Original Research Article

Impact of Government Agricultural Policies on Exports of Cocoa and Rubber in Nigeria

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Abstract

The authors investigated the impact of government agricultural policies on exports of cocoa and rubber in Nigeria using co-integration and Error Correction Model approach. The analysis was carried out on time series data collected from 1970 to 2008. The result shows that Policies like Agricultural Credit Guarantee Scheme Fund (ACGSF), Structural Adjustment Programme (SAP) and Post-Structural Adjustment Programme (PSAP) have a significant positive impact on exports of cocoa and rubber. A possible reason been that the export promotion incentives provided in the SAP and PSAP periods probably encouraged the production of these crops. Among these incentives are liberalization of agricultural exports, liberalization and devaluation of the Naira exchange rate. Similarly, the ACGSF provided incentives in the form of credit which probably encouraged the production of these crops.

Keywords: agricultural policies; exports; cocoa; rubber; Nigeria.

INTRODUCTION

The agricultural sector is an important economic sector in Nigeria's economy. It plays an important role in rapid growth and development of Nigerian economy (Famoriyo and Nwagbo, 1981). It provides food for the growing population, employment for over 70% of the population, raw materials and foreign exchange earnings for the development of industrial sector (Giroh et al., 2010). In spite of the predominance of the petroleum sub-sector in Nigerian economic growth and development, agriculture remains a major source of economic resilience (Ojo and Akanji, 1996). However, the oil boom in the early 1970s caused a drastic fall in the percentage contribution of the agricultural sector from 70% to 35% in the early 1980s.

It is imperative to note that Nigeria, once a leading exporter of several agricultural products like Cocoa, Rubber, Palm Kernel and Groundnuts, has lost leadership position in these products (Mesike, 2010). The realization of this setback by the government led to the formation of different agricultural programmes and policies aimed at preventing the collapse of the agricultural sector and subsequently targeted at short-to-medium-term adjustment to ensure sustainable growth of the sector. Amongst these policies and programmes instituted by the government are: the River

Basin Development Authorities (RBDAs) in 1991, the National Accelerated Food Programme (NAFP) in 1972, Agricultural Development Projects (ADPs) in 1975, the Operation Feed the Nation (OFN) in 1976, the Agricultural Credit Guarantee Scheme Funds (ACGSF) in 1977, the Green Revolution Programme (GRP) in 1980, and Structural Adjustment Programme (SAP) in 1986 (Ojo, 1988).

By the middle of 1980s, trade policies have since then been aimed at liberalizing the economy as well as achieving greater openness and greater integration with the world economy. The policies ranged from abolition of marketing boards, to introduction of the second tier foreign exchange market (SFEM), various export expansion incentive schemes and establishment of the Nigeria Export-Import Bank. With the scrapping of the Marketing Board in 1986, the marketing channel now has more operators and links; resulting into many people becoming gainfully employed. Moreover, cocoa and rubber farmers in Nigeria were saved the agonies of long delays in payment and purchases. Official statistics from CBN (2008) indicate that an average of about 240,000 and 111,000 tonnes of cocoa and rubber, respectively, were produced between 1986 and 1993 as against an average of about 154,000 tonnes and 54,000 tonnes of cocoa and rubber, respectively, in the period 1978 to 1985.

Table 1: Summary of Cocoa and Rubber Production, Export and Value of Credits Provided through Agricultural Scheme Guarantee Scheme Fund (ACGSF) in Nigeria, 1970 – 2008

Periods	Production of cocoa ('000 tonnes)	Production of rubber ('000 tonnes)	Export of cocoa ('000 tonnes)	Export of rubber ('000 tonnes)	ACGSF cocoa (Naira)	ACGSF rubber (Naira)
1970-1974	246.4	65.09	216.99	51.94	-	-
1975-1979	179.6	58.60	161.23	31.16	-	-
1980-1984	152.6	51.60	115.88	24.48	40.6	16.3
1985-1989	193.4	77.56	146.49	40.28	1045.5	375.4
1990-1994	286.6	133.20	141.21	65.05	570.8	10.8
1995-1999	287.8	120.40	153.43	82.27	1.183	49.8
2000-2004	367.4	122.20	196.11	26.24	1.609	244
2005-2008	486.5	142.75	216.40	31.66	19.869	604.8

Source: Computed from CBN statistical Bulletin (various issues), CBN Economic and Financial Review (various issues)

Another fact that is conveyed in Table 1 was the improvement in the export of cocoa and rubber.

As part of efforts being made to improve Nigeria's agricultural sector, former Nigerian President (Chief Olusegun Obasonjo) had at various times organized forums where he met with relevant stakeholders in Rice, Vegetable oil, Sugar, Cassava, Tree crops and Livestock industry, respectively. The forums aimed at identifying the peculiar problems confronting each industry and to chart the way forward. 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, the President, Federal Republic of Nigeria launched a special programme tagged "Cocoa Rebirth" in 2005 in Ibadan, Oyo State, Nigeria. This was in order to promote awareness of the wealth creation potentials of cocoa, promote increase in production, attract youth into cocoa cultivation, generate surplus for export and help raise funds for the development of the industry. A similar programme tagged "Presidential Initiative on Rubber" was also held in Benin city, Edo state, in 2006 to promote increase in both local production and utilization of rubber to the point where Nigeria can export and have enough for domestic use, generate rural employment, increase farmers income and standard of living. The Presidential initiatives on cocoa and rubber reform have raised the hope of farmers to such extent that many farmers have gone back to their abandoned farms. Within the short period of operations, the Presidential Initiative has made remarkable achievements. Notable among these achievements is the planting and rehabilitation of old plantations and setting up of new ones, increase in production, training of farmers, sensitization for increase in local consumption and exports, and renewed efforts in research. It is on the strength of these issues that the study was conducted to determine the impact of government agricultural policies such as Agricultural Credit Guarantee Scheme Funds, Structural Adjustment Programme and Green Revolution Programme on exports of cocoa and rubber in Nigeria.

MATERIALS AND METHODS

Source of data

The data for the export volume and the value of Agricultural Credit Guarantee Scheme Funds were obtained from secondary sources which include the Central Bank of Nigeria (CBN) Publications such as Annual reports and statements of Account, Statistical Bulletin and Economic and financial review. The data cover the period from 1970 to 2008.

Method of data analysis

The study employed the Error Correction Model (ECM) within the context of co-integration theory to analyze the data. The estimation procedure was used to overcome the problems of spurious correlation often associated with non-stationary time-series data. Further, the procedure is able to generate long-run relationships (Engle and Granger, 1987; Hendry, 1986; Johansen, 1988; Johansen and Juselius, 1990; Goodwin and Schroeder, 1991; Hallam et al., 1994). Tambi (1999) noted increased importance of cointegration analyses for describing long-run equilibrium relationships.

In using Error Correction Model (ECM), the first step is to assess the order of both the dependent and independent variables in the model. The order of integration ascertains the number of times a variable will be differentiated to become stationary. Dickey-Fuller statistics (DF) and Augmented Dickey-Fuller statistics (ADF) was used in this study to test the stationarity of individual series (Dickey and Fuller 1981). The DF and ADF test procedure is indicated in equations 1 and 2.

$$\Delta X_t = \alpha_o + \delta X_{t-1} \tag{1}$$

$$\Delta X_t = \alpha_o + \delta X_{t-1} + \sum \beta_j \Delta X_{t-1} + e_t \tag{2}$$

Where t is the time or trend variable, e_t is a pure white noise error and $\Delta X_{t-1} = (X_{t-1} - X_{t-2})$.

The decision rule states that the t-statistics on the coefficient of the variable δ, which is expected to be negative, must be significantly different from the critical values for a given sample size, if the null hypothesis is to be rejected. The null hypothesis is that the variable of interest is non-stationary [i.e. it is integrated of order one I (1)].

After establishing the stationary properties of the individual series, linear combinations of the integrated series were tested for cointegration. Cointegration is a test of stationarity of the residuals generated from running a static regression at levels of one or more of the regressor variables on the dependent variable.

ECM is accepted when the residuals from the linear combination of non-stationary I (1) series are themselves stationary. The acceptance of ECM implies that the model is best specified in the first differences of its variables. In this context, the application of cointegration paradigm will guard against the loss of information from long-term relationships in the first differences. The information in the error term of the long-run relationship is used to create a dynamic error correction model. The ECM is then used to analyze the effect of government policies on exports of cocoa and rubber in Nigeria.

The government policies that were examined are Green Revolution (1980-1985), Agricultural Credit Guarantee Scheme Fund (1981-2008), Agricultural Policies under the structural adjustment programme (1986-1993) and the post-SAP policies (1994 to date).

To control for the effects of different government policies, the amounts of credit given to cocoa and rubber farmers were used for the Agricultural Credit Guarantee Scheme Fund (ACGSF) while dummy variables were used for other policies. The dummy variables took the value of 1 (one) in the policy period and 0 (zero) otherwise.

Table 2: Unit Root Tests of Exports and ACGSF of Cocoa and Rubber

Variable	ADF Test	Critical Value at 1%	Critical Value at 5%	Order of Integration	Remark
Cocoa export	-2.632639	-3.615588	-2.941145	I(1)	Non stationary
Rubber export	-1.796915	-3.615588	-2.941145	I(1)	Non stationary
ACGSF cocoa	1.624212	-3615588	-2.941145	I(1)	Non stationary
ACGSF rubber	-2.916302	-3.615588	2.941145	I(1)	Non stationary

The required equation is:

$$\Delta X_t = \beta_0 + \beta_1(ACGSF)_t + \beta_2(GR)_t + \beta_3(SAP)_t + \beta_4(PSAP)_t + \beta_5 ECM(-1) + \delta_t \qquad (3)$$

Where *GR, SAP, PSAP* are dummy variables for Green Revolution, Structural Adjustment Programme and Post-structural Adjustment Programme policies. Δ is the difference operator, X_t is the exports volume of cocoa and rubber, ECM (-1) is the error correction factor and δ_t is the stochastic error term assumed to be independently and normally distributed with zero mean and constant variance. The *a priori* expectation is that ACGSF, GR, SAP and PSAP will positively affect the exports of cocoa and natural rubber.

RESULTS AND DISCUSSION

Test for Order of Integration

The results of the ADF tests for the order of integration of exports and ACGSF of cocoa and rubber using EVIEW 5.1 software is given in Table 2. The tests were applied over the period of 1970-2008 without a time trend. The test results strongly support the null hypothesis that exports of cocoa,

rubber, ACGSF of cocoa and rubber are I (1) or non-stationary. Following from this is the need to differentiate the variables that are I (1). In essence any attempt to use the non-stationary variable at its level could lead to spurious results.

Cointegration Test

The Engle Granger two-step procedure was adopted to test for co-integration of exports of cocoa and rubber with their fundamentals. This was done as a condition for accepting the Error Correction Mechanism (ECM) model. Cointegration would be accepted if the residuals of the series that were I (1) are in fact I (0). The test tries to establish whether there was long-run relationship between the dependent variables and their fundamentals. Table 3 and Table 4 show the result of the cointegration tests conducted. From these tables it is seen that the absolute value of the Augmented Dickey-Fuller (ADF) test statistic was greater than its critical value at 1%, so cointegration was not rejected. The results indicated that the exports of cocoa and rubber cointegrate with the government agricultural policies used in the model. The existence of cointegration among the dependent variables and their determinants implies that there is a long-run equilibrium relationship between the variables used in the model.

Table 3: Result of Cointegration Test of Impact of Government Policies on Exports of Cocoa

Variable	Coefficient	Standard error	t-statistic	Probability
Constant	197.800	14.70384	13.45227	0.0000
ACGSF	0.008725	0.001463	5.962481	0.0000
GR	45.19366	24.01136	1.882178	0.0687
SAP	54.95297	22.10449	2.486054	0.0182
PSAP	116.9672	2158747	5.418289	0.0000
	Test statistic	Critical value at 1% level	Critical value at 5% level	Critical value at 10% level
ADF	-5.622784	-3.621023	-2.943427	-2.610263

Table 4: Result of Cointegration Test of Impact of Government Policies on Exports of Rubber

Variable	Coefficient	Standard error	t-statistic	Probability
Constant	60119.90	5790.814	10.38194	0.0000
ACGSF	18.60627	10.87366	1.711132	0.0964
GR	10377.61	10037.18	1.033917	0.3087
SAP	56241.58	8688.818	6.472869	0.0000
PSAP	62141.44	8161.192	7.614261	0.0000
	Test statistic	Critical value at 1% level	Critical value at 5% level	Critical value at 10% level
ADF	-5.838163	-3.621023	-2.943427	-2.610263

Error Correction Model

The existence of cointegration among the dependent variables and its determinants necessitated the specification of ECM for impact of government policies on export of cocoa and rubber. Table 5 and Table 6 show the result of the error correction model of impact of government policies on export of cocoa and rubber, respectively.

For the cocoa industry, the result shows that ACGSF, GR, SAP and PSAP have a significant positive impact on export of cocoa. This implies that the ACGSF provided incentives in the form of credit, which probably encouraged the production of cocoa. Similarly, the Green Revolution (GR) provided incentives in the form of liberal resource allocation to agriculture, particularly irrigation facilities, agro-chemicals, equipment, improved seedlings and infrastructural facilities, which probably encouraged the production of cocoa. In addition, the export promotion incentives provided in the SAP and PSAP periods probably encouraged the production of cocoa as a result of economic openness that made them to be better

off facing the world market price. Among these incentives are liberalization of agricultural exports and liberalization and devaluation of the Naira exchange rate (Ukoha, 2007). The ACGSF and PSAP were significant at 1 percent probability level while SAP and GR were significant at 5 percent and 10 percent probability level, respectively. The error correction term [ECM (-1)] for cocoa has the expected negative sign, and is statistically significant at 1 percent probability level. The error correction estimates of (-0.439177) indicates that there was over 43 percent convergence to equilibrium with intermediate adjustments captured by difference term. The ECM estimates indicates a feedback of about 43.91 percent of the previous year's disequilibrium from the long-run values of the independent variables.

For the rubber industry, the result shows that ACGSF, SAP and PSAP have a significant positive impact on export. This implies that there is a positive relationship between ACGSF and export. Similarly, the export promotion incentives provided in the SAP and PSAP periods probably encouraged the production of rubber and the farmers also had their income

Table 5: Error Correction Model of Impact of Government Agricultural Policies on Export of Cocoa

Variable	Coefficient	Standard Error	t-statistic	Probability
Constant	198.1273*	15.13756	13.08846	0.0000
ACGSF	0.008731*	0.001800	4.851299	0.0003
GR	43.58948***	24.94254	1.747596	0.0932
SAP	54.67033**	22.276162	2.401864	0.0236
PSAP	115.7842*	22.48272	5.149919	0.0000
ECM(-1)	0.439177*	0.078541	5.592332	0.0000
Adjusted R^2	0.76			
Schwarz criterion	21.98			
F- statistic	25.87*			
Hetero test	2.25(0.61)			
Normality test	16.68(0.00*)			
Ramsey RESET test	2.17(0.21)			
DW	1.96			

*, **, *** indicate significance at 1%, 5% and 10% probability level. Values in parentheses are the corresponding probability level

Table 6: Error Correction Model of Impact of Government Agricultural Policies on Export of Rubber

Variable	Coefficient	Standard Error	t-statistic	Probability
Constant	59671.52*	4960.328	12.02975	0.0000
ACGSF	23.60855**	10.39034	2.272165	0.0345
GR	43.15431	23.32770	1.849917	0.0693
SAP	51697.89*	7540.766	6.855788	0.0000
PSAP	61330.33*	6992.410	8.770986	0.0000
ECM(-1)	0.602463*	0.161356	3.733744	0.0008
Adjusted R2	0.82			
Schwarz criterion	22.56			
F- statistic	34.24*			
Hetero test	2.19(0.57)			
Normality test	13.12(0.00*)			
Ramsey RESET test	2.26(0.21)			
DW	1.62			

*, ** indicate significance at 1% and 5% probability level. Values in parentheses are the corresponding probability level

levels relatively improved as a result of economic openness that made them to be better off facing the world market price. Among these incentives are liberalization of agricultural exports, liberalization and devaluation of the Naira exchange rate etc. SAP and PSAP policies were significant at 1 percent probability level while ACGSF policy was significant at 5 percent probability level. The result agreed with the study of Obadan (1993) that SAP policies have positive impact on the exports supply of rubber. The error correction term [ECM (-1)] for rubber have the expected negative sign and statistically significant at 1 percent probability level. The error correction estimates of (-0.602463) indicates that there was over 60 percent convergence to equilibrium with intermediate adjustments captured by difference term. The ECM estimates indicates a feedback of about 60.24 percent of the previous year's disequilibrium from the long-run values of the independent variables.

In conclusion, the result shows that there is significant positive effect of government agricultural policies such as SAP, PSAP and ACGSF on the exports of cocoa and rubber in Nigeria. The policy had tremendous effects on the level and volume of exports in agricultural subsector as a result of liberalization policy that made the farmers to be better off facing the world market price. It is therefore necessary for policy makers to formulate policies that will eventually enhance investment in cocoa and rubber as these will lead to increased output and values of these crops in the country if when implemented.

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