variables

	CREDI2PRI	GDPCON	AGRICU	OILRENT	MAN_GDP
Mean	10.16841	4.28E+13	24.33193	12.79044	12.6727
Median	8.909485	3.88E+13	24.14331	13.86325	11.52236
Maximum	19.6256	7.21E+13	36.96508	26.41973	20.92708
Minimum	4.957522	2.17E+13	19.99025	2.803919	6.552817

Source: *Authors*

But productivity in the agricultural sector may not actually be booming without aid—either financial aid or subsidies. Especially in Nigeria, where agriculture is mostly practiced by small-scale farmers, most of them are located in rural areas, have average education, inadequate access to information and market value, and poor access to financial support. The unapproachability of farmers finances hampers agricultural productivity, and the persistently inadequate access to credit being encountered by farmers has severe consequences for household-level outcomes, including technology adoption, agricultural productivity, food security, health, and the overall well-being of farmers (Adewale, Lawal, Aberu, & Toriola, 2022).

Problem Statement

In spite of the contribution to the economy, Nigeria's agricultural sector suffers several issues that hamper productivity and these include weak land tenure system, inadequate irrigation scheme, climate change and degradation, technical know-how, up-rising production cost and skewed distribution of inputs. These problems have hampered agricultural productivity affecting the sector's contribution to the country's gross domestic product (United Nation, 2022). Nigeria, with a rising population which has enhanced agricultural growth, is importing foods from other countries. For example, Nigeria's cumulative agricultural imports stood at N3.35 trillion, four times higher than the agricultural export of N803 billion within the same period between 2016 and 2019.

Nigeria, for example, is Africa's largest fish consumer and one of the world's largest, consuming over 3.2 million metric tons of fish each year. Its fisheries and aquaculture industries are among the fastest developing in the country. With an 853-kilometer coastline and more than 14 million hectares of inland waters, total fish production each year is close to one million metric tons (313,231 metric tons from aquaculture and 759,828 metric tons from fisheries). Fishing is an important protein source for Nigerian households and a significant source of income for the disadvantaged. The aquaculture sub-sector is viewed as a very realistic option for satisfying the nation's need for self-sufficiency in fish production and nutritional needs (United Nations, 2022). With an expected 400 million people by 2050, increased agricultural production through the use of new technology and innovations is required to maintain food security and nutrition.

According to Iwu (2020), a total of N334.3 billion was spent on importations comprising mainly foodstuffs, beverages, tobacco, spirits, and alcohol between January and June 2019, representing a total increase of 47% over the preceding year, 2018. In order to boost agriculture productivity and ensure food security, successive governments in Nigeria embarked on different policies and programs aimed at accelerating productivity in the agriculture sector. These include Operation Feed the Nation of 1976–1980 during the regime of General Olusegun Obasanjo, the Green Revolution of 1980 introduced by Alhaji Shehu Shagari, as well as the Directorate for Food, Road, and Rural Infrastructure in 1985–1986 during the Gen. Babangida administration (Aiyedogbon, O., Zhuravka, F., Korneyev, M., BanchukPetrosova, O., & Kravchenko, O. 2022). In addition, in 1986, the Structural Adjustment Programme (SAP) policy was introduced to ensure market-oriented policies in agricultural activities, thereby stirring increased private sector participation in food production and export.

According to Penda S. (2012), investing in people is critical to developing businesses in Nigeria so that a dynamic and entrepreneurial agricultural sector may thrive. Previous failures in significant private-sector initiatives in Nigeria have come from low-level investment in agriculture, business, human capital development, economic instability, and security. Collaboration among government policymakers, educational institutions, and private enterprise is required for the development of the agricultural sector and smallholder farmers.

According to the World Bank Report (2022), Nigeria ranks among the least or worst countries battling with human capital growth and the nation's ambitious poverty-reduction targets hinge on developing human capital. And agricultural productivity being an activity that requires improved technology to strive in view of feeding the nation as exportation is still being practiced traditionally in Nigeria,

Past failures in great private-sector projects in Nigeria came from low-level investment in human capital development in agricultural production, economic variability, and security. The development of the agricultural sector and smallholder farmers needs an alliance with government policymakers, educational institutions, and private industry (Penda, 2012).

Study Objectives

Specifically, the study is designed to achieve the following objectives in addition to the broad objective earlier stated:

(i)   To examine the effect of population growth as an input on agricultural productivity in Nigeria

(ii) To determine the impact of access to credit on agricultural productivity in Nigeria

(iii) To examine the impact of access to electricity on agricultural productivity in Nigeria

(iv) To examine the impact of human capital growth on agricultural performance in Nigeria.

Research Hypotheses

The study shall adopt statistical testing criteria to examine the genuineness of the following hypotheses:

Ho1: Population growth has no significant effect on agricultural output in Nigeria

Ho2: Access to credit has no significant impact on agricultural productivity in Nigeria

Ho3: Access to electricity supply has no effect on agricultural productivity in Nigeria

Ho4: Human capital growth has a significant impact on agricultural output in Nigeria.

Justification for the study

The study is justified since it will make available proper comprehension on why Nigeria as a country is still importing most of the agricultural products and how Nigerian financial institutions should bridge the gap between farmers and access to credit amid population growth. Secondly, the study will provide insight into the true position of the Nigerian population and possible ways of using them more in production as well as consumption. It will serve as a guide to the government of Nigeria, especially the policymakers, because it will teach the fundamentals of policy making, formulating future policies, and planning for development. The paper will be a good tool for students since it will reveal some information for those interested in population trends in Nigeria.

The remaining parts of this work are structured as follows: theoretical and empirical review, data and methodology, empirical finding, and conclusion and policy recommendations of the study.

LITERATURE REVIEW

Theoretical Review

The Malthusian Theory

The theory revealed that the human population increases more rapidly than the supply of food until famines, war, or disease reduce the population. In 1798, Thomas Malthus notably foretold that short-term gains in standards of living would unavoidably be weakened as human population growth exceeded food supply. He believed that the world would begin a downward trend due to the growing population and inadequate food supply. In fact, he stated that if population growth is uncontrolled, it will lead to a depletion of resources, increased pollution, overcrowding, and increased unemployment. He was of the view that food is crucial to living and believed that human beings, like other living things, are compelled to increase their population by what he called the powerful instinct, the urge to reproduce. He claimed that population growth will exceed the food supply, and this inadequate food will in the end put a stop to the increase in population. According to him, the "preventive checks" would comprise all likely means of birth control, such as abstinence, contraception, and abortion. However, he believed that the only conventional means of checking a birth rate was to enact moral restraint: "that is, to postpone marriage, remaining chaste in the meantime, until a man feels secure that he should have" (Akintola, 2021).

Access to Credit and Agricultural Productivity Linkage

It is impossible to underestimate the relevance of credit facilities for agricultural productivity. Farmers, in fact, require both ex-ante and ex-post capital access. The former is required to finance large production costs such as labor and input resources, which must be paid in advance before output is realized. Similarly, after the manufacturing process is completed, or ex-post, capital access is crucial, especially when there is no insurance, as is frequently the case in low-income rural countries (Romanus, O., Anita, M. & Adeyemi, O., 2022).

Agricultural production is intensely seen where inputs are transformed into outputs with substantial time lags (Conning & Udry, 2005), putting pressure on the households budget constraints, which are usually small. Economic theory advocates that farmers faced with compulsory capital constraints would tend to make use of lower-level production techniques compared to those with fewer budget constraints (Freeman, H.A., Simeon, K.E., & Jabar, M.A., 1998). The implication of this is that access to credit could increase rural poor households' willingness to adopt new technologies that raise both mean levels and riskiness of income (Awotide et al., 2016).

More significantly, according to Freeman *et al.* (1998), farmers' access to finance is also very essential in the sense that it can smooth the levels of resource use closer to their probable levels, especially when capital is not a problem. According to Kashuliza A., Hella P., Magayane, F., and Mvena Z. (1998), the informal financial system refers to all transactions, loans, and deposits that take place outside the stipulated monetary arrangement, and this includes the activities of intercessors such as relatives and friends at the office or place of work, traders, and money lenders. Semi-formal institutions are described by Samuel, A. (2017) as institutions that are established to provide financial services.

The Federal Government of Nigeria (FGN) instituted credit organizations such as the Agricultural Credit Guarantee Scheme (ACGS) in 1977 and the Agricultural Credit Support Scheme (ACSS) to ensure farmers' access to agricultural credit. The ACGS fund was set up with the sole aim of providing assurance with respect to loans granted by any bank for agricultural purposes (Central Bank of Nigeria, 1990).

Population Growth and Agricultural Productivity Linkage

Agricultural productivity is measured as the ratio of agricultural outputs with respect to inputs, where single products are commonly measured by weight, usually known as yields. This productivity or output is literally some type of information about labor, land, and technical progress (Preckel, Paul V.; Hertel, Thomas W.; Arndt, Channing; & Nin, Alejandro, 2003). Productivity is usually driven by changes in either agricultural methods or technological patterns (Egli, D.B., 2008). Productivity in the agricultural sector may also be referred to as total factor productivity (TFP), which measures the ratio of agricultural inputs to growth of outputs. Agricultural productivity is now very crucial because, as the world population increases, food prices will tend to decrease, enabling people to spend less on food and combating hunger (Kumar, Alok, Al Mahmood Mosfeq, & Abdullah (2012).

Empirical Literature

According to John O., Sarah O., Grace, Yuriy P., and Olena Z. (2022), who used the Cochrane-Orcutt iterative method on an ordinary least squares (OLS) to study the impact of population growth on food security in Nigeria from 1986 to 2020, population growth had a significant effect on agricultural productivity. The report also demonstrated that economic growth in Nigeria is considerably and favorably responsive to changes in agricultural output and population growth rates. They also suggested that the government considers increasing budget allocations to agriculture in order to improve food security.

Adewale et al. (2022) examined the effect of farmers' credit on agricultural productivity from 1981 to 2016 using data from the World Bank Development Growth (WDI). The results of the Ordinary Least Squares (OLS) regression show that agricultural bank credit has a significant positive impact on agricultural output. They also show that lending rates and foreign exchange rates do not have a significant effect on agricultural output and advocate the basics of government provision of savings and bank credit to farmers.

Ojiya E., Okoh S., Mamman A., and Chukwuemeka N. (2017) found a negative association between government spending and agricultural output using empirical OLS regression. Furthermore, we urge that the Nigerian government adopts policies capable of assisting existing banks in making credit facilities freely accessible to farmers while maintaining effective control and oversight.

Akintola A. T. (2021), who studied the impact of population growth on the Nigerian economy using Descriptive statistics, the ordinary least squares, and augmented Dickey-Fuller (ADF) stationarity test combined with Granger Causality, the error correction model, and co-integration tests. The result showed that there is a positive association between economic growth, population growth, and food production and recommended that the population growth rate of Nigeria be sustained.

Awotide, Abdoulaye T., Alene, and Manyong M. (2016), examined the impact of access to credit on agricultural productivity in Nigeria using the Endogenous Switching Regression Model (ESRM). The first and second stages of the ESRM show that total livestock units and farm size are positive and negative, respectively, and are statistically significant. This explains the discrepancies in cassava productivity among the farmers that have access to credit.

Romanus O., Anita M., and Adeyemi O. (2020) examined how agricultural sector performance will be enhanced in Nigeria through access to credit using Autoregressive Distribution Lag (ARDL) and showed that agricultural credit and commercial bank credit to agriculture significantly increased agricultural performance. They recommend that farmers should be provided with satisfactory access to finance, which will enhance their ability and willingness to acquire some inputs required to increase output.

Efuntade O. and Efuntade A. (2020), who investigated the effect of population growth on the economic growth of Nigeria over the period of 1994 to 2019, used the co-integration and vector error correction model to analyze the variables. And discovered that mortality rate has a significant negative effect on GDP in Nigeria.

Literature Gap

Agricultural productivity is hereby defined as the ratio of agricultural outputs to inputs. So inputs enhancement increases the yield at any given time. Some inputs like labor, land, and technological progress literally influence productivity or output. Several studies, like those by Akintola A. (2021) and John O. et al. (2022), focused on the impact of population on either food security or economic growth in Nigeria. However, in order to achieve higher productivity, the study will try to examine how best to use population growth as an input in agricultural production or process alongside other covariates like direct access to credit, access to electricity and interest rate. Finally, most of the previous works noticed that employment in agriculture has a reverse relationship as the population and year increases.

DATA AND MATERIALS

The data, which is an annual secondary dataset of Nigeria for the period of 22 years from 2000 to 2021, is used in this analysis and was sourced from the World Bank's World Development Indicators (WDI), CBN Bulletin.

Model Specification

The study adopts a version of the stochastic production frontier theory in its analysis of efficiency of population growth, in line with the objectives of the study. Assuming a production function of the form $q_i = f(X_i, \theta)$, in the absence of error or inefficiency, the output produced will be:

$$q_t = f(X_t, \theta) \quad . \qquad . \qquad . \qquad (3.1)$$

where q_i is the output and X_i is the set of inputs. The stochastic production frontier analysis assumes that the potential productivity is less than it should due to some degree of inefficiency. In specific terms:

$$q_t = f(X_t, \theta)\mathfrak{z}. \qquad . \qquad . \qquad (3.2)$$

In this study, we consider the Cobb–Douglas function:

$$Y = AK^{\alpha}L^{\beta} \qquad . \qquad . \qquad . \qquad (3.3)$$

where

Y = Output growth, measure for agricultural productivity

K = Capital stock, which is captured by the direct access to credit

L = Population growth

A = Human capital growth.

The objectives are to examine the effect of direct access to credits and population growth on the agricultural productivity or output, that is, to see how efficient or inefficient they are to the agricultural sector since it is seen as one of the major sources of revenue to the Nigerian government. The functional form of the model for objectives one is:

$$Agric\_GDP = g(Hum, Popgrt, Dpricr, Accessel). \qquad . \qquad . \qquad (3.4)$$

where

Agric_GDP = Agricultural output as percentage of GDP

Accessel= Access to electricity (percentage of the population)

Popgrt = Population growth rate

Dpricr = Direct Access to credit as percentage of GDP

Hum = Human capital growth

The econometric specification of equation (3.4) is written below as:

$$Agric_{GDP} = a_0 + a_1 Hum + a_2 Dpricr + a_3 Popgrt + a_4 Accessel + e_t .$$

Definition of Variables

From the economic model in equation (3.5), agricultural productivity as a percentage of Nigerian GDP depends on direct credit in the private sector as a percentage of GDP, population growth, and innovation proxied by human capital growth (Hum). It is also expected that the connection between credit facilities and agricultural productivity will be positive. This is because an increase in credit facilities would also increase the amount of capital available to farmers, which would enable them to improve their level of productivity. Population growth is also expected to be the fulcrum of agricultural productivity since it is a sector that requires adequate human resources and the medium through which facilities are expended. Finally, innovation or technical progress measured by Hum is expected to enhance agricultural productivity by augmenting existing components of production.

The Estimation Techniques

The techniques of estimation employed in this study are the Cobb-Douglas and Ordinary Least Square methods and Johannsen co-integration estimation. This is suitable for time series data to avoid the problem of spurious misleading inferences and spurious results, as time series data are often categorized as mean and time-invariant (Aghabozorgi, Shirkhorshidi, & Wah, 2015). Co-integration helps to solve the problem of spuriousness and also helps in predicting long-run relationships between variables.

The unit root test is also used to determine the trend of the model's variables. In order to distinguish between stationary and non-stationary variables, the unit root is used. The augmented Dickey-Fuller was used for the unit root test. This was done to determine the nature of the variable trend before completing the analysis and to avoid erroneous estimations. This is required because a biased outcome will have an impact on policy recommendations.

RESULTS AND FINDINGS

This segment of the study shows the results obtained from the econometric explorations and it will be presenting the summary statistics of the variables as shown in Table 2 below.

The statistical properties of the variables are highlighted here. The emphasis here is on the mean, standard deviation, Jarque-Bera and its probability statistics for the variables involved in this study. The result showed that the mean of the variables Agric_gdp, Accessel, Dcpri, Hum and Popgrt are all positive. In the case of their skewness, all the variables are positively skewed. Hence, the variables are not standardized normal variables because they violated the properties of a standardized normal distribution.

Here, one can actually see that the Nigerian economy needs intervention, where only 24% of the entire population has access to electricity, which is a factor that determines agricultural productivity as well as its value added. From Table 2 below, it shows that the portion of the Nigerian GDP meant for access to credit for farmers and other private sectors was 10% on average from 1990 to 2021. Again, agricultural output has been one of the sources of GDP for the Nigerian government, contributing at least 24% and 37% at maximum.

Table 2: Descriptive Statistics

	Agric_gdp	Accessel	Dcpri_	Hum	Popgrt
Mean	24.33821	24.02574	10.103	4.54636	2.57602
Median	24.18453	23.93499	8.68558	4.82356	2.57209
Maximum	36.96508	33.97046	19.6256	15.3292	2.68093
Minimum	19.99025	14.25291	4.95752	-2.0351	2.48879
Std. Dev.	3.891879	5.704862	3.58798	3.98662	0.06979
Skewness	1.497144	0.080673	0.95805	0.43011	0.15931
Kurtosis	5.54028	2.129528	3.5476	3.31336	1.52148
Jarque-Bera	19.27347	0.979692	4.96415	1.04771	2.85941
Probability	0.000065	0.612721	0.08357	0.59223	0.23938
Observations	30	30	30	30	30

Source: *Authors*

Table 3: The Stationarity Test Result (ADF & PP)

Variables	ADF (Trend & Intercept)			PP (Trend & Intercept)		
	T-Stat	Critical Value	Order of Integration	T-Stat	Critical Value	Order of Integration
Agric_GDP	-6.368413*	-3.679322 -2.967767 -2.622999	I(1)	-6.2865*	-3.689194 -2.971853 -2.725121	I(1)
POPGRT	-4.4616**	-2.610012 -2.261600 -2.04533	I(1)	-4.2904*	-2.689194 -2.371853 -2.125121	I(1)
DCPRI_	-4.923969**	-3.689194 -2.971853 -2.62517	I(1)	-8.9736*	-4.999871 -3.276263 -2.927420	I(1)
ACCESSEL	-7.543362*	-3.689194 -2.971853 -2.625121	I(1)	-5.3267*	-3.689184 -2.971753 -2.625221	I(1)
HUM	-9.03192**	-3.689194 2.971853 2.625121	I(1)	-3.5518**	-3.689194 2.971853 2.625121	I(1)

*(**) denotes significance at 1% and 5% level.

Source: *Authors*

According to the results of the stationarity test in Table 3 utilizing the Augmented Dickey Fuller test for stationary, all four variables were not stationary at level but became stationary at first difference. The result from Phillip-Perron gave similar results, with four variables becoming stationary at the first difference at either the 1% or the 5% critical value. Moreover, Table 4 below shows that variables in the model will co-move in the future.

Table 4: Johanssen Co-integration Result

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.832562	116.8345	47.85613	0.0000
At most 1 *	0.694881	63.22021	29.79707	0.0001
At most 2 *	0.435321	27.60863	15.49471	0.0005
At most 3	0.294459	7.46371	11.84147	0.6012

Trace test indicates 2 co-integration equations

Source: *Authors*

Table 5: OLS Regression Result

| Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACCESSEL	0.23499	0.115174	2.040301	0.052
POPGRT	-53.3115	11.45197	-4.65522	0.0001
DCPRI_	0.29099	0.207439	1.402773	0.173
HUM	0.587865	0.130417	4.50757	0.0001
C	150.4113	27.25171	5.519334	0.0000
R-squared	0.69124			
F-statistic	9.040152	Durbin-Watson stat		1.484211
Prob(F-stat)	0.000117			

Source: Authors

DISCUSSIONS

The Coefficient of Determination value of 0.691062 indicates that about 69% of the variation in agricultural productivity (Agric_GDP) is explained by changes in the explanatory variables, meaning that only 31% of the Agric_GDP is left unexplained. Similarly, the F-statistic value is 9.04015, accompanied by a probability value of 0.000117, showing that the overall model and regression are well specified and significant. And Durbin Watson's result of 1.4842211 shows that the model is not suffering from serial autocorrelation as seen in Table 5 above.

From Table 5 above, most of the independent variables, such as direct access to credit (DCPRI), access to electricity (ACCESSEL), and gross domestic product growth (GDPGRT) have the expected positive sign and significant ex, but population growth appears otherwise. Access to electricity (ACCESSEL), though slightly insignificant, shows that the availability of power or electricity to farmers will enhance productivity, just that very few of the Nigerian population have access to electricity supply. Availability of power is a fulcrum of development, advancement and production especially in the agricultural production process. Again, direct access to credit facilities has a positive impact on agricultural productivity though insignificant in this study, which may be as a result of poor budgetary allocation funds as seen in Table 2 above where the government of Nigeria allocated as low as 5% of her GDP to farmers and private sectors. In fact, very many reasons could lead to this positive insignificant result but centered on insensitivity and corruption. Corruption in the agricultural sector is an impediment which when fought and eliminated will make agriculture demand driven in Nigeria (Godson-Ibeji, C. C., Ogueri, E. I., & Chikaire, 2016).

In addition, one of the findings from the above Table 5 depicts that population growth has a negative impact on the agricultural productivity in Nigeria within the years of study. The result is against the positive apriori expectation that an increase in population growth is expected to enhance productivity in the agricultural sector, that a 1% increase in population leads to a 53% decline in agricultural productivity in Nigeria. This could be so because upon population increase, the percentage of it that is employed in the agricultural sector decreases at a decreasing rate as seen in Figure 1 below. Put simply, employment in the agricultural sector started reducing from 1996 till date. A country that is meant to be exporting foods and other agricultural produce is heavily importing virtually consumable foods. For instance, from 2020

to 2021, over 1.2 trillion Nigerian naira (NGN) worth of consumable goods and 808.7 billion NGN worth of on-durable goods were brought into Nigeria just to meet up with an uncontrollably rising population (Doris, D. S., 2022).
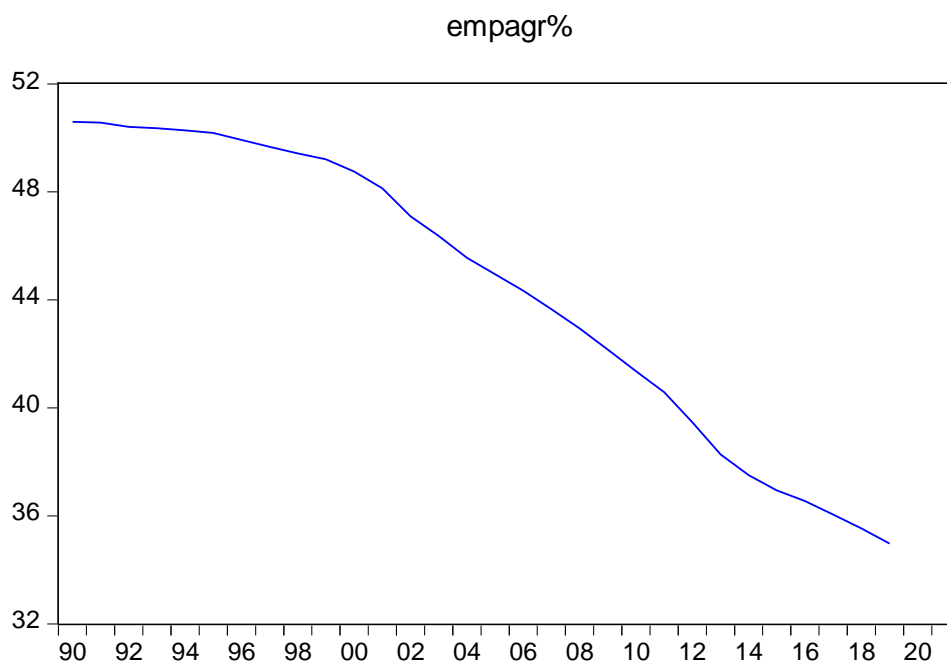
Figure 1: Agricultural Employment as the Percentage of Total Employment

Source: *Authors*

From the outcome of the regression result in Table 5 above, there exists a positive relationship between human capital growth (Hum) and agricultural productivity which confirms with the apriori expectation. From the result, it shows that a 1% increase in GDP growth will cause agricultural productivity to rise by 58% in Nigeria. This outcome is similar to the findings of Penda S. (2012), who argued that developing human resources is vital and key to national building through enhancing agricultural productivity.

Some Diagnostic Tests

Some diagnostic tests were carried out to check the robustness of the model outcome like serial correlation and stability. From Table 6, it was deduced that the model outcome is not suffering from autocorrelation as the F-statistic is not significantly different from zero, and Figure 2 reveals that the model is stable and well specified.
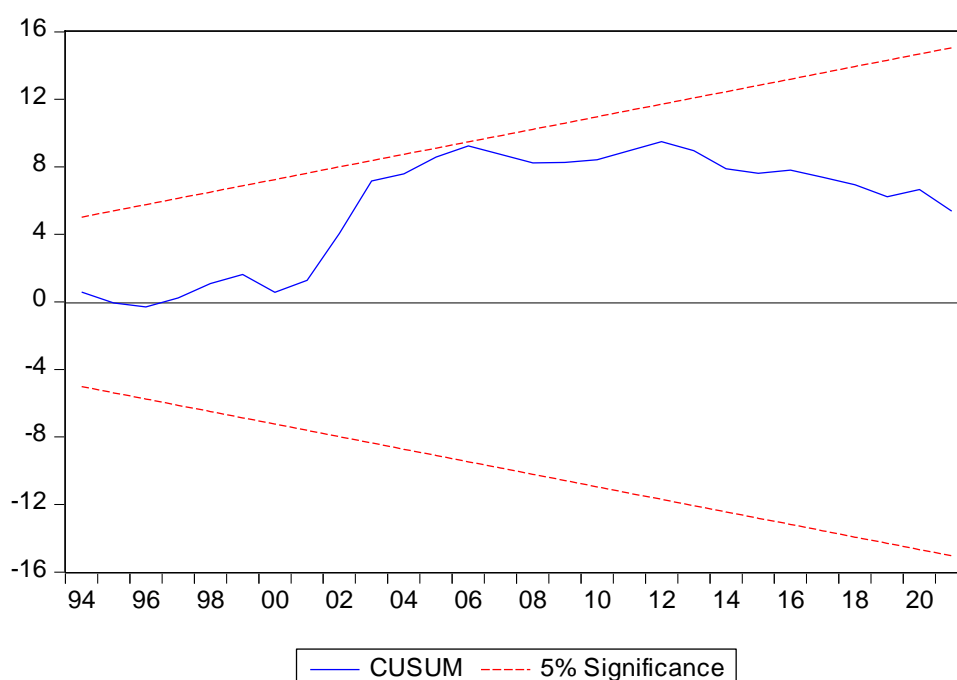
Table 6: Serial Correlation Result

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.088811	Prob. F(2,26)	0.3515
Obs*R-squared	2.473022	Prob. Chi-Square(2)	0.2904

Source: *Authors*

Figure 2: Stability Test

RESEARCH IMPLICATION AND RECOMMENDATIONS

Recommendations

The study thereby recommends that:

1. The government of Nigeria ought to take advantage of population increase and use this more as a tool or instrument in the agricultural production process by investing more resources in human capital development through quality

2. Since agricultural sector is among the top sources of revenue and employment, the government should increase the budgetary allocation to agriculture and private sectors.

3. Government should on a matter of urgency make available modern facilities and incentives as well as increased access power supply.

4.   More investment should be made towards strengthening and improving the agricultural sector.

5.   Above all, the government should establish a corrupt-free agency for the efficient implementation of available funds or materials.

CONCLUSION

The outcome of the findings revealed that access to electricity supply or power is among the major determinants of agricultural productivity or performance, and it is widely known that it adequately explains the growth and development of any nation at large. And that access to credit supports agricultural performance, though it is not significant, suggesting that enhancement in the budgetary allocation is highly needed because increasing investment in agriculture by very many private farmers will not only increase productivity but will also help in reducing the unemployment rate in Nigeria. It was discovered from the results that investing in human beings through a series of trainings and research will also boost Nigeria's economy to meet up with the overwhelming demand from the country's population. Finally, it was revealed that population growth has a reverse effect on agricultural efficiency. This is so because as the population rises, employment in agriculture reduces drastically, as shown in Figure 1 above. Nigeria today imports the majority of her consumable goods from abroad, thereby increasing and decreasing the unemployment rate in domestic and foreign countries, respectively.

Future Research

From the outcome of the research, it is expected that subsequent studies should focus on the need to improve on human or population quality as an instrument of production activities, that is, population growth should not be seen as a curse.

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