



## Evaluation of the Performance of Cocoa Export and Import in Nigeria

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### Abstract

The study evaluates the performance and determinants of cocoa export and import in Nigeria (1970-2025). Simultaneous models were developed to capture the joint effects of export and import of the crop. Two Stages Least Square (2SLS) approach was used to estimate the determinants of cocoa export and imports in Nigeria. The study revealed that quantity of cocoa output, producer's price of cocoa; world price and nominal exchange rate were the significant determinants of cocoa export. The quantity of cocoa consumed, agricultural gross domestic product and rainfall were positive determinants of cocoa import while producer's price of cocoa and import value negatively influenced import. The performance evaluation estimate showed that the total quantity of cocoa exported (48,934,000 tons) was higher than the quantity imported (5,735,500 tons) over the study period. The balance of trade value was 48,360,450, meaning a positive balance of trade within the study period. The study concludes that government should encourage the export and import promotion strategies so as to realize a surplus balance of trade. The study recommended the following: government should encourage the export and import promotion strategies so as to realize a surplus balance of trade. Also, adequate security, effective fiscal and monetary policy and infrastructural facilities should be put in place so that foreign investors will be attracted to invest in cocoa subsector of the economy, policies that enhances sustained performance of cocoa industries in terms of export and import for future growth self-sustainability should be adopted, adoption of exchange rate stabilization policies is strongly advocated and government intervention in form of subsidies, targeting export promotion programmes.

**Key words:** Cocoa, export, import, performance, evaluation and determinants.

### Introduction

Agricultural export remains a major driver towards economic development of any nation. The degree to which this is reached and maintained relies strongly on the level of export capacity, contributing to employment foreign exchange and food production (Adetarami *et.al.* 2025). Agriculture's commodity exports can be grouped into traditional and non-traditional commodities. Cocoa remains one of the noticeable traditional export commodities and the most predominant crop in the export basket of Nigeria. Its production, domestic consumption and export have remained central concerns of the government. Nigeria is ranked among the first five positions globally in cocoa production and export trade contributing 5.2% share to the world market estimated at 4.85 million in 2025, while West African accounts for about 70% of the world market share of cocoa and generates about 13million dollars annually, while its end product has a turnover of 105billion dollars (International Cocoa Organisation (ICO), 2025). In Nigeria, about 80% of cocoa produced is exported as cocoa beans while the other 20% is processed into powder, butter, cake and liquor before being exported (Oseni and Adams 2024). Cocoa is cultivated in the southern region of Nigeria due to good soil and climate condition. The top cocoa producing states are Ondo, Ogun, Osun, Oyo and Ekiti. They account for about 60% of the cocoa production and make at least 30% of the total cocoa export in Nigeria. Ondo state remains at

the peak among the cocoa producing state with an estimated output of 77,000tons/annum. Cocoa remains the largest revenue earners and the second most exported commodity after oil and gas export. The major cocoa export destinations are Western Europe and North America where cocoa processing industries are located. Rome *et.al.* (2022) reported that the top export destinations from Nigeria includes; Netherlands (165million), Indonesia (54 million), Malaysia (23 million), Germany (20 million), Belgium (19.1 million), Vietnam (5.76 million), Spain (3.53 million), Italy (3 million), United State (2.42 million) and South Africa (1.35 million) all in US dollars. Sequel to the discovery of oil in the 1970s, the agricultural sector in Nigeria experienced various fundamental changes. First, there was high reliance on crude oil export as the main source of foreign exchange earnings and revenue generation to the government. Secondly, agriculture was neglected leading to a declining trend in its contribution to export earnings Akinrinmola and Ogunwande (2026). Prior to the discovery of crude oil, Nigeria was the World's second largest producer of cocoa in the World after Brazil but has dropped to the fourth largest producer of cocoa after Ivory Coast, Indonesia and Ghana (ICC0, 2019). Currently, it occupies the third position after, Cote d' Ivoire (USD 3.9 billion), Ghana (USD 2.5 billion), and Nigeria (USD 0.8 billion) as the largest exporter (ICO, 2025). Cocoa output was 305,000 tons in 1970; the figure declined sharply to 100,000 tons in 1987 and started showing significant

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fluctuations from 1988 to 1998. It increased steadily from 1999(225000tons) to 2010(525000tons). It declined again from 2011 (289940) to 2018(255000tons) and it now about 350,000 tons (Samuel, 2024). After dropping to fourth place, Nigeria is now the fourth largest producer of cocoa after Ivory Coast, Indonesia and Ghana (IC0, 2025). This downward trend has a negative influence on sustained economic growth and is generating a serious concern among the stakeholders in the cocoa industry. In terms of export, cocoa export declined from 302000 to 1508000 tons from 1970 to 1980. It started to fluctuate from 1981-2002, 2011-2025. Even with the adoption of Structural Adjustment Programme (SAP) in 1986, the quantity of exports never reached the value obtained in 1970. The quantity exported was very minimal in 1992 with a value of 110,000 tons the country now ships 300,000 MT of cocoa (Salau and Agbede 2022). Cadoni (2023) had suggested that “the political situation of the country in that period (1992-1996), resulted in various economic sanctions from United Nation and subsequent expulsion of Nigeria from Common Wealth, could have been responsible for this”. This is because during this period, aggregate output of cocoa in Nigeria was on increase and one would expect a corresponding increase in volume of export since cocoa is produced mainly for export. According to Food and Agriculture Organization (FAO) (2025) export increased within 2003-2010, 2014-2025. There has been an increase in cocoa export from 302,000 to 504000tons from 1970 to 2025. However, irrespective of the different strategies put in place by government to encourage commodity export, Nigeria agriculture is presently experiencing little signs of being able to compete in the world market. Today the producers of traditional agricultural commodities in Nigeria face the world market directly. They benefit when prices are good but absorb shocks and experience losses when prices decline (Daramola, 2022). Consequently, the prices at which cocoa producers sell their produce depend on their response to both local and global demand. Furthermore, unfavourable domestic terms of trade, loss of market power and decreasing output also contribute to the performance of traditional exports, and those factors reflect in the interaction of inappropriate domestic pricing policies and external shocks (Imbens and Wooldridge, 2009). In order to revive Nigeria’s agriculture, government had organized different fora and meetings with key where:

- Ye = Quantity of cocoa export (metric tonnes)
- X<sub>1</sub> = Quantity of cocoa output (metric tonnes) ( $\gamma_1 > 0$ )
- X<sub>2</sub> = Producer price of cocoa (naira/tonne) ( $\gamma_2 < 0$ )
- X<sub>3</sub> = World price of cocoa (N/tonne) ( $\gamma_3 > 0$ )
- X<sub>4</sub> = Exchange rate (N/US\$) ( $\gamma_4 < 0$ )
- X<sub>5</sub> = Trade openness ( $\gamma_5 > 0$ )
- X<sub>6</sub> = Export value of cocoa ( $\gamma_6 > 0$ )
- X<sub>7</sub> = Balance of trade ( $\gamma_7 > / < 0$ )
- U<sub>t</sub> = Random error term
- $\gamma_0$  = intercept
- $\gamma_1 - \gamma_7$  = slope (elasticity)

The import function is specified explicitly as:

$$\text{Ln}Y_1 = \beta_0 + \beta_1 \text{Ln} X_{11} + \beta_2 \text{Ln} X_{12} + \beta_3 \text{Ln} X_{13} + \beta_4 \text{Ln} X_{14} + \beta_5 \text{Ln} X_{15} + \beta_6 \text{Ln} X_{16} + \beta_7 \text{Ln} X_{17} + \beta_8 \text{Ln} X_{18} + \beta_9 \text{Ln} X_{19} + V_t$$

(ii)

where:

- Y<sub>1</sub> = Quantity of cocoa import (metric tonnes)
- X<sub>11</sub> = Quantity of cocoa consumed (metric tonnes) ( $\beta_1 > 0$ )

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stakeholders in food crops, tree crops and livestock industry respectively with the purpose of identifying the challenges facing each industry and provide solution. Salau and Agbede (2022) noted that the various presidential committees established have produced blueprints to boost production and achieve self-sufficiency within the shortest possible time and also generate surplus for export. In order to sustain and improve on the performance of cocoa production, various programmes and trade policy have been put in place. This includes; National cocoa development programme, Agricultural Promotion Policy (2016-2020), Tarriff, import ban and domestic support amongst others. Studies on cocoa have concentrated majorly on cocoa export neglecting its import. Based on these, this study aims at evaluating the performance and determinants of cocoa export and import in Nigeria. The study would not only consider the export of cocoa but also the import. Agricultural export remains a major driver towards economic development of any nation. But the export in Nigeria is low arising from poor production. Also, cocoa production and export a high revenue spinner has been neglected, there is high reliance on crude oil export as the main source of foreign exchange earnings and revenue generation in Nigeria. Agriculture in general has been neglected leading to a declining trend in its contribution to export earnings. estimate of the determinants of cocoa export in Nigeria; estimate of the determinants of cocoa import in Nigeria; Performance evaluation of cocoa export and import in Nigeria

**Materials and Methods: The Study Area:** The study area is Nigeria with a total geographical area of 923,768 square kilometers and a population estimate of about 200 million. It is located between latitudes 4<sup>0</sup>16’ and 13<sup>0</sup> 53’ North and longitudes 2<sup>0</sup>40’ and 14<sup>0</sup>41’ East. Annual time series data was used for the study, with data on consumption and production of the selected grains obtained from United States Department of Agriculture (USDA).

**Analytical Technique and Model Specification:** To ascertain the determinants of cocoa export and import in Nigeria, two models were used and specified below i.e. export and import function. The export function is specified explicitly as:

$$\text{Ln}Y_e = \gamma_0 + \gamma_1 \text{Ln} X_1 + \gamma_2 \text{Ln} X_2 + \gamma_3 \text{Ln} X_3 + \gamma_4 \text{Ln} X_4 + \gamma_5 \text{Ln} X_5 + \gamma_6 \text{Ln} X_6 + \gamma_7 \text{Ln} X_7 + U_t \quad (i)$$

$X_{12}$  = Producer price of cocoa (in naira) ( $\beta_2 < 0$ )  
 $X_{13}$  = Agricultural Gross Domestic Product proxy for consumer's income (million) ( $\beta_3 > 0$ )  
 $X_{14}$  = External reserve (million) ( $\beta_4 > 0$ )  
 $X_{15}$  = Population (million) ( $\beta_5 > 0$ )  
 $X_{16}$  = Import value of cocoa ( $\beta_6 < 0$ )  
 $X_{17}$  = Price of substitute (Oil palm) (naira) ( $\beta > 0$ )  
 $X_{18}$  = Rainfall (mm/annum) ( $\beta_8 > / < 0$ )  
 $X_{19}$  = Policy (Dummy 0=1970-1985(closed economy); 1=1986-2025 (open economy) ( $\beta_9 > 0$ )  
 $V_t$  = Random error term  
 $\beta_0$  = intercept  
 $\beta_{11} - \beta_{19}$  = slope (elasticity)  
 From the simultaneous equations above, the endogenous variables are:  
 $Y_1$  = Quantity of cocoa import (metric tonnes)  
 $Y_e$  = Quantity of cocoa export (metric tonnes)  
 $X_{12}$  = Producer price of cocoa  
 The pre – determined variables are:  
 $X_1$  = Quantity of cocoa output (metric tonnes) ( $\gamma_1 > 0$ )  
 $X_3$  = World price of cocoa (N/tonne) ( $\gamma_3 > 0$ )  
 $X_4$  = Exchange rate (naira to one US dollar) ( $\gamma_4 < 0$ )  
 $X_5$  = Trade openness ( $\gamma_5 > 0$ )  
 $X_6$  = Export value of cocoa ( $\gamma_6 > 0$ )  
 $X_7$  = Balance of trade ( $\gamma_7 > / < 0$ )  
 $X_{11}$  = Quantity of cocoa consumed (metric tonnes) ( $\beta_1 > 0$ )  
 $X_{13}$  = Agricultural Gross Domestic Product proxy for consumer's income (million) ( $\beta_3 > 0$ )  
 $X_{14}$  = External reserve (million) ( $\beta_4 > 0$ )  
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A check of the identification property revealed that the model is over identified and can be estimated using two – stage least squares (2SLS). Following time series estimation, the variables were subjected to stationarity test before (2SLS) technique was used to describe the simultaneous equation association.

The export and import penetration ratio was used to ascertain the performance of cocoa export and import in Nigeria. More so, Net export and terms of trade was also used. The formula as adopted by Kolawole and Ajayi (2022) is stated thus:  $Y = D + Ex - Im$  where:

$D$  = Domestic demand of cocoa (metric tones)

$Ex$  = export (metric tones)

$Im$  = import (metric tones)

Export penetration ratio =  $EX/Y$

Import penetration ratio =  $Im/D$

**Results and Discussion: Stationarity Test:** The result indicates that only Trade openness ( $LnX_5$ ) and quantity of cocoa import ( $LnY_i$ ) were stationary at level I (1) while other variables became stationary after first differencing I (1). See table 1 for the stationary test.

**Determinants of Cocoa Export:** The estimate of the determinants of cocoa export is presented in Table 2. The result showed that quantity of cocoa output, producer price of cocoa, world price and nominal exchange rate were the significant determinants of cocoa export in Nigeria. The findings were in line with *a priori* expectations. The quantity of cocoa output was positive (0.3154) and significantly determines cocoa export at 1%. This implies that a 10% increase in quantity of cocoa output will lead to 3.154% in cocoa export. The producer price of cocoa was negative (-0.1216) and significant at 5%. This suggests that an inverse relationship exist between cocoa export and the producer price implying that a decline in producer's price will increase cocoa export. This agrees with findings by Ruf *et al.*, (2023), the negative relationship between producer price

and export is synonymous with a producer with the objective of disposing products will most likely give out the products at a reduced price with the consequent increase in sales but the moment the producer price is increased, sales will likely drop.

The world price has a positive (0.1358) influence on cocoa export. This implies that cocoa export rises with an increase in world price. This agrees with Nwachukwu *et al.*, (2024); and Verter and Bečvářová (2023). The nominal exchange rate had a negative (-0.0860) and significant influence on export at 5% level. This implies that, a unit increase in nominal exchange rate might reduce cocoa export by 0.086%. This result is in line with Aliyu (2011) who noted that appreciation of exchange rate results in increased imports and reduced export but not in line with findings by Daramola (2022). The country adopted floating exchange rate regime upon the introduction of SAP in 1986 as among the tools for liberalization. Arguably, this could drive cocoa export if the value domestic currency is stable as against the basket of international currencies. Furthermore, the

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variables trade openness (0.0228), export value (0.0624) and balance of trade (0.0923) all had a positive but not significant influence on cocoa export. Trade openness indicates the size of Nigeria in the international trade or the integration of the country into the global economy. It implies that as trade openness increases, cocoa export may also increase. More so, an increase in the export value may result to an increase in export. The result of balance trade reveals that Nigeria experiences a surplus in cocoa export.

**Determinants of Cocoa Import:** The estimate of the determinants of cocoa import is presented in Table 3. The result showed that quantity of cocoa consumed, producer price of cocoa, agricultural gross domestic product, import value and rainfall were the significant variables that influences cocoa import. The quantity of cocoa consumed had a positive (0.0584) and significant influence on import at 5% level. This suggests cocoa import appreciates with a rise in domestic consumption. The producer's price had a negative (-0.2763) and significant influence on import at 5% level. This shows an inverse relationship between producer price and import. The result is in line with the theory of demand. The agricultural gross domestic product which was proxy for income had a direct influence on import at 10% significant level. This implies that a 1% increase in consumer's income will increase import by 0.1449%. The import value had a negative (-0.7665) and significant influence on import at 1%. This reveals that a unit increase in import value will lead to a decline of 0.7665MT in import. The coefficient of rainfall was positive (2.0817) and significant at 5%. An increased rainfall will lead to increased output and consumption. The rise in consumption may lead to increase in import (Edet *et. al.* 2022). Furthermore, the coefficients of external reserve (0.0614), population (6.6131), price of substitute (0.2166) and policy (1.1856) were positive but not significant. The positive sign on external reserve is not in line with theory and is expected that it should have an inverse relationship with import.

**Diagnostic test results:** The cocoa export and import function have appreciable R<sup>2</sup> estimates of 62% and 87% implying that the test of goodness of fit is validated. The Wu-Hausman test showed the absence of endogeneity problem while the Sargan (score) of over identifying restrictions accepted the test hypothesis for both export and import function.

**Performance Evaluation of Cocoa Export and Import in Nigeria:** The study revealed that there is a high import penetration from 2000-2009 while the highest export penetration ratio was experienced from 1980-1989 (Table 4). Furthermore, from 1970-1979, there was zero import but only export. The study showed a fluctuation in export penetration ratio from 1970-2025 while that of import declined from 2000-2025. The overall result showed that the export penetration ratio is greater than import ratio. The performance evaluation in terms of net export and terms of trade revealed that cocoa exports was greater than import from 1970-2025. The total quantity of cocoa exported (48,934MT) was higher than the quantity imported (5,735.5MT) from 1970 to 2025. The balance of trade value is 48,360,450. Nigeria had a positive balance of trade within the study period. It can therefore be deduced that cocoa exports can adequately finance cocoa imports. This agrees with findings by Ndubuto *et.al.*, (2023) who reported an

increased performance in cocoa export from 2005-2012 with an estimated annual income of about US\$ 136.7 and US\$ 90 and Marginal revenue (US \$ million) of 78.3 to 66.7 from 2006-2015.

**Conclusion And Policy Recommendations:** The study evaluated the performance and determinants of cocoa export and import in Nigeria from 1970-2025, using 2SLS approach. The findings revealed that quantity of cocoa output, producer's price of cocoa; world price and nominal exchange rate were the significant determinants of cocoa export while the quantity of cocoa consumed, producer's price of cocoa, agricultural gross domestic product, import value and rainfall were the significant variables that influences cocoa import in Nigeria. The total quantity of cocoa exported was higher than the quantity imported over the study period and Nigeria had a positive balance of trade within the study period. The study recommended the following: government should encourage the export and import promotion strategies so as to realize a surplus balance of trade. Adequate security, effective fiscal and monetary policy and infrastructural facilities should be put in place so that foreign investors will be attracted to invest in cocoa subsector of the economy; Policy that enhances sustained performance of cocoa industries in terms of export and import for future growth self-sustainability should be adopted; Adoption of exchange rate stabilization policies is strongly advocated; Government intervention in form of subsidies, targeted export promotion programmes, expanded export processing zones (value addition) should be adopted.

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Appendix

Table 1: ADF test results for levels and variable difference

Variable	ADF at levels	Variables at difference	ADF at Difference	Order of integration
LnX <sub>1</sub>	-2.0419	DLnX <sub>1</sub>	-9.2425***	I(1)
LnX <sub>2</sub>	-1.7593	DLnX <sub>2</sub>	-5.9034***	I(1)
LnX <sub>3</sub>	-1.5451	DLnX <sub>3</sub>	-5.0896***	I(1)
LnX <sub>4</sub>	-1.6749	DLnX <sub>4</sub>	-6.4258***	I(1)
LnX <sub>5</sub>	-6.2886***	DLnX <sub>5</sub>		I(0)
LnX <sub>6</sub>	-1.8345	DLnX <sub>6</sub>	-7.0263***	I(1)
LnX <sub>7</sub>	-1.7009	DLnX <sub>7</sub>	-6.5568***	I(1)
LnX <sub>11</sub>	-1.0144	DLnX <sub>11</sub>	-8.9099***	I(1)
LnX <sub>13</sub>	-1.7902	DLnX <sub>13</sub>	-6.8891***	I(1)
LnX <sub>14</sub>	-1.7008	DLnX <sub>14</sub>	-6.5610***	I(1)
LnX <sub>15</sub>	-0.2439	DLnX <sub>15</sub>	-8.8328***	I(1)
LnX <sub>16</sub>	-2.1475	DLnX <sub>16</sub>	12.6811***	I(1)
LnX <sub>17</sub>	0.2111	DLnX <sub>17</sub>	-6.2377***	I(1)
LnX <sub>18</sub>	-0.9970	DLnX <sub>18</sub>	-7.7001***	I(1)
LnYe	-0.8764	DLnYe	-11.1899***	I(1)
LnY <sub>i</sub>	-3.9895***	DLnY <sub>i</sub>		I(0)

Notes: \*\*\* = Significant at 1% level

Source: ICO, 2025

Table 2: Determinants of cocoa export in Nigeria

Variables	Coefficient	t-statistics
LnX <sub>1</sub>	0.3154 (0.1282)**	2.46
LnX <sub>2</sub>	-0.1216 (0.0457)**	-2.66
LnX <sub>3</sub>	0.1358 (0.0496)**	2.74
LnX <sub>4</sub>	-0.0860 (0.0368)**	-2.33
LnX <sub>5</sub>	0.0228 (0.1187)	0.19
LnX <sub>6</sub>	0.0624 (0.0815)	0.76
LnX <sub>7</sub>	0.0923 (0.1496)	0.62
Constant	3.0022 (0.7426)***	4.04
R-square	0.6192	
Root MSE	0.2027	
Wu-Hausman	1.1423 (p=0.3573)	

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Sargan (score) 0.7643 (p=0.8580)  
 Notes: \*\*\* = Significant at 1% level; \*\* = Significant at 5% level

Source: ICO, 2025

**Table 3: Determinants of cocoa import in Nigeria**

Variables	Coefficient	t-statistics
X <sub>11</sub>	0.0584 (0.0281)**	2.08
X <sub>12</sub>	-0.2763 (0.1031)**	-2.68
X <sub>13</sub>	0.1449 (0.0762)*	1.90
X <sub>14</sub>	0.0614 (0.0465)	1.32
X <sub>15</sub>	6.6131 (4.8252)	1.37
X <sub>16</sub>	-0.7665 (0.1605)***	-4.78
X <sub>17</sub>	0.2166 (0.3070)	0.71
X <sub>18</sub>	2.0817 (0.8386)**	2.48
X <sub>19</sub>	1.1856 (1.9634)	1.34
Constant	106.5802 (79.6807)	1.34
R-square	0.8684	
Root MSE	1.1372	
Wu-Hausman	1.6105(p = 0.1764)	
Sargan(score)	1.9697(p = 0.9225)	

Notes: \*\*\*, Significant at 1% level; \*\*, Significant at 5% level; \*, Significant at 10%

Source: ICCO, 2025

**Table 4: Performance evaluation of cocoa export and import**

Year	Export	Import	Import Penetration Ratio	Export Penetration Ratio
1970-1979	3938000	0	0	0.649
1980-1989	19845000	50000	0.002	0.925
1990-1999	19945000	836000	0.143	0.907
2000-2009	2603600	3064800	0.871	0.682
2015-2025	2602400	1784700	0.032	0.785
<b>Total</b>	<b>48934000</b>	<b>5735500</b>	<b>1.048</b>	<b>3.948</b>

Source: ICCO, 2025