

EFFECTS OF AGRICULTURAL EXPORTS ON ECONOMIC GROWTH IN NIGERIA: A CO-INTEGRATION ANALYSIS (1980-2019)

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Abstract

The study analysed the nexus between agricultural exports and economic growth in Nigeria. Time series data covering the period between 1980 and 2018 were utilized by the study. Data were analysed using descriptive statistics, Augmented Dickey-Fuller statistics, Johansen's co-integration method, and vector error correction mechanism (VECM). The results of the time series analysis revealed that the first difference of the variables is stationary and co-integrated. Descriptive analysis results reveal a fluctuating trend in the volume of agricultural exports and economic growth with an average of 351.99 tonnes and \$24,200,000 respectively. The contribution of agricultural exports to economic growth declined progressively, with an average of 7.09 percent. VECM results reveal that agricultural exports volume and ratio of average world price to producer price of agricultural export commodities negatively affects economic growth. While exchange rate affects economic growth positively. The study concluded that agricultural exports, exchange rate, and the ratio of average world price to producer price of agricultural export commodities are significant determinants of economic growth in Nigeria. Thus, embarking on agricultural policy interventions that will stimulate increased agricultural export supply, stable producer prices of agricultural export commodities and a friendly macro-economic environment for agricultural exports would promote economic growth.

Key words: agricultural export commodities, agricultural policy interventions, error correction mechanism

INTRODUCTION

Agriculture has been the pivot of the Nigerian economy at independence in the 1960s. The sector through agricultural exports contributed significantly to the total Gross Domestic Product (GDP) of Nigeria. The sector is the largest employer of labour in Nigeria, providing employment more than 36% of the total labour force [8] and [13].

The agricultural exports sub-sector was the highest foreign exchange earner in the Nigerian economy in 1960s; contributing over 60 percent of the GDP through the exports of agricultural commodities such as Cocoa, Palm oil, Cotton, Rubber and Ground nuts [5].

However, the advent of oil exploration and subsequent production in commercial quantities in the early 1970s led to serious

neglect of the agricultural export sector by the government for the quick income generating crude oil sector; a phenomenon known as "Dutch Disease" [3].

Although, the oil boom era in the 1970s led to significant changes in the Nigerian economy such as increase in government revenue, rapid development of infrastructural facilities and improvement in GDP, the agricultural export sector continues to suffer serious decline in output because little or no attention was given to the sector by the government [11].

Consequently, the neglect of the agricultural sector resulted into serious food and economic problems, especially food insecurity and balance of payment deficit as food importation bills continue to surge [4].

The contribution of agriculture to Nigeria's total export earnings is small relative to crude

oil exports. For instance in 2019, agriculture contributed less than 2% of total exports, while the crude oil sub-sector contributed 76.5%. Agricultural exports declined by about 11% from ₦302.2 billion in 2018 to ₦269.8 billion in 2019 [13].

According to [7], [12], [2], and [17] as cited by [15], in emerging economies, the role of agricultural exports in the growth and development of the economy is a serious policy issue. Growth in real exports is expected to cause improvement in real GDP and product. This can be attributed to the fact foreign exchange earnings from exports will help in the acquisition of industrial and capital goods, and technological advancement in production.

The hypothesis of Adam Smith and Ricardian export-led growth (ELG) which postulates that export is a significant factor in economic growth and development has been subjected to empirical analysis by a number of studies and its role in economic growth and development is a significant policy matter in under-developed and emerging economies [6] and [9].

Serious arguments have erupted in the literature on the link between economic growth and agricultural exports. It has been established by a number of empirical studies that a significant relationship exists between agricultural exports and economic growth in the first, second, and third world countries.

Some of these studies ([5]; [11]; [1]; [16]; [10]; [14] and [9]) argued that foreign exchange earnings from agricultural exports are used to procure imported capital goods, which will result in a long-run expansion of the productive capacity of the less developed countries with comparative disadvantage in the manufacture of capital goods.

From the foregoing, the study analysed the influence of agricultural exports on economic growth in the economy of Nigeria from 1980 to 2019. Specifically, the study examined trends in agricultural exports volume, GDP growth, agricultural exports contribution to GDP, and the relationship between agricultural exports and growth in the economy of Nigeria over the study period.

MATERIALS AND METHODS

Time series data for the period between 1980 and 2018 were employed in the study. The data were obtained from reputable sources such as publications of Central Bank of Nigeria (CBN), National Bureau Statistics (NBS) and Food and Agriculture Organisation Statistical Database (FAOSTAT). Data were analysed with trend analysis model, Augmented Dickey Fullers tests, Johansen co-integration model and error correction analysis

The implicit model used in this study is specified as follows:

$$\Delta \ln X_{1t} = \alpha_1 + \alpha_2 \Delta \ln X_{1t-1} + \alpha_3 \Delta \ln X_{2t-1} + \alpha_4 \Delta \ln X_{3t-1} + \alpha_5 \Delta \ln X_{4t-1} + \alpha_6 \Delta \ln X_{5t-1} + \alpha_7 \Delta \ln X_{6t-1} + \lambda_1 ECT_{t-1} + u_{t1} \dots \dots \dots (1)$$

$$\Delta \ln X_{2t} = \beta_1 + \beta_2 \Delta \ln X_{1t-1} + \beta_3 \Delta \ln X_{2t-1} + \beta_4 \Delta \ln X_{3t-1} + \beta_5 \Delta \ln X_{4t-1} + \beta_6 \Delta \ln X_{5t-1} + \beta_7 \Delta \ln X_{6t-1} + \lambda_2 ECT_{t-1} + u_{t2} \dots \dots \dots (2)$$

$$\Delta \ln X_{3t} = \theta_1 + \theta_2 \Delta \ln X_{1t-1} + \theta_3 \Delta \ln X_{2t-1} + \theta_4 \Delta \ln X_{3t-1} + \theta_5 \Delta \ln X_{4t-1} + \theta_6 \Delta \ln X_{5t-1} + \theta_7 \Delta \ln X_{6t-1} + \lambda_3 ECT_{t-1} + u_{t3} \dots \dots \dots (3)$$

$$\Delta \ln X_{4t} = \rho_1 + \rho_2 \Delta \ln X_{1t-1} + \rho_3 \Delta \ln X_{2t-1} + \rho_4 \Delta \ln X_{3t-1} + \rho_5 \Delta \ln X_{4t-1} + \rho_6 \Delta \ln X_{5t-1} + \rho_7 \Delta \ln X_{6t-1} + \lambda_4 ECT_{t-1} + u_{t4} \dots \dots \dots (4)$$

$$\Delta \ln X_{5t} = \phi_1 + \phi_2 \Delta \ln X_{1t-1} + \phi_3 \Delta \ln X_{2t-1} + \phi_4 \Delta \ln X_{3t-1} + \phi_5 \Delta \ln X_{4t-1} + \phi_6 \Delta \ln X_{5t-1} + \phi_7 \Delta \ln X_{6t-1} + \lambda_5 ECT_{t-1} + u_{t5} \dots \dots \dots (5)$$

$$\Delta \ln X_{6t} = \epsilon_1 + \epsilon_2 \Delta \ln X_{1t-1} + \epsilon_3 \Delta \ln X_{2t-1} + \epsilon_4 \Delta \ln X_{3t-1} + \epsilon_5 \Delta \ln X_{4t-1} + \epsilon_6 \Delta \ln X_{5t-1} + \epsilon_7 \Delta \ln X_{6t-1} + \lambda_6 ECT_{t-1} + u_{t6} \dots \dots \dots (6)$$

Where:
 X₁ is economic growth represented by gross domestic product (GDP) in \$billions;
 X₂ is volume of agricultural exports in tonnes;
 X₃ is exchange rate measured as amount of ₦ exchanged per \$;
 X₄ is interest rate in the economy measured in percentage;

X_5 is inflation rate in the economy measured in percentage;

X_6 is the ratio of average world price to producer price of agricultural export commodities;

Δ is the difference operator;

$t-1$ is the lagged values of variables;

ECTt is the error correction term;

U_{ts} are stochastic random errors;

$\alpha, \beta, \theta, \rho, \phi, \lambda$ and ϵ are parameters to be estimated.

RESULTS AND DISCUSSIONS

Trends in the volume of agricultural exports (tonnes) (1980-2019)

Table 1 and Figure 1 present the trend in agricultural exports volume during the period under study. Data in the Table reveals a fluctuating trend in agricultural exports volume rising from 252.30 tonnes recorded during the 1980-1989 period to 407.36 tonnes in 2010-2019. The highest and lowest values of agricultural exports volume were 252.30 tonnes and 407.36 tonnes respectively, occurring in the 1980-1989 and 2010-2019 sub-periods respectively. The overall average agricultural exports volume for the entire period of the study stands at 351.99 tonnes. degree of instability over the study period.

Table 1. Trends in volume of agricultural exports (tonnes) in Nigeria (1980-2019)

Sub-period	Average volume ('000 tonnes) per annum	Annual percentage change	Coefficient of variation
1980-89	252.30	+0.18	44.75
1990-99	353.33	-13.35	38.92
2000-09	405.98	-6.71	33.01
2010-19	407.36	+38.34	9.41
All periods	351.99	-3.00	36.48

Source: Computed from FAOSTAT, NBS and CBN Statistical Bulletin, 2021.

The intra sub-period percentage change per year in agricultural exports volume shows that the average positive annual growth rate was recorded during the 1980-1989 and 2010-2019 sub-periods, while a negative annual growth rate was recorded in the 1990-1999 and 2000 and 2009 sub-periods. The average annual growth rate of agricultural exports

volume was a negative of -3.00 percent for the duration of the study. Trends in the coefficients of variation show a high degree of instability in the agricultural exports volume, ranging between 9.41 percent and 44.75 percent, and averaging 36.48 percent over the study period. Generally, agricultural exports volume reflects a high.



Fig. 1. Trends in volume of agricultural exports (tonnes) in Nigeria (1980-2019)
 Source: Authors' computation, 2021.

Trend in economic growth represented by gross domestic product (GDP) in Nigeria (1980-2019)

Table 2 and Figure 2 show the trend in economic growth (proxied by GDP) in Nigeria between 1980 and 2019. The trend in the GDP shows a stagnation between 1980 and 1994, thereafter, it increases sharply between 1995 and 2019, with increasing averages across the sub-periods. It increases from \$190,558.60 in the 1980-1989 sub-period to \$83,907,233.00 in the 2010-2019 sub-period. Average GDP during the study period is in the range of \$190,558.60 in the 1980-1989 sub-period and \$83,907,233.00 in the 2010-2019 sub-period, averaging \$24,200,000.00 for the period covered by the study. The trend in the intra sub-period annual percentage growth rate in GDP shows a positive growth rate of 4.37 percent in the 2010-2019 sub-period. However, a negative annual percentage growth rate of -18.67 percent, -32.99 percent, and -22.74 percent in GDP were recorded in the 1980-1989, 1990-1999, and 2000-2009 sub-periods, with an average of -3.00 percent growth rate for the entire period of the study. The coefficients of variation ranged from 56.63 percent to 21.50 percent, with an average of 138.43 percent

over the study period, indicating that GDP was not stable during the period covered by the study.

Table 2. Trend in economic growth represented by GDP in Nigeria (1980-2019)

Sub-periods	Average economic growth (GDP) (USD)	Annual Percent change	Coefficients of variation
1980-89	190,558.60	+18.67	56.63
1990-99	2,752,327.00	-32.99	69.91
2000-09	22,747,393.00	-22.74	55.83
2010-19	83,907,233.00	+4.37	21.50
All Periods	24,200,000.00	-18.66	138.43

Source: Computed from FAOSTAT, NBS and CBN Statistical Bulletin, 2021.

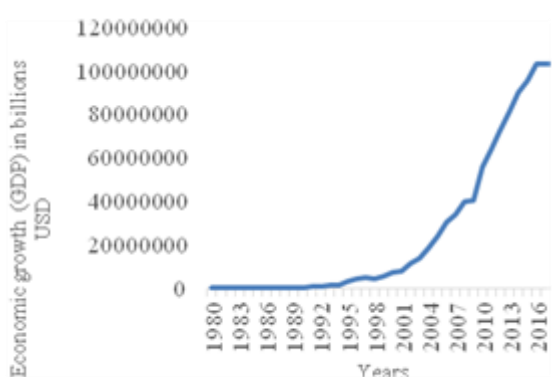


Fig. 2. Trend in economic growth (GDP) (\$ billions) in Nigeria (1980-2019)

Source: Authors' computation, 2021.

Trend in the contribution of the agricultural exports to economic growth (GDP)

The trend in the contribution of agricultural exports to economic growth (GDP) in Nigeria is presented in Table 3 and Figure 3. The Table and Figure reveal that contribution of agricultural exports to economic growth (GDP) in Nigeria continuously decline over the study period, decreasing progressively from 13.24 percent in the 1980-1989 sub-period to 0.49 percent in the 2010-2019 sub-period. The lowest average contribution of agricultural exports to economic growth occurred in the 2010-2019 sub-period, and the highest average contribution of agricultural exports to economic growth is recorded in the 1980-1989 sub-period. Agricultural exports was responsible for 7.09 percent of the growth

in the Nigerian economy during the period under study.

In summary, there is a steady decline in the contribution of agricultural exports to economic growth during the study period.

Table 3. Trend in the contribution of the agricultural exports to the economic growth (GDP) in Nigeria (1980-2019)

Sub-periods	Average value of export ('000 USD)	Average GDP ('000 USD)	Contribution to economic growth (Percentage)
1980-89	252.38	1,905.59	13.24
1990-99	358.33	2,752.33	12.84
2000-09	405.98	22,747.39	1.79
2010-19	407.36	83,907.23	0.49
All Periods	356.01	27,578.14	7.09

Source: Computed from FAOSTAT, NBS and CBN Statistical Bulletin, 2021.

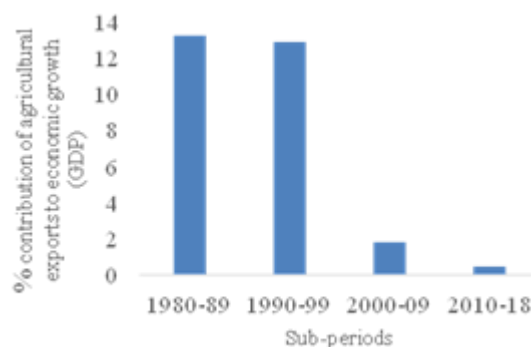


Fig. 3. Trend in percentage contribution of agricultural exports to economic growth (GDP) (1980-2019)

Source: Authors' computation, 2021.

Short run equations

Economic growth (GDP) equation

$$X_{1t} = -0.04 (-0.00) + 0.635 (4.99)* X_{1t-1} - 14120.72 (-3.30)* X_{2t-1} + 33010.65 (0.87) X_{3t-1} - 1.30e07 (-1.05) X_{4t-1} - 4089.45 (-0.14) X_{5t-1} - 79736.63 (-0.92) X_{6t-1} - 0.01(-1.99) **ECT_{t-1} R^2 = 0.73$$

Volume of agricultural exports equation

$$X_{2t} = 78.19 (1.98) ** - 7.60e-07 (-0.13)* X_{1t-1} - 0.17 (-0.86) X_{2t-1} - 1.28 (-0.71) X_{3t-1} + 433.07 (0.74) X_{4t-1} - 1.76 (-1.24) X_{5t-1} + 8.63 (2.11)* X_{6t-1} + 6.27e-07(2.61)*ECT_{t-1} R^2 = 0.56$$

Exchange rate equation

$$X_{3t} = -2.77 (-0.73) + 3.30e07 (0.57) X_{1t-1} - 0.028 (-1.47) X_{2t-1} + 0.50 (2.95)* X_{3t-1} - 30.42 (-0.54) X_{4t-1} + 0.04 (0.33) X_{5t-1} - 0.41 (-1.05) X_{6t-1} - 5.83e-08(-2.55)*ECT_{t-1} R^2 = 0.48$$

Interest rate equation

$$X_{4t} = 0.02 (1.65) - 1.74e-10 (-0.09) X_{1t-1} + 0.00 (1.27) X_{2t-1} - 0.00 (-0.19) X_{3t-1} - 0.03 (-0.17) X_{4t-1} - 0.00 (-1.27) X_{5t-1} + 0.00 (1.24) X_{6t-1} + 9.35e-11(1.25) ECT_{t-1} R^2 = 0.15$$

Inflation rate equation

$$X_{5t} = -8.20 (-2.00) * - 2.68e-07 (-0.43) X_{1t-1} - 0.17 (-0.86) X_{2t-1} + 0.13 (0.70) X_{3t-1} + 26.59 (0.44) X_{4t-1} - 0.28 (-1.85) X_{5t-1} + 0.17 (0.17) X_{6t-1} - 7.53e08 (-3.03)*ECT_{t-1} R^2 = 0.45$$

Ratio of average world price to producer price of agricultural export commodities equation

$$X_{6t} = 3.30 (1.46) + 2.10e-07 (0.61) X_{1t-1} + 0.02 (1.37) X_{2t-1} - 0.14 (-1.38) X_{3t-1} + 27.94 (0.84) X_{4t-1} + 0.12 (1.53) X_{5t-1} + 0.15 (0.67) X_{6t-1} + 2.85e-08(2.08)*ECT_{t-1} R^2 = 0.35$$

Long run equation

$$ECT = 1.00X_{1t-1} - 1234898 (-10.00)* X_{2t-1} + 3899326 (8.07)* X_{3t-1} - 9.3e08 (-4.74) X_{4t-1} + 4197355 (5.00) X_{5t-1} - 1.62e07 (-10.50)* X_{6t-1} + 9.67e08$$

In the economic growth (GDP) short-run equation, the coefficients of agricultural exports volume have a negative sign, and are significant statistically at a 1% level, implying a short-run negative impact of agricultural exports volume and economic growth (GDP).

In the same way, in the agricultural exports volume equation, economic growth (GDP) is negatively signed and is significant statistically at the 1% level. These results imply that economic growth (GDP) is inversely related to agricultural exports volume, and the ratio of world price to producer price of agricultural export commodities is directly related to agricultural exports volume during the study period.

Long-run equation reveals that agricultural exports volume and the ratio of world price to producer price of agricultural export commodities have a positive impact on the gross domestic product, while the exchange rate has a negative impact on the gross domestic product. The coefficients are significant statistically at the 5% level.

The adjustment term (0.01) is statistically significant at a 5% level, suggesting that last year's error or deviation from long-run equilibrium are rectified for within the current year at a convergence speed of 10%.

In summary, from the estimated ECM equations, the error correction factor coefficient is negative as expected and is significant, statistically at a 1 percent level. The coefficients of agricultural exports volume and world price to producer price of agricultural export commodities ratio lagged by one year is negatively signed and is significant, statistically at 1 percent. The exchange rate coefficient lagged by one year is has a positive sign and is significant statistically at 1 percent.

CONCLUSIONS

From the empirical findings from this study, it is concluded that agricultural exports, exchange rate, and the ratio of average world price to producer price of agricultural export commodities has a significant influence on economic growth. Thus, embarking on agricultural export policies interventions that will improve production and agricultural export supply, stabilise producer prices of agricultural export commodities, and a friendly macro-economic environment for agricultural exports would promote economic growth.

REFERENCES

- [1]Balassa, B., 1978, Exports and economic growth: further evidence. *Journal of Development Economics* 5: 181-189. DOI: [http://dx.doi.org/10.1016/0303878\(78\)90006-8](http://dx.doi.org/10.1016/0303878(78)90006-8), Accessed on 10th November, 2020.
- [2]Ben-Amor, R., Aguayo, E., de Miguel-Gomez, M.D. 2015, The competitive advantage of the Tunisian palm date sector in the Mediterranean Region. *Spanish Journal of Agricultural Research* 13: 0101. DOI: <https://doi.org/10.5424/sjar/2015132-6390>, Accessed on 8th September, 2020.
- [3]Central Bank of Nigeria (CBN) 2009, Annual statistical report.
- [4]Central Bank of Nigeria (CBN) 2011, Annual statistical report.
- [5]Chenery, H.B., Strout, A.M., 1966, Foreign assistance and economic development. *The American Economic Review* 56(4): 679-733.
- [6]Dawson, P.J., 2005, Agricultural exports and economic growth in less developed countries. *Agricultural Economics* 33: 145-152.
- [7]Gilbert, N.A., Linyong, S.G., Divine, G.M., 2013, Impact of agricultural export on economic growth in Cameroon: Case of Banana, Coffee and Cocoa.

International Journal of Business and Management Review 1: 44-71.

[8]Iganiga, B. O., Unemhilin, D. 2011,The impact of federal government agricultural expenditure on agricultural output in Nigeria. *Journal of Economics* 2 (2): 81-88.

[9]Kang, H., 2015, Agricultural exports and economic growth: Empirical evidence from the major rice exporting countries. *Agricultural Economics – Czech* 61: 81-87. DOI: 10.17221/99/2014-AGRICECON, Accessed on 20th August, 2020.

[10]Kavoussi, R.M., 1984, Export expansion and economic growth: Further empirical evidence. *Journal of Development Economics* 14 (1): 241-250.

[11]Michael, M., 1977, Exports and growth: An empirical investigation. *Journal of Development Economics*, 4 (1): 49 -53.

[12]Njimanted, G.F., Aquilas, N.A., 2015, The Impact of Timber Exports on Economic Growth in Cameroon: An Econometric Investigation. *Asian Journal of Economic Modelling* 3: 46-60. DOI:

<https://doi.org/10.18488/journal.8/2015.3.3/8.3.46.60.>, Accessed on 10th September, 2020.

[13]Oyaniran, T., 2020, Current state of Nigeria agriculture and agribusiness sector A paper presented at the Series II Agriculture and Agribusiness Workshop organised by the National Action Committee for the implementation of Africa Continental Free Trade Area Agreement (AfCFTA) held on 29 September, 2020. pp 1-13.

[14]Shirazi, N.S., Manap, T.A.A., 2005, Export-led growth hypotheis: Further econometric evidence from South Asia. *The developing economies* 43: 472-488. DOI:

<https://doi.org/10.1111/j.1746-1049.2005.tb00955>, Accessed on 12th August, 2020.

[15]Siaw, A., Jiang, Y. S., Pickson, R.B., Dunya, R., 2018, Agricultural exports and economic growth: A disaggregated analysis for Ghana. *Theoretical Economics Letters* 8: 2251-2270. DOI: <https://doi.org/10.4236/tel.2018.811147>, Accessed on 8th October, 2020.

[16]Tyler, W.G., 1981, Growth and export expansion in developing countries: Some empirical evidence, *Journal of Development Economics* 9 (1): 121-130.

[17]Verter, N., Bečvařova, V., 2016, The impact of agricultural exports on economic growth in Nigeria. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 64: 691-700. DOI: <https://doi.org/10.11118/actaun201664020691>, Accessed on 19th August, 2020.