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STRENGTHENING NIGERIA'S WEAK ECONOMY; DOES AGRICULTURAL EXPORTS REALLY MATTER? EVIDENCE FROM COTTON SEED EXPORTS

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ABSTRACT

Following recent weakness in Nigeria's economy, this paper examines how to possibly strengthen the weak economy through agricultural exports particularly cotton seed exports. The paper combines data on yearly cotton seed exports in Nigeria over 46 years (1970-2015) with data on the determinants to examine the relevant variables. Co-integration approach was used in analyzing the data to examine the presence of a co-integrating relationship between the variables in the short and long run. There are two main results from the study. First, the export of cotton seed in Nigeria within the study period was low and fluctuating apart from the 70s when it was high and stable. Second, there was Co-integration relationship between cotton seed export and macroeconomic factors during the study period in Nigeria as it indicated that producers' price, exchange rate and output are long-run determinants of cotton seed exports. The results therefore indicate that commitments to policies and programmes that can favour determinants of cotton seeds exports in Nigeria are calls certainly in the right direction to strengthen its weak economy. These include the provision of export incentives such as removal of stamp duties from export trade, provision of explicit export bonuses, aligning producer price with export price as well as encouraging private sector inclusion through the provision of an enabling environment for the private sector to flourish and get involved in the strengthening of the weak economy. The paper has contributed to agricultural development policy implications connected with agricultural export programs for the government, investors, exporters and farmers in Nigeria.

Key Words: Agricultural exports, cotton seeds, Nigeria, weak economy

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INTRODUCTION

There is no doubt that Nigeria's economy is weak. There is a high level of hunger, poverty and unemployment in the country. An important question now is "how can the weak economy of Nigeria be strengthened"? This question as a matter of fact has become increasingly important in view of the fact that Nigeria is an agrarian region. The situation is more worrisome when it is realized that the country is blessed with suitable environmental factors that favour cotton seeds outputs which can boost her economy when traded internationally. The high level of disparity between the well-being of an average person in the developed nations where the per capita income exceeds US$ 20,000 and that of sub-Sahara nations including Nigeria under US$

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500 per year is striking. Furthermore, as much as 400 million people have been found to live on less than US$1.90 per day (World Bank, 2017). Nigeria certainly requires a remarkable and conscious effort now to strengthen her economy in a bid to meet up with her economic, social and political responsibilities. However, the Federal Government of Nigeria between 1986 and 1994 came up with the Structural Adjustment Programme (SAP) to re-structure its weak economy with the main purpose of diversifying the export base of the nation away from the oil sector and the intensification of the agricultural exports as a way of expanding the exports from the non – oil sector. This attempt failed as a result of inconsistencies in agricultural policies and programmes as well as frequent changes in government.

Ehidero (2015), pointed out that Nigerian government ought to really focus on agriculture where the nation has comparative advantage. Nigeria neglected cotton seed exports which were basically one of its major foreign earners in the 60s and 70s and contributed largely to the Gross Domestic Product (GDP), for the export of crude oil regarded as "black gold". Cotton seed and lint exports from Nigeria have accounted for 9.8%, 4.9%, 2,4%, 3.8% and 3.8% share of the total value of exports from Nigeria in 2009, 2010, 2011, 2012 and 2013 respectively (Akenbor and Nwandu, 2021; CBN, 2013). This shows a downward movement in the contribution of cotton towards the total exports value from the country. Now that the export of black gold has failed the nation, thereby weakening her economy as a result of its unstable nature in the world market, there is therefore an urgent need to diversify the economy by going back to the export of cotton seed which is relatively stable in international market. More so, cotton seed is renewable, but crude oil is not. Increased export of cotton seed in Nigeria as part of the nation's economic development cannot be over-emphasised. This has become imperative as cotton is a main cash crop which can be traded internationally and can be grown at commercial level in almost all parts of Nigeria. The only challenge in its production is that rainfall reduces its yield considerably. This can simply be overcome by planting at such a time when during the production of the seed and lint in the next six months after planting, it would have been dry season. Fortunately, all parts of the region including Nigeria enjoy a fairly long period of dry season. Cotton seed is a produce derived from cotton plant. Despite these advantages of its short period of production and highly traded globally, the export of cotton in Nigeria, dropped considerably over the years while employment from the industry dropped from 700,000 in 1980s to 25,000 in 2012 as well as a drop in the value addition from 25 percent in the same period to only 5 percent (Adesina, 2012). Statistics obtained from the Central Bank of Nigeria indicate that the total output of cotton seeds were 857,000 tonnes in 1990-1994 and 1,004,000 tonnes in 2010-2014 as against 462,901 tonnes in 1970-1974 as shown in Table 1. The table also indicates that the quantity of cotton seed exported from the country were 10,473 tonnes in 1990-1994 and 39,800 tonnes in 2010-2014 as against 276,206 tonnes in 1970-1974. It is observed from the table that while the production of cotton seed increased over the years, the exports declined. The reason for the increase in production was that many cotton producers were encouraged to increase production due to the abolition of the marketing boards in 1986 which had a lot of problems, including fixing producer's price far below the export price. Furthermore, Table 1 shows that there has been a continuous increase in the exchange rate in Nigeria over the years. Obayelu and Salau (2010), posited that

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increases in exchange rate leads to increases in foreign exchange earnings by producers and nations through their product export. Therefore, matching this increase in cotton seed output with increase in its exports would have strengthened Nigerian economy over the years.

Fortunately, barriers to world trade have been reduced globally in the past twenty years and many developing nations from Asia and Latin America have integrated into world markets to strengthen and boost their economies. However, Nigeria has not taken advantage of this to integrate into the market as exemplified by Asia and Latin America. A major reason for this is that the macroeconomic environment which determines agricultural competitiveness in the international market is hardly considered by Nigeria.

Therefore, investing massively on cotton seed which can resist drought and has a short life cycle may be a right step in the right direction. This paper is unique in that it is the first to examine cotton seed exports in Nigeria using a time series of 45 years (1970-2015) with a co-integration approach. The two objectives of this paper are to examine the growth trend in cotton seed export in Nigeria from 1970-2015 and to ascertain the macro economic factors that have affected the exports of cotton seed in Nigeria within the period under review.

METHODOLOGY

This work was done in Nigeria, situated in West Africa. Time series data were collected for a long period of 46 years, 1970 to 2015 from secondary sources which include various issues of Central Bank of Nigeria (CBN), United Nations Food and Agricultural Organization (UNFAO), World Bank and United Nations Development Programme (UNDP). Others include International Cotton Advisory Committee, International Food Policy Research Institute (IFPRI) as well as International Centre for Trade and Sustainable Development (ICTSD). In order to achieve the various objectives of this study, different analytical tools were used. Co-integration, Growth models, Frequency Distribution Tables, Graphical Methods and OLS were used in analyzing the data for the study.

In estimating the growth trend in cotton seed export for the period of 1970 to 2015, compound interest formula was used to develop the model (Shadmehri, 2008) and expressed as:

$Y_t = Y_0 (1+r)^t$ …… (1)

Let;

Y_t = Export of cotton seed ('000 tonnes)

Y_0 = Initial Value of Export of cotton seed ('000 tonnes) in 1970.

r= Compound rate of growth of Export of cotton seed over time

t= Time trend (1970 to 1985, 1986 to 1994 and 1995 to 2015)

Taking the natural logarithm of equation (1), equation (2) was derived as:

$\ln Y_t = \ln Y_0 + t\ln (1+r)$ ..... (2)

Taking into cognisance;

$\ln Y_0 = b_0$

$\ln (1+r) = b_1$

Then equation (2) can thus be rewritten as:

$\ln Y_t = b_0 + b_1 t$ …… (3)

By adding disturbance term to equation (3), the explicit form of the model becomes:

$\ln Y_t = b_0 + b_1 t + u_t$ …… (4)

Where:

Y_t = Export of cotton seed ('000 tonnes)

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t= Time trend (1970 to 1985, 1986 to 1994 and 1995 to 2015)

b_0= constant term

b_1= Coefficient of time variable

u_t= Random term

Compound growth rates of export were estimated for cotton seed using log-linear function. Ghosh (2010) highlighted that compound growth rates give a more dependable means of comparing of growth rates between crops as well as among periods. In analyzing the growth rate trend, OLS equation was fitted of the semi-log equation form as was employed by Shadmehri (2008). The semi-log equation is usually of the form:

$LnY_t = b_o+b_1t+e$ --------- (5)

Where; LnY_t is the natural logarithm time series data for export of cotton seed for year t, b_o is the constant term, t is the time trends for years of interest, e is the error term and b_1 is Growth rate for the period under consideration (i.e., slope coefficient). b_1 measures the relative change in Y_t for a given absolute change in the value of the explanatory variable (t). Multiplying b_1 by 100 gives the percentage growth rate in Y_t for an absolute change in variable (t):

$CGR = (antilog\ b_1) x100$ ..... (6)

In examining the determinants of seeds exports in Nigeria from the year 1970-2015, Co-integration and Vector-Error Correction Model was used in specifying the model as:

$LnX_t = \beta_o + \beta_1 LnP_{xt} + \beta_2 LnP_t + \beta_3 LnRER_t + \beta_4 LnY_t$ ---------- (7)

Where;

Ln = Natural Logarithm

X_t = Exports of cotton seed at time, t

P_{xt} = Exports price of cotton seed at time, t

P_t = Producers price of cotton seed at time, t

RER_t = Real Exchange rate at time, t

Y_t = Output of cotton seed at time, t

β_o and β_1-β_4 are the constant and slope co-efficients respectively

Test for Unit Root

To estimate the VECM the following steps were followed: first a test of stationary of the variables included in the model was conducted using an Augmented Dickey Fuller test (ADF) and Philip Peron test (PP), proposed by Dickey and Fuller (1981) and Philips and Peron (1988) respectively.

The ADF test for unit roots required the following model;

$\Delta x_t = \alpha_o + \delta x_{t-1} + \sum\beta\Delta x_{t-1} + e_t$. ..... (8)

Where; Δ = difference operator

X_t = variable being investigated for stationarity

δ = test coefficient

e_t = white noise

According to the decision rule, the t-statistics which is usually on the coefficient of the variable (δ) normally expected to have a negative value should be statistically different from the critical values significantly if there is going to be a rejection of the null hypothesis which states that the variable being considered is non-stationary and could be integrated of order +1 (1). However, in accepting this, the series is then regarded as not stationary and would require the process of differencing to make it a stationary series. After the process of differencing in d number of times, a series is regarded as being integrated if it has become stationary in a d order 1(d). In other words, differencing a series will yield a stationary series +1(0).

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Test for Co-integration

After checking the hypothesis of non-stationary, the time series was examined for and explores a linear combination of integrated time series that was itself stationary. For co-integration, the Johansen (1988) Maximum Likehood procedure was used.

VECM Specification

The VECM model provides a long term relationship and short-term dynamics of the endogenous variables. The VECM model is specified as follows:

$$\Delta LnX_t = \beta_o + \beta_1 \Delta LnP_{xt} + \beta_2 \Delta LnP_t + \beta_3 \Delta LnRER_t + \beta_4 \Delta LnV_t$$

$$\lambda(xt - \beta_o - \beta_1 P_{xt} - \beta_2 P_t - \beta_3 RER_t - \beta_4 Y_t) \text{ ..... (9)}$$

Where: ΔLnX_t, ΔLnP_{xt}, ... β_0, β_i are as defined in equation 7

Where; Δ denotes first difference, λ is the error correction coefficient that shows the speed of adjustment of disequilibrium. If λ has a negative sign and is statistically significant, it indicates the existence of a long-run equilibrium relationship between the model variables.

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RESULTS AND DISCUSSION

Trend in the Export of Cotton Seed in Nigeria

Figure 1 shows the trend in export of cotton seed in Nigeria from 1970-2015. The graphical representation shows a decrease from about 96,017 metric tonnes in 1970 to about 11,126 metric tonnes in 1974 with a sharp decline to zero in 1975. It further shows that there was an increase in 1978 to about 10,000 metric tonnes and a decrease in 2015 to about 8,035 metric tonnes. Truly the export of cotton seed in Nigeria within the study period was low and fluctuating and cannot be said to be impressive. This result is in agreement with Ethiopia and Ramli (2011), who studied the variability of palm oil export earnings in Malaysia by using generalized autoregressive conditional heteroskedasticity (GARCH) and found that prices of palm oil and soya bean constituted the main sources of instability in Malaysian export earnings. This result is also in agreement with Arene and Nwachukwu (2013), who did a study on the response of cocoa export market to climate and trade policy changes in Nigeria and found that cocoa export market in Nigeria was unstable and would likely continue for a long time.

Determinants of cotton seed exports

The determinants of cotton seed exports in Nigeria, was carried out using Vector Error Correction Models (VECM).

Descriptive Statistics: Table 2 presents the descriptive statistics for the macroeconomic variables. All variables exhibit a positive mean return. Over the period 1970-2015, as shown in Table 2, the maximum and minimum values were also positive. In terms of skewness, only Log of. Export Price (LESP) has return distribution that are positively skewed, while Log of Cotton Seed Producers Price (LCSPP), Log of Exchange Rate (LEXCRATE), Log Export of Cotton Seed (LEXPSED) and Log of Cotton Seed Output (LGSOT) were negatively skewed. The variables were relatively normally distributed as indicated by the p values of Jarque Bera statistic. The probability that a Jarque-Bera statistic exceeds the observed value under the null hypothesis indicates that a small probability value leads to the rejection of the null hypothesis of a normal distribution. The sum of squared deviation row represents the net change over the sample period. It shows that the LCSPP declined by about 47.48%, LESP 93%, LEXCRATE 46.04%, LEXPSED 63.05% and LGSOT by 4.26% respectively.

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Unit root test result: This was carried out to check for possibility of trend in mean and variance which is an evidence of auto correlation and seasonality in the data collected for the period. If such a trend is found, then it is regarded as a non–stationary series.

Test for stationarity: Phillip Peron (PP) and Augmented Dickey Fuller (ADF) Unit Root Tests were used to confirm the level of stationarity of the variables -log of cotton seed producers price (LCSPP), log of Export price (LESP), log of exchange rate (LEXCRATE), log export of cotton seed (LEXPSED) and log of cotton seed output (LGSOT). It was observed that the dependent and independent variables were of unit root levels +1(1), hence they did not reject the null hypothesis. They were now stationary after first difference as shown in Table 4. The unit root tests results are shown in Tables 3 and 4. The results were non-stationary at their levels, since the reported PP statistic for each of the variables is greater than the critical t-value at 5% and 10% significant levels. However, after carrying out differencing, they became stationary at first difference, integrating in the order of 1 i.e., +1(1) using intercept specification hence all variables became integrated of order one, I (1). Since all series were integrated of the same order, a necessary condition for co-integration test analysis has been met.

Based on the observation of order of stationarity identified, the results show the possibility of co-integration between the dependent variable and the explanatory (independent) variables that was obvious. Given the fact they have the same order of interaction, Co-integration test was carried out.

Co-integration test: Having confirmed that the variables are stationary, the presence of a co-integrating relationship between the variable was examined. The estimation of Co-integration test was carried out with lag length of 1, through the use of Juselius Johansen Co-integration technique (Unrestricted Co-integration Rank Test). This estimation showed trace statistics which indicated 1 co-integrating vectors and maximum eigen value statistics as well as indicating 1 co-integrating vector at 5% significance level. The Johansen co-integration test results are shown in Tables 5 and 6 respectively.

The result thus shows that, cotton seed output, exchange rate as well as cotton seed producers price are long-run determinants of export of cotton seed in Nigeria.

Vector Error Correction Models Estimate for Cotton Seed Export

Based on the presence of long run relationships, vector error correction model was estimated. Table 7 shows results of the VECM estimates for supply response of cotton seed export in both the long run and short run. Majority of the estimated coefficients have the expected signs, thus meeting a priori expectations. The magnitude of the coefficient of determination, (R^2) of 0.2386 and the F statistics show the equation's goodness of fit with a value of 1.97 and significance of estimated relationships. The value of 0.2386 of the R^2 implies that the variables in the equation explain 23.86% of cotton seed export, while the value of calculated F- statistics (1.97) indicated absence of heteroskedasticity in the model.

With reference to the results of the co-integrating coefficient in the long run as presented in Table 6, the long run coefficient of -3.187153 indicates that 1% increase in exchange rate will lead to a 3.187153% reduction in cotton seed export. Similarly, 1% increase in cotton seed producers' price will lead to an increase in cotton seed export by

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2.13%. Also cotton seed export will increase by 3.63%, with 1% increase in cotton seed output. On the other hand, cotton seed export price was not significant in exporting. The VECM analysis presented in Table 6 in the short run showed that one out of the five variables is relatively integrated in the long run. This is at variance with some authors findings such as Begum *et al* (2002), Rahji and Adewumi (2008) and Ayanwale *et al* (2013) where in the long run of rice supply response in Nigeria, area cultivated was observed to significantly influence the output (supply) of local rice.

Conclusion and recommendations

The study concluded that there was Co-integration relationship between cotton seed export and macroeconomic factors during the study period as it indicated that producers' price, exchange rate and output are long- run determinants of cotton seed exports in Nigeria. Concerted effort should be geared towards increasing cotton seed exports in Nigeria.

A major task of the government now is to motivate cotton seed exporters through the provision of export incentives such as currency retention scheme and draw-back scheme. Others include the removal of stamp duties from export trade as well as provide explicit export bonuses. More so, effort should be made to activate the macroeconomic variables in order to enhance the stability of producer price of cotton seed and align it to world prices without further delay. The government should also provide an enabling environment for the private sector to get involved and flourish in cotton seed exports and hence, help in strengthening the weak economy. These measures will help to enhance sustainable and increased cotton seed exports for economic expansion which will strengthen the nation's economy.

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APPENDICES

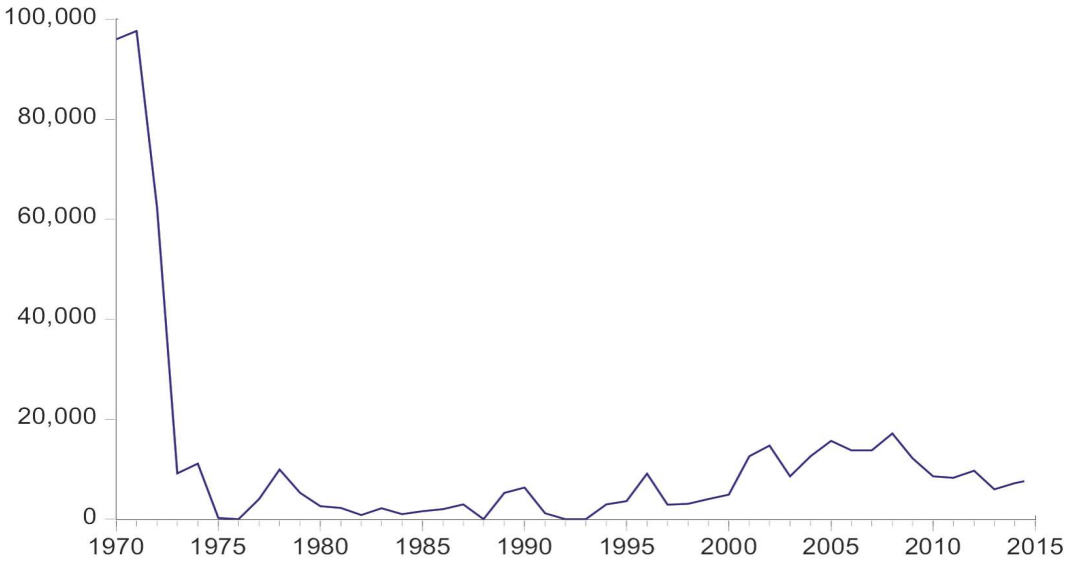

Figure 1: Trend in Cotton Seed export in Nigeria from 1970 to 2015

Table 1: Cotton Seed Output and Export figures in Nigeria, 1970 -2015

Periods	Output of cotton seed (tonnes)	Export of cotton seed (tonnes)	Exchange rate (N) / US Dollar)
1970 -1974	462,901	276,206	0.679
1975 -1979	506,210	19,406	0.618
1980 -1984	211,317	8,834	0.664
1985 -1989	314,000	11,869	3.772
1990 -1994	857,000	10,473	15.837
1995 -1999	992,000	22,688	36.048
2000 -2004	1,344,000	53,400	119.570
2005 -2009	1,483,000	72,700	131.964
2010 -2014	1,004,000	39,800	159.416
2015	220,805	8,035	250.182

Source: Authors Computation from CBN Statistical Bulletin and Annual Report of various issues

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Table 2: Descriptive Statistics on Export of Cotton Seed in Nigeria (1970-2015)

	LCSPP	LESP	LEXCRATE	LEXPSED	LGSOT
Mean	3.691849	2.652336	1.023145	3.450481	5.122874
Median	3.636309	2.563523	1.289245	3.749940	5.189761
Maximum	4.985426	3.313023	2.398253	4.989632	5.568202
Minimum	2.033424	2.178977	0.301030	0.000000	4.380211
Std. Dev.	1.027167	0.295414	1.011508	1.183682	0.307706
Skewness	-0.245376	0.641246	-0.093287	-2.062213	-0.673330
Kurtosis	1.486921	2.591727	1.343153	6.777482	2.633529
Jarque-Bera	4.849634	3.471990	5.328243	59.95381	3.733271
Probability	0.088494	0.176225	0.069661	0.000000	0.154643
Sum	169.8250	122.0075	47.06467	158.7221	235.6522
Sum Sq. Dev.	47.47822	3.927125	46.04172	63.04964	4.260746
Observations	46	46	46	46	46

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Table 3: Unit Root Tests Result of Variable at levels (Cotton Seed)

Variable		Unit root Statistics	Critical value (1%)	Critical value (5%)	Critical value (10%)	Prob.	Conclusion
LCSPP	PP	-1.034735	-3.584743	-2.928142	-2.60223	0.7328	Non-stationary
	ADF	-0.971992	-3.584743	-2.928142	-2.60223		
LESP	PP	-2.766525	-3.584743	-2.928142	-2.60223	0.0712	Non-stationary
	ADF	-2.590144	-3.584743	-2.928142	-2.60223		
LGSOT	PP	-2.859764	-3.584743	-2.928142	-2.60223	0.0582	Non-stationary
	ADF	-1.680905	-3.584743	-2.928142	-2.60223		
LEXCRATE	PP	-0.185754	-3.584743	-2.928142	-2.60223	0.9328	Non-stationary
	ADF	-2.610653	-3.584743	-2.928142	-2.60223		
LEXPSED	PP	-4.289571*	-3.584743	-2.928142	-2.60223	0.0014	Stationary
	ADF	-3.984352	-3.584743	-2.928142	-2.60223		

*** Significant at 10% critical value ** Significant at both 5% critical value
*Significant at 1% critical value. The Mackinnon (1996) one -sided p-values

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Table 4: Unit Root Tests Result of Variable at First difference

Variable		Unit root Statistics	Critical value (1%)	Critical value (5%)	Critical value (10%)	Prob.	Conclusion
LCSPP	PP	-7.253707	-3.588509	-2.929734	-2.603064	0.000	Stationary
	ADF	-7.038090	-3.588509	-2.929734	-2.603064		
LESP	PP	-6.403015	-3.588509	-2.929734	-2.603064	0.000	Stationary
	ADF	-4.764244	-3.588509	-2.929734	-2.603064		
LGSOT	PP	-17.77746	-3.588509	-2.929734	-2.603064	0.000	Stationary
	ADF	-7.774033	-3.588509	-2.929734	-2.603064		
LEXCRATE	PP	-5.451955	-3.588509	-2.929734	-2.603064	0.000	Stationary
	ADF	-10.23405	-3.588509	-2.929734	-2.603064		
LEXPSED	PP	-7.253707	-3.588509	-2.929734	-2.603064	0.000	Stationary
	ADF	-10.88143	-3.588509	-2.929734	-2.603064		

B:N

*** significant at 10% critical value **significant at both 5% critical value

* significant at 1% critical value. The Mackinnon (1996) one -sided p-values

D signifies first Difference

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Table 5: Johansen Co-integration test for Cotton seed Export (Unrestricted Co-integration Rank Test (Trace)

Null Hypothesis	Rank (or)Hypothesized NO. of CE(s)	Eigen value	Trace Statistics	Critical Value	Probability
r=0	None *	0.614885	89.18414	69.81889	0.0007
r=1	At most 1	0.437569	47.19877	47.85613	0.0576
r=2	At most 2	0.288852	21.87737	29.79707	0.3054
r=3	At most 3	0.137707	6.87887	15.49471	0.5918
r=4	At most 4	0.008145	0.35984	3.84147	0.5486

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level
r. Indicates the number of co-integration
* denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) p-values

Table 6: Johansen Co-integration test for Cotton Seed Export (Unrestricted Co-integration Rank Test (Max-Eigen)

Null Hypothesis	Rank (or) Hypothesized NO. of CE(s)	Eigen value	Max-Eigen Statistics	Critical Value	Probability
r=0	None *	0.614885	41.98537	33.87687	0.0044
r=1	At most 1	0.437569	25.32140	27.58434	0.0948
r=2	At most 2	0.288852	14.99850	21.13162	0.2890
r=3	At most 3	0.137707	6.519025	14.26460	0.5475
r=4	At most 4	0.008145	0.359841	3.841466	0.5486

Max-Eigen test indicates 1 co-integrating eqn(s) at the 0.05 level
r. Indicates the number of co-integration
* denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) p-values

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Table 7: Long-run and Short-run VECM results of Cotton Seed Export in Nigeria (1970-2015)

Variables	Coefficient	Standard error	Test statistics
Long -run			
Constant	-57.32843	-	-
LEXPSED	1.0000000		
LEXCRATE	-3.187153***	0.52753	--6.04169
LCSPP	2.128008***	0.67128	3.17007
LGSOT	3.639505**	1.42680	2.55082
LESP	-0.547537	1.15877	-0.47251
Short -run			
C	0.293418*	0.16709	1.75604
D(LEXPSED(-1))	-0.040605	0.15481	-0.262301
D(LEXCRATE(-1))	-0.400156***	0.27882	-1.43520
D(LCSPP(-1))	-1.573356	1.67228	-0.94084
D(LGSOT(-1))	-0.267056	1.32779	-0.20113
D(LESP(-1))	0.288507	1.62796)	0.17722
ECM(-1)	-0.263577**	0.10874	-2.42389

R^2=0.238638; F–statistic1.97, *sign. at 1%, **sign. at 5% ***sign. at 10%**, AIC=5.040, SIC=5.324282