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# ANALYSIS OF TRENDS OF AGRICULTURAL PRODUCTIVITY AND ECONOMIC GROWTH IN NIGERIA (1981–2013): IMPLICATIONS FOR POVERTY ALLIVIATION

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***Abstract***

*This study analysed relationship between agricultural productivity and economic growth in Nigeria and its implications for poverty alleviation. Using annual time series data from 1981 to 2013, covering GDP, agricultural value added per worker, exchange rate, interest rate, inflation, imports, and exports, sourced from the Central Bank of Nigeria, World Development Indicators, and the National Bureau of Statistics, The analysis employed dynamic ordinary least squares within the error correction framework. Stationarity was tested using the Augmented Dickey-Fuller method, while exponential and simple linear regression models and the Granger causality test were applied. Results indicated that the coefficients of agricultural productivity (AGP), economic growth (ECG), exchange rate (ECR), interest rate (ITR), imports (IMP), and exports (EXP) were positive and statistically significant at the 1% level, reflecting exponential increases. Inflation growth declined by –0.02%, consistent with compound growth estimates, implying a downward trend over time. The simple regression results further showed that a unit increase in AGP or ITR raises economic growth by 0.06 and 2.859 units, respectively. Granger causality tests, however, revealed no causal relationships. The study recommends policies to boost agricultural output, particularly through quality seeds and inputs, to stimulate growth, employment, and poverty reduction.*

***Keywords:*** *Analysis, Trends, Agricultural, Productivity, Economic Growth*

## 1.0 Introduction

Agriculture remains central to the economies of most developing countries, providing food security, employment, and livelihoods for a large share of vulnerable populations. Accordingly, strengthening agricultural productivity continues to be a major policy priority for governments and international development institutions (World Bank, 2013;

FAO, 2012). Empirical evidence suggests that stagnation in agricultural growth is strongly linked to weak overall economic performance, while sustained improvements in agricultural productivity have consistently underpinned successful structural transformation and industrialization in many developing nations (Christiaensen, Demery and Kuhl, 2011; Diao, Hazell and Thurlow, 2010).

Nigeria aims to diversify its crude oil-dependent economy, necessitating the revitalization of agricultural output and development. This is due to the significant transformation in the agriculture industry's fortunes throughout the years, transitioning from being the predominant sector of the economy. During the 1960s, agriculture accounted for more than 80% of export earnings and employment, approximately 65% of the gross domestic product (GDP), and around 50% of government revenue, despite the reliance of the majority of Nigerian farmers on traditional tools and indigenous farming techniques (Federal Republic of Nigeria 2000, Oluwafemi et al., 2015). This contribution to Nigeria's economic growth has, however, diminished over the years. This results from decades of neglect primarily attributed to the misalignment of the country's economic policy. Agriculture's contribution to GDP was approximately 50% in 1970, 34% in 2003 (CBN 2003), and today stands at 24.18% (CBN 2016). The petroleum sector has now supplanted the agricultural industry, undervaluing the crucial role it played in the past. The agricultural industry currently constitutes less than 30% of the GDP (World Bank 2014). Agriculture remains the primary economic activity for employment and connections with the broader economy (NNPC 2004).

Numerous policy analysts attribute the current situation to the chronic neglect of the sector subsequent to the discovery of petroleum resources in the early 1970s and the

resultant foreign exchange gains. Farming was not merely neglected; the framework of domestic demand for food and agricultural commodities in Nigeria was transformed to prioritize imports of cereals, drinks, vegetable oils, and fibre goods. Nigeria was formerly recognized as the world's foremost producer (Oyekunle, 2013).

Furthermore, between 1981 and 2000, agricultural production increased at an annual rate of 1.7%, which is significantly lower than the country's population growth rate of approximately 2.7% per annum (CBN, 2010). This is a key reason the country has one of the highest poverty rates globally.

Oyinbo and Rekwot (2014) define economic growth as the sustained rise in a nation's national income, encompassing the complete volume of products and services. An effective measure of economic growth is the long-term increase in Gross National Product (GNP). Robust agricultural expansion primarily links Nigeria's economic growth to the performance of four key sub-sectors: crops, livestock, fisheries, and forestry. Conversely, economic development signifies both structural and functional transformation of all economic indicators from a low to a high state (Siyan, 2000). To facilitate a clearer understanding and a more thorough investigation of the pertinent subject, the central question is: how can improvements in agricultural productivity influence economic growth and its implications for poverty alleviation in Nigeria? The study specifically examines the trend and effect of agricultural productivity in Nigeria (1981-2023).

## 2.0 Review of Literature

The correlation between agricultural productivity and economic growth has garnered

significant interest in both theoretical and empirical studies. Lawal and Atte (2006) utilized time series data to examine agricultural production in Nigeria from 1981 to 2003. Their findings indicated that from 1980 to 2003, total agricultural production increased by only 5.4%. This indicates that all elements of the agriculture industry have not experienced significant production growth. The data indicate that the trend in agricultural production is unimpressive, with increases being neither rapid nor consistent. Oluwafemi et al. (2015) delineated the annual trend of agricultural contributions to Nigeria's GDP from 1982 to 2013. The investigation revealed an inconsistent pattern in the agricultural sector's contribution to GDP. The study indicated that variation fluctuated between 25% and 38% from the early 1980s to the late 1990s, attributed to an oil glut in the 1980s, peaking at approximately 48% in the early 2000s. This situation indicates a continual decrease in the agricultural sector's contribution to Nigeria's economy.

After the implementation of the Structural Adjustment Programme (SAP) from 1986 to 1990 and the accompanying enhancement of foreign exchange market control, the ongoing depreciation of the native currency was temporarily alleviated. Between 1988 and 1990, enhancements in GDP growth were observed due to the devaluation of the Naira aimed at fostering exports and trade liberalization. The primary catalysts for growth during this period were manufacturing, trade, and services.

Initially modest in the early 1980s, the average GDP growth rate rose between 1986 and 1993, reaching its peak from 2001 to 2003. The enhanced output performance during this period may be attributed to the government's expansionary fiscal and monetary policies. The government boosted its expenditure on rural development and

infrastructure through the founding and funding of the Directorate of Food, Roads and Rural Infrastructure (DFRRI) and the National Directorate of Employment (NDE), among other initiatives. However, the overall GDP growth rate plummeted after 1990. This decreased growth is probably attributable to deregulation and the implementation of SAP, except in 1996 when there was a tiny increase.

Ahungwa et al. (2014) examined the trends and impact of agriculture on Nigeria's GDP over a period of 53 years (1960-2012). The study conducted thorough trend and regression analyses, revealing that the agricultural sector's contribution to total GDP exhibited a declining tendency while still retaining a significant dominance over other sectors from 1960 to 1975. The agricultural industry remains the predominant economic activity for employment and its connections with the broader economy. The analysis also found that the period from 1976 to 1989 exhibited a fluctuating trend, interwoven with the industrial sector. The regression results indicated that agriculture exhibits a positive correlation with GDP, contributing significantly with a coefficient of 0.664, suggesting that a percentage rise in agricultural contribution can elevate GDP by 66.4% more than any other sector. This analysis confirms the significant contribution of agriculture to Nigeria's GDP.

Oyinbo and Rekwot (2014) have provided empirical evidence regarding the correlation between agricultural production and the growth of the Nigerian economy, emphasizing poverty alleviation. Time series data were utilized in their research, and the data were analyzed utilizing unit root tests and the boundaries autoregressive distributed lag (ARDL) testing method for cointegration. Their research revealed a significant influence of agricultural production on Nigeria's positive economic growth trend. Ukeji

(2003) asserts that agriculture accounted for 64% of the total GDP in the 1960s, but this figure diminished to 48% in the 1970s, further declining to 20% in 1980 and 19% in 1985, attributable to the oil glut of the 1980s.

Memon et al. (2008) utilized time series data to examine the causal links between agricultural gross domestic product (GDP) and exports in Pakistan from 1971 to 2007. Robust statistical evidence derived from the investigation indicated implications for Pakistan's economic policies, as both variables exhibited a strong long-term link. Their investigation also demonstrated a bidirectional Granger correlation between total exports and agricultural GDP. However, in the short run, neither variable influences the other in either direction. Eyo (2008) presents empirical connections between macroeconomic growth and agricultural productivity in Nigeria. The findings indicated that the exchange rate regime, nominal interest rate, government expenditure, and foreign private investment in the agricultural sector had negative effects on the exchange rate and positive effects on the index of agricultural output in Nigeria, demonstrating significant impacts. Shombe (2008) examined causal links among agriculture, industry, and exports in Tanzania utilizing time series data from 1970 to 2005. The empirical findings indicate the presence of Granger causality, demonstrating that agriculture influences both exports and manufacturing.

Santos-Paulino (2010) found that while trade liberalization significantly influences export expansion, its effects on long-term growth remain uneven across developing economies. Similarly, Awokuse and Xie (2010) demonstrated that in some Asian and African countries, agricultural exports contribute to economic growth, although the strength and direction of causality vary by context. In Sub-Saharan Africa, Goh, Sam,

and McNown (2012) revealed a weak or non-existent causal link between agricultural output and exports, underscoring the limitations of the export-led growth hypothesis in structurally constrained economies.

Salih (2006) studied the influence of the agriculture sector on the economy of North Cyprus. Empirical data indicates a substantial long-term association between agricultural output growth and economic expansion, presuming bidirectional causation. The resilience of the agricultural sector is significantly contingent upon the country's economic growth, which is primarily influenced by the stability of major macroeconomic fundamentals such as currency rates, interest rates, and inflation rates.

## 3.0 Methodology

The research was conducted in the Federal Republic of Nigeria. The data for this investigation primarily consisted of quantitative time series data. The material primarily consists of secondary information acquired from publications and various sources. Time series data on exchange rates (1981–2013), agricultural productivity measured by agricultural value added per worker (1981–2013), economic growth indicated by real gross domestic product (1981–2013), interest rates, inflation rates, and import and export figures were sourced from various editions of the Central Bank of Nigeria statistical bulletin and annual reports, World Development Indicators, and the National Bureau of Statistics. The econometric instruments utilized for data analysis are contingent upon the study's unique aims, which are associated with the articulated hypotheses.

This study employs exponential trend analysis and the Granger causality test. Trend analysis was employed to accomplish the objective. This model has been adapted

from the works of Gujarati (2003), Chiang and Wainwright (2005), and Gujarati and Porter (2009). The compound interest formula is applied to the issues of exchange rate, inflation rate, imports, exports, agricultural productivity, and economic growth in Nigeria, as articulated in equation 3.1.

$$Yt = Y0(1+r)t \quad (3.1)$$

Where;

Yt = exchange rate, agricultural productivity and economic growth in year t

Y0 = exchange rate, agricultural productivity and economic growth in the base year.

r = compound rate of growth of Y

t = time in chronological years

Taking the natural log of eqn (3.1) to make it linear,

$$InYt = In\ Y0 + tIn\ (1+r) \quad (3.2)$$

Substituting In $Y_0$ with $\beta_1$ and In(1+r) with $\beta_2$, equation (3.2)

$$In\ Yt = \beta 1 + \beta 2t \quad (3.3)$$

Adding the disturbance term to equation (3.3), we obtain

$$In\ Yt = \beta 1 + \beta 2t + \mu t \quad (3.4)$$

Equation (3.4) represents the growth rate model formulated and estimated in this work.

This study employed a semi-log growth rate model rather than a linear trend model due to its focus on both absolute and relative changes in the parameters of interest. The primary parameter of relevance in equation (3.4) is the coefficient of β2 (b2), which represents the slope coefficient that quantifies the constant proportional or relative change in Y corresponding to a specified absolute change in the regressor t. Initially, multiplying b2 by 100 yielded the instantaneous growth rate at a specific moment.

IGR = b2 x 100 (3.5)

where IGR = Instantaneous Growth Rate

b2 is the least-squares estimate of the slope coefficient β2. Subsequently, by taking the antilogarithm of b2, subtracting 1, and multiplying the result by 100, one obtains the compound growth rate (CGR) for a specified duration.

CGR = [antilog b2 – 1] x 100

(3.6)

If b2 is positive and statistically significant, growth accelerates; if b2 is negative and statistically significant, growth decelerates; if b2 is not statistically significant, growth stagnates.

**Granger causality examination**

Two ECMs were estimated to assess Granger causality, with the first equation featuring real GDP as the dependent variable and the second equation using agricultural value added as the dependent variable. The empirical multivariate regressions are presented as follows:)7.3(11111111*itPiitPiitPiitPiitPiitPiitPiito**EEXPIMPIFRECRITRAGPECGECG*++++++++=Dåå å åå å å å=-=-=-=-=-=-=-bbbbbbj j

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$$_{tPiit}EIMP_{211}+\text{å}_{=-}\text{f} \qquad (3.8)$$

In this context, ECG denotes economic growth, AGP represents agricultural productivity, EXR signifies the exchange rate, ITR refers to the interest rate, IFR indicates the inflation rate, $\varepsilon_{1t}$ and $\varepsilon_{2t}$ are error terms presumed to be uncorrected. The parameters α, β, ϒ, δ, ω, and ϕ are to be evaluated.

## 4.0 Results and Discussion

Figures 1 and 2 below illustrate the trends in annual economic growth and agricultural production in Nigeria. During the 1980s and early 2000s, it is graphically obvious that economic growth and agricultural productivity remained stagnant. This is probably attributable to the Federal Government implementing policies and programmes, such as the Structural Adjustment Programme (SAP), initiated in July 1986. During this period, there existed agricultural prejudice marked by active discrimination against the agricultural sector. This period was characterized by export prohibitions and tariffs on food products, which acted as disincentives to domestic agricultural development. During the era of governmental intervention, agricultural policies sought to enhance rural development and regulate food supplies. During the Structural Adjustment Programme (SAP), the policy aimed to eradicate pricing distortion and foster market liberalization, as mentioned by Adofu et al. (2010).

Subsequently, they demonstrate a comparable growth pattern. This is largely due to the agricultural sector remaining the predominant economic activity regarding employment and its connections with the broader economy. This finding aligns with Oyinbo and

Rekwot (2014), whose results indicated that agricultural production significantly influenced the positive trend of economic growth in Nigeria. In agreement with Oluwafemi et al. (2015), the agriculture sector continues to play a significant part in Nigeria's economy.

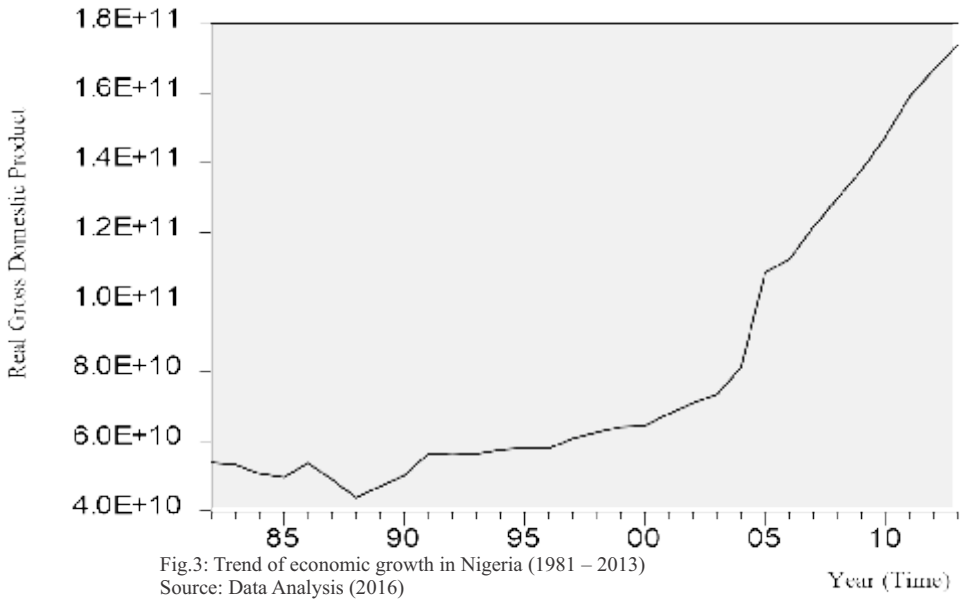



Fig.3: Trend of economic growth in Nigeria (1981 – 2013)
Source: Data Analysis (2016)

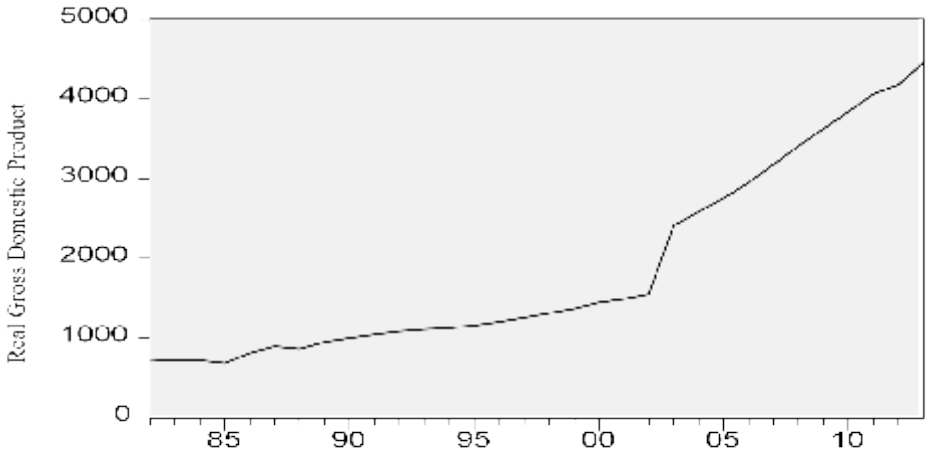



Fig.4: Trend of Agricultural productivity in Nigeria (1981 2013)
Source: Data Analysis (2016)

To ascertain the temporal dynamics of the variables under examination, they were modelled using regression analysis with time as an independent variable. Three functional forms were applied to the data for each variable. These include linear, quadratic, and exponential forms. Additionally, the Akaike Information Criterion (AIC) was employed to select the optimal model. Residual autocorrection of the resultant model was further assessed by analyzing the Durbin–Watson (DW) statistics. The results indicated that, in the majority of instances, the exponential functional form provided a superior fit to the data compared to other functional forms, as evidenced by the lower AIC values associated with this model.

An analysis of the data for the exponential regression model (Table 1) indicated that the model's explanatory power ($R^2$) is substantial (0.95%). This indicates that the model accounted for at least 95% of the variability in agricultural productivity in Nigeria. Moreover, the corrected $R^2$ (0.95%) suggested that the model fit the data perfectly, while the Durbin-Watson score (0.33) indicated a lack of autocorrelation.

The coefficient for the trend in the exponential regression model for Nigeria's agricultural productivity (AGP), economic growth (ECG), exchange rate (ECR), interest rate (ITR), imports (IMP), and exports (EXP) was positive and statistically significant at the 1% level. This indicates an exponential increase in agricultural productivity (AGP), economic growth (ECG), exchange rate (ECR), interest rate (ITR), imports (IMP), and exports (EXP). The inflation rate increase was observed to decline during the era. The outcome aligns with the value derived via compound growth. Consequently, inflation diminishes with time in Nigeria.

**Table 1: Results of Exponential Model Regression of Trend Analysis from 1980 – 2013**

| Variable | Constant | b1 | $R^2$ | Adj $R^2$ | DW | Growth (%) | t-Const (p-value) | t-b1 (p-value) |
|---|---|---|---|---|---|---|---|---|
| Agricultural Productivity | 6.39 | 0.064 | 0.95 | 0.95 | 0.33 | CG=6.61; IG=6.4 | 130.58 (<0.001 ***) | 23.52 (<0.001 ***) |
| Economic Growth | 24.37 | 0.042 | 0.84 | 0.83 | 0.15 | CG=4.29; IG=4.2 | 399.27 (<0.001 ***) | 12.32 (1.1e-13 ***) |
| Exchange Rate | 0.01 | 0.200 | 0.91 | 0.90 | 0.28 | CG=22.14; IG=20 | 0.06 (0.953 ns) | 17.01 (<0.001 ***) |
| Inflation Rate | 3.00 | -0.020 | 0.05 | 0.01 | 1.14 | CG=-1.98; IG=-2 | 11.67 (4.6e-13 ***) | -1.21 (0.235 ns) |
| Interest Rate | 2.66 | 0.010 | 0.13 | 0.10 | 0.52 | CG=1.01; IG=1 | 24.20 (<0.001 ***) | 2.12 (0.042 **) |
| Imports | 1.77 | 0.260 | 0.95 | 0.95 | 0.51 | CG=29.69; IG=26 | 9.58 (<0.001 ***) | 25.10 (<0.001 ***) |
| Exports | 1.94 | 0.270 | 0.96 | 0.96 | 0.67 | CG=31; IG=27 | 10.88 (<0.001 ***) | 27.54 (<0.001 ***) |

Significance codes:
*** p < 0.01(highly significant)
** p < 0.05 (significant)
ns = not significant
CG = Compound Growth, IG = Instantaneous Growth
Source: Field Survey Data (2016)

**Table 2: Results of OLS Regression on Effects of Agricultural Productivity on Economic Growth from 1980 – 2013.**

| Variable | B (Coefficient) | Std. Error | t-statistic | p-value |
|---|---|---|---|---|
| Constant | 176.57 | 22.96 | 7.68 | <0.001 *** |
| Agricultural Productivity | 0.069 | 0.025 | 2.73 | 0.008 ** |
| Exchange Rate | 0.212 | 0.233 | 0.91 | 0.366 (ns) |
| Inflation | -0.140 | 0.341 | -0.41 | 0.682 (ns) |
| Interest Rate | 2.859 | 1.049 | 2.73 | 0.008 ** |
| Agricultural Imports | 0.160 | 0.010 | 1.64 | 0.104 (ns) |
| Agricultural Exports | 0.012 | 0.008 | 1.45 | 0.152 (ns) |

Model Fit: $R^2 = 0.986$

Significance codes:
*** p < 0.01 (highly significant)
** p < 0.05 (significant)
ns = not significant

Source: Field Survey Data (2016)

A simple linear regression revealed an R-squared value of 98.6%, which indicates a good fit for the model, implying that the explanatory variables explained economic growth by 98.6%. This shows that agricultural productivity and interest rate were both positive and statistically significant at 1%, implying that a unit increase in agricultural productivity or interest rate results in an increase in economic growth by either 0.06 units or 2.859 units. Similarly, agricultural exports had a positive effect on economic growth, implying that a unit increase in agricultural imports increases economic growth by 0.016 units, and this relationship is statistically significant at the 10% significance level, while the exchange rate, inflation, and agricultural exports all had an insignificant effect on economic growth, but only inflation had a negative effect. This is in agreement with Su and Soon (2024), who discovered a negative relationship between inflation and economic growth in Singapore.

## 5.0 Conclusion and Recommendations

### 5.1 Conclusion

This study examined the nexus between agricultural productivity and economic growth in Nigeria from 1981 to 2013, emphasizing the role of financial and trade variables. The empirical findings indicate that agricultural productivity and interest rates both had positive and statistically significant impacts on economic growth. The regression results indicated that a one-unit increase in agricultural productivity was associated with a 0.06-unit increase in growth, whereas a one-unit increase in interest rates led to a 2.859-unit increase in growth. Agricultural exports also had a positive effect, but they were not as strong as trade, which shows how important trade is for growth. On the other hand, inflation harmed growth during the study period. These results indicate that agriculture is

crucial for Nigeria's economic transformation. They also show that higher productivity, better financial intermediation, and more agricultural exports are all important for long-term and inclusive economic growth.

### 5.2 Recommendations

Based on the findings, this study recommends sustained investment in agricultural productivity through research, improved seeds, irrigation, extension services, and rural infrastructure, as these will raise yields and support food security. Strengthening the financial system is equally important, with emphasis on expanding credit access for farmers and agribusinesses and improving financial intermediation, rather than relying solely on interest rate adjustments to stimulate growth. We should also focus on enhancing storage, transport, and customs processes to boost agricultural exports, ensuring farmers can meet international quality standards. Ensuring inclusive growth is critical so that the benefits of agricultural expansion and trade reach smallholder farmers and rural households. Finally, maintaining stable macroeconomic policies, increasing budgetary allocations to agriculture, and reinforcing institutional support will create the

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