International Scholars Journals

African Journal of Tropical Agriculture ISSN 2375-091X Vol. 2 (11), pp. 111-115, November, 2014. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Economic down turn in aggregate cocoa Production

Olise V. O. Cyril

Department of Agricultural Economics, Faculty of Agriculture, University of Ibadan, Ibadan, Nigeria.
Email: Cyril.olise45@ui.edu.ng

Accepted 24 October, 2014

In the 1970s and 1980s there was a consistent economic down turn and decline in aggregate cocoa output in Nigeria. This culminated in the introduction of structural adjustment programme (SAP) in 1986 to stem this trend. The objective of the paper was to evaluate the effect(s) of the deregulated policy measures on the cocoa industry in southwest Nigeria. Data were collected from six important cocoa producing Local Government Areas (LGAs) within the region and these were analyzed using descriptive statistics and regression techniques. The study found that after two decades of operating SAP and economic liberalization policy in the country, cocoa production still remains in the hands of smallholder operators with little application of chemical inputs to enhance output. The paper concludes that significant increases in aggregate cocoa output can be achieved through a combination of sustained increase in real producer prices, local currency devaluation and increased supply of chemical fertilizers.

Key words: market deregulation, cocoa, southwest Nigeria.

INTRODUCTION

Prior to the 1970's, the policy of government towards agricultural development in general and to cocoa production in particular in Nigeria was one of minimum government intervention. Governments' involvement was mainly supportive of the activities of farmers and focused mainly in the areas of research, extension, export crop marketing and pricing activities (Manyong et al., 2005). The attitude of government was borne largely out of the prevailing economic policy of laissez faire inherited from the colonial masters. This was soon to change.

By the middle to late sixties, the Nigerian government like other developing countries, in realization of the relative importance of cocoa and other agricultural exports to the economy, brought the input supply and produce marketing systems under the state official monopoly. Marketing Boards were set up to intermediate between the farmers and the international market. The objectives then were to (i) stabilise prices paid to the producers (ii) ensure public access and control over foreign exchange earnings (iii) strengthen the marketing mechanisms (iv) create an ideological antipathy to private traders and (v) impose constraints on multinational enterprises (Delloitte et al., 1990). In spite of these laudable objectives, the monopolistic marketing structure erected in the name of Commodity Boards served as a great disincentive to cocoa farmers both in production and replanting (Idowu, 1986). As found out by several studies, the Commodity Boards represent-ted agencies for taxation as the producer prices paid to the farmers were well below world prices (Oni, 1971; Olayide et al., 1974; Idachaba, 1990; Akanji and Ukeje, 1995). Other factors that negatively influenced cocoa pro-duction and marketing as argued by Delloitte et al. (1990) were the oil boom syndrome and relative over-va-luation of the Nigerian currency (Naira) to other curren-cies. Consequently as observed by Idowu (1986), the 1970s and 1980s witnessed a consistent decline in aggregate cocoa output. Various research efforts were carried out to find the appropriate policy response to-wards restoring cocoa production to the prime position it used to enjoy before the advent of crude oil boom. The literature on the determinants of cocoa production and marketing including the analysis of Nigerian agricultural pricing policies can be generally classified under three groups: the pre-SAP, during SAP

and post-SAP studies. The pre-SAP studies that included Olayide et al. (1974); Idowu (1986), and Adegeye (1986) among others established a strong relationship between the aggregate cocoa output and producer prices. Based on this, the policy recommendations tended to favour price incentive strategies in the form of administrative upward review of producer prices and input subsidization as panacea to sustaining increased aggregate output of cocoa. Other important factors identified as influencing cocoa pro-duction and marketing include bureaucratic problems associated with Commodity Boards (Delloittee et al., 1990); socio- economic and agronomic factors like age of the farmers, age and size of plantation, institutional inadequacies of Research Institutes and the Cocoa Development Units (Adegeye, 1986; Idowu, 1986).

In spite of the price increases however, the aggregate output of cocoa in Nigeria showed a consistent decline (Adegeye, 1986). The inability of price increases to enhance cocoa production was then was linked to the structural weakness in the Nigerian economy. The global economic depression of the 1980s had an adverse effect on the Nigerian economy. There were both internal and external imbalances created as a result of price distortions (CBN/NISER, 1992). Various austerity measures adopted at the beginning of the 1980s like stabilization measures of 1982 along with the restrictive monetary policy and stringent exchange control measures of 1984 proved ineffective (Ojo, 1994). The situation then called for a complete economic re-design that would ensure economic stability, restructure the pattern of production and consumption and ensure reasonable growth.

In 1986, the government of Nigeria announced the adoption and implementation of a Structural Adjustment Programme (SAP) with four cardinal objectives as follows:(i) Restructuring and diversifying the productive base of the economy in order to reduce dependence on oil exports; (ii) Reducing the dominance of unproductive investment in the public sector; (iii) Encouraging non-oil exports especially agricultural ones; and (iv) Improving the sectors' efficiency and intensify the growth potential of the private sector.

The SAP embraced exchange rate deregulation, liberalization of export trade, reduction in extra budgetary expenditure, withdrawal of subsidies and the privatization of public enterprises. Thus, deregulation placed much emphasis on the market forces in determining the prices of goods and services and allocating the resources within the economy. Therefore, the policy measures as they affect agriculture ensued as follows: (i) The abolition of commodity Boards and the privatization of many agricultural enterprises previously controlled by the government (ii) Market liberalization of agricultural exports and; iii) Foreign exchange liberalization and currency devaluetion. The effects of Nigerian deregulation policy measures on cocoa production both at micro and macro level have also been investigated by many. Prominent among these are Adegeye and Dittoh (1988); Idowu (1988); Adegeye (1991); CBN/NISER (1992); Alimi and Awoyomi (1995) and Akanji and Ukeje (1995). The most prominentanalytical techniques had been descriptive statistics of "before, during and after" effect approach; budgetary analysis and production response function analysis. Some of the major findings included: first, the increased cost of maintaining cocoa farms by about 300% while producer prices increased by about 800% (Adegeye, 1991)., and second, the adoption of SAP gave an estimated positive gross margin of N1,585.00 per hectare in 1989 compared to negative gross margin of N105.00 per hectare in 1985. Also, the production function estimated by CBN/NISER (1992) indicated that the aggre-gate output of cocoa is determined by real producer prices, exchange rates, interest rates, farm wage rates, world prices, and SAP dummy variable.

Nevertheless, all these SAP period studies had a major shortcoming in that the SAP periods covered by the studies were too short for any meaningful analysis and evaluation for long run policy formulations. Incidentally even after canceling the SAP, the government has continued to intensify the privatization of public enterprises, increased wages, liberalized export trade and increased spending on infrastructural support to the agricultural sector putting in place stringent fiscal and monetary policies (UNS, 2001). The production and marketing of cocoa has also witnessed its ups and downs with the dynamics in national economic policy. The dynamics that has taken place in the production and marketing of cocoa has however not been evaluated. Hence, the main objective of this paper is to evaluate the effect(s) of the deregulated policy measures on the cocoa industry in southwest Nigeria.

RESEARCH METHODOLOGY

Two sets of data were utilized for this study. The first set, which were primary data, were obtained from the cocoa farmers. Three hundred questionnaires were analyzed for the cocoa farmers. Six important cocoa producing Local Government Areas (LGAs) of Oyo, Osun and Ondo states in southwest Nigeria were randomly selected for the study. These were Egbeda (Oyo); Isokan (Osun); Irewole (Osun); Ayedaade (Osun); Owena (Ondo); and Ile-Oluji (Ondo). In each of the LGAs, 70 questionnaires were administered and those considered analyzable for the purpose of this study were Owena (40); Ile-Oluji (58); Ayedaade (48); Irewole (66); Isokan (40) and Egbeda (48). The data collected included socioeconomic variables like age, farm size, annual output per farmer, educational level, family size, volume of business and experience with the aim of identifying how they influence cocoa production and to study any significant shift from other previous studies.

The second set of data were secondary in nature and included the producer prices, aggregate fertilizer supply, the world prices, the national output, the foreign exchange rates and the lending rates over a period of 35 years (from 1970 to 2004). These information were obtained from the official records of the Central Bank of Nigeria (CBN), Federal Office of Statistics (F. O. S), the International Cocoa Organisation (ICCO) and the Ministries of Agriculture and Natural Resources of respective

states.

The data collected were analysed using various analytical tech niques. Descriptive Statistics was employed to analyze the socio economic characteristics of the farmers while Correlation and Regression Analyses were used to obtain the structural equations for cocoa output at farm level for each local government area sampled as well as fitting a cocoa production response function using the ordinary least squares estimation technique.

Two models were specified and estimated. These were:

Cocoa Output Function at Farm Level which was specified as

$$Q_o = f(X_1, X_2, E_i) \text{ ---------- (1)}$$

where: Q_o = output per farmer; X_1 = man days of labour employed X_2 = Intensity of chemical used for fumigation (obtained as the amount of chemical use divided by farm size).

Both the linear and power functions were fitted. *A priori* expectations were that the variables X_1, and X_2 would bear positive signs. The model was estimated separately for each Local Government Area and for the whole region.

Cocoa Production Response Function which was also specified as

$$Q_s = f(X_a, X_b, X_c, X_d, X_e, E_i) \text{---------- - (2)}$$

where: Q_s = aggregate output of cocoa in year t; X_a = one year lagged real producer prices (1985=100); X_b = one year lagged exchange rate (dollar to Naira); X_c = one year lagged world price (₦); X = aggregate fertilizer supplied in year t (metric tonnes); X_e = lending rates in year t (%); E_i = stochastic disturbance of zero mean and constant variance.

Both the linear and double -log functions were tried. *A. priori* expectations of the model were that the coefficients X_a, X_b X_c, and X_d would bear positive signs while X_e would bear a negative sign.

The two models specified were estimated by employing the least squares (OLS) estimation regression technique. In each case, the correlation matrixes of the variables were first obtained to observe the existence of multi collinearity problems. Also all the assumptions of the classical normal linear regression model were assumed to hold.

The insight obtained from the correlation matrix helped in the formulation of the model postulates. The findings and discussions sequel to the analyses are discussed in the next section.

RESULTS AND DISCUSSIONS

Socio economic characteristics of the cocoa

farmers Age of the cocoa farmers

The age distribution of the cocoa farmers showed that none of the farmers was less than 28 years of age. Over 68% of the farmers interviewed were over 50 years of age while the overall mean, mode and median were 55.8, 65 and 58 years respectively. The F-statistic of 2.285 obtained from the ANOVA (against the critical value of 2.37) indicated that the differences in the mean ages across the six LGAs sampled were not statistically significant at 5% level.

The implications of these findings were that most of the farmers were getting too old and may not be able to meet the demands which the intensive care of cocoa farms require. In addition young and energetic people were scar-ce in the industry. This may lead to shortage of cocoa farmers in the near future.

Present size of cocoa farms

The size distribution of cocoa farms indicated that about 65% of the cocoa farms were 2 hectares or less. Just about 5% had 5 hectares or more. The overall average size of holdings was 2.19 hectares. The mode and median were 1.54 and 1.89 hectares respectively. There were variations in mean farm sizes across the Local Governments Areas sampled as the computed F-statistic of 3.28 against the critical value of 2.37 indicated that at least two of the mean farm sizes have their differences statistically significant at 5% level.

The conclusion that can be drawn from this finding is that cocoa production takes place on smallholdings. Thus a representative cocoa farmer in southwestern Nigeria is a small-scale producer. This further shows that despite the SAP measures, cocoa production had not shown a remarkable deviation from the pre-SAP days findings by Helleiner (1966) and Idowu (1986).

Age of cocoa plantations

The age distribution of cocoa plantations indicated that over 70% of the cocoa trees were above 30 years of age with less than 10% below the age of 20 years. The overall mean age of the plantation was 35.23 years while the modal and median values were 43.25 and 43.45 years respectively.

The inferences from these findings are that: first, most of the plantations have exceeded their economic use life, generally taken to be 30 years (Oshikanlu, 1982). Second, relatively new plantations were not adequate enough to effectively replace the ageing ones. Third, it could be argued from the distribution that there was no mass replanting exercises during the 1980's and 1990's.

Volume of cocoa produced per farmer

The distribution of the volume of cocoa produced per farmer indicated that about 69% of the farmers produced less than one tonne of dried cocoa beans for the period of 2005 cropping season. Only about 9% produced above two tonnes for the same period. The overall mean output per farmer was 0.973 tonnes while the mode and median values were 0.712 and 0.796 tonnes respectively. The computed F-ratio of 5.7228 (against the critical value of 2.37) showed that there were variations in output per farmer across the Local Government Areas. This further buttresses the fact that the representative cocoa farmer in the southwestern Nigeria is a small-scale producer.

Types of access gained to cocoa farms cultivated

The system of acquiring access to cocoa farms tends to follow three main patterns viz:- (i) inheritance (ii) operator cultivated, and (iii) leasing Most of the times, the farmers possess a combination of different access types. It was

Table 1. Estimated structural equations of cocoa production at farm level dependant variable Q_o = output per farmer (kg).

LGA'S	CONSTANT	X_1	X_2	R^2	Adj R^2	F-ratio	DW
EGBEDA							
Linear	198.57	19.81000*	-9.2500*	0.8598	0.84646	64.400	1.56
	(62.33)	(1.74000)					
Double	1.47000	1.00000*	-0.10700	0.8963	0.8865	90.841	1.74
Log	(0.12843)	(0.07458)	(0.08591)				8
ISOKAN							
Linear	-112.6800	31.07700*	-0.79340*	0.9513	0.94557	166.039	2.67
	(75.2000)	(0.07458)	(0.08591)				
Double	1.42700	1.05112*	-0.08409	0.90855	0.84779	84.446	2.28
Log	(0.15200)	(0.08313)	(0.07392)				
AYEDAADE							
Linear	90.59000	27.55800*	-8.52200	0.979	0.957	54.329	2.49
	(106.950)	(1.22000)	(9.02080)				
Double	1.43340	1.07500*	-0.12100	0.97018	0.94126	168.240	2.07
Log	(0.12170)	(0.05863	(0.09174)				
IREWOLE							
Linear	9.52587	25.40090*	1.25036	0.8514	0.84147	85.925	2.40
	(65.9260)	(1.998)	(2.12070)				
Double	1.45847	0.97100*	-5.67000*	0.79463	0.78094	58.040	2.19
Log	(0.14834)	(0.09419)	(0.10488)				
ILE OLUJI							
Linear	23.84289 (98.4200)	21.37378*	2.78650	0.9484	0.94438	238.709	2.11
		(1.04305)	(5.95195)				
Double	1.39346	0.94648*	1.04483	0.95864	0.95546	301.304	2.07
Log	(0.07357)	(0.04399)	(0.06135)				
O**WENA**							
Linear	-58.76600	25.37815*	-940975	0.80149	0.77813	34.318	2.39
	(249.387)	(3.06682)	(13.366)				
Double	1.24029	1.08700*	-0.05426	0.8994	0.88754	75.973	2.77
Log	(0.15764)	(0.8977)	(0.07348)				
ALL LOCAL							
GOVTS.	761.2820	23.18600*	-1.21698	0.8935	0.89207	616.771	2.11
Linear	(39.0874)	(0.66334)	1.89235				
Double	1.45995	0.98335*	-0.04302	0.89646	089505	636.380	2.11
Log	(0.05017)	(0.02778)	(03351)				

Figures in parenthesis are the standard errors.*Indicates the significant variables at 5% level.

found that about 30% of the farms were inherited; the operators cultivated 38% while just 10% obtain their ac cess rights through leasing. About 18.70% of the farms comprised of inheritance and operator operated.

The existence of a large proportion of inherited farms could explain the ageing condition of most of the planta-tions. This can pose a serious bottleneck to inflow of cre-dits to the industry from the formal sources, as the len-ders may not be willing to accept ageing and inherited co-coa farms as collateral.

Levels of education of the farmers

The amount of effort put into any economic activity, the risk bearing and the readiness to adopt new farming technology depend on age and literacy levels (Alimi and Awoyomi, 1995). This assertion makes education of cocoa farmers an important variable.

It was found that 34% of the respondents did not have any formal education; another 14% had adult education while 30% had just primary education. Only 21% attend-

Table 2. Cocoa response functions for the region.

Linear Function			Double-log Function		
Variables	**Coefficients**	**T-value**	**Variables**	**Coefficients**	**T-value**
Q_s			Log Q_s		
X_a	0.0188	2.025*	Log X_a	0.4262	2.376*
X_b	5.549	2.179*	Log X_b	-0.2290	0.949
X_c	0.00079	1.284	Log X_c	0.4728	3.160*
X_d	0.00019	2.530*	Log X_d	0.1935	0.633
X_e	-1.488	-0.573	Log X_e	-0.1020	-0.800
Constant	-41.7	-0.566	Constant	0.0714	0.018
R^2	0.923613		R^2	0.94324	
Adj. R^2	0.79613		Adj. R^2	0.8723	
F-ratio	7.244		F-ratio	13.29	
D-W Test	2.194		D-W Test	2.49	

*Significant at 5% level

ed secondary school and other institutions of higher learning. This implied that literacy level is very low among the cocoa farmers of southwestern Nigeria

Factors influencing cocoa output at the farm level

Table 1 presents the empirical results obtained for the cocoa output per farmer for each Local Government Area (LGA) and all the LGAs combined. Judging by the coefficient of multiple determination (R^2), and the F-values obtained, all the structural equations demonstrated good fits. However only variable X_1 (mandays of labour) conformed to the *a priori* expectation for all the equations. Variable X_2 (intensity of chemical used) had negative regression coefficients in contrast to the *a priori* signs except for Irewole and Ile Oluji Local Government Areas. Furthermore, only X_1 was statistically significant in all, while X_2 was only significant in Egbeda and Ile Oluji Local Government Areas.

With respect to the result for Egbeda Local Government Area, the independent variables X_1 and X_2 explained about 85% of the adjusted variabilities in the volume of cocoa produced per farmer. For example an increase of one manday in the number of labour used will lead to an increase of about 19.8 kg of cocoa produced while an increase of 1 kg/ha of chemical used will lead to a decrease of about 9.25 kg of cocoa produced per farmer, *ceteris paribus*. Similar interpretation goes for all other LGAs. It was observed on the field that the larger the number of plots or sizes of cocoa farms cultivated, the fewer the number and quantity of fumigations applied (chemical use on cocoa trees). Hence the smaller the quantity of chemicals applied per hectare the larger the size of the farm. This implied that farmers with smaller plots utilize more quantity of chemicals per hectare than those with large farm sizes. Thus, the unexpected negative regression coefficient on X_2.

Estimated cocoa production response functions for the region

cocoa production response function earlier specified. The in equation (2) was estimated using the least square regression techniques. Both the linear and double-log functions were estimated and the empirical results are presented in Table 2.

The results indicated that the explanatory power of the linear model is about 92% while that of the double-log is about 94%. Judging by the value of their F-ratios, the two equations demonstrated good fits. Also the Durbin Watson test for the two functional forms (D-W Test = 2.19 and 2.49) showed that there was no serious autocorrelation among the variables. All the variables in the linear model conformed to their economic *a priori* signs. The significant variables are the lagged real producer prices (X_a), lagged exchange rate (X_b) and the aggregate fertilizer supply for the year (X_d).

Using the coefficients of the double-log function as the measure of the direct elasticities, the result indicated that the short-run elasticity for the real producer price is 0.4262. Other elasticities are lagged world price (0.4728); lagged exchange rate (-0.229); aggregate fertilizer supply (0.1935) and lending rate (-0.102).

From the above, it can be suggested that significant increases in aggregate cocoa output in southwestern Nigeria can be achieved through a combination of sustained increase in real producer and world prices; and an increase in aggregate fertilizer supply.

Conclusion

The internal and external imbalances created as a result of price distortions of the 1980s prompted the introduction of a structural adjustment programme in Nigeria with one of its major policy objectives being the market liberalization

of agricultural exports. The paper examined the pre-sent situation in the Nigerian cocoa industry and con-cludes that despite about two decades of operating SAP and economic liberalization in the country, the cocoa industry still remains under smallholder production.

However, the study concluded that aggregate cocoa output could be stimulated through a combination of a number of factors influencing the cocoa industry. These are sustained increase in real producer and world prices; and an increase in aggregate fertilizer supply. In addition, all the stake holders should carry out mass replanting exercises to replace old stocks of cocoa trees on plantations along with provision of incentives that will encourage young people to invest in cocoa farming. The current efforts of the Federal and State Governments aimed at replanting ageing cacao trees (called Cocoa Rebirth Programme) should be supported by all the stakeholders as a major way of boosting and developing the Nigerian cocoa industry.

REFERENCES

Adegeye AJ (1991). A Comparative Analysis of the Costs of Production and Producer Prices of a Tonne of Cocoa from Matured Trees in Nigeria before and during the Structural Adjustment Programme, Ife. J. Agric. 2: 14-18.

Adegeye AJ (1986). Price Incentives for Major Agricultural Export Crops in Nigeria: The case of Cocoa (in *Cocoa Revolution in Nigeria,* Adegeye AJ, Ajayi WO). pp. 139-148.

Adegeye AJ, Dittoh JS (1988). Is there a Structurally Adjusted Induced Boom in the Nigerian Cocoa Industry? Paper Presented at the 1988 Annual Conference of the Nigerian Association of Agricultural Economists, Obafemi Awolowo University, Ile-Ife Campus, 3rd -7th May.

Akanji OO, Ukeje EU (1995). A Review and Analysis of Agricultural Prices in Nigeria", Central Bank of Nigeria Economic and Financial Review. 33(4): 35-61.

Alimi T, Awoyomi B (1995). Impact of SAP on Cocoa Farming" Ife J. Econ. Finance. 2: 1-2.

CBN/NISER (1992). The Impact of SAP on Nigerian Agriculture and Rural Life, Vol. 1.

Delloitte, Haskins, Sells (1990). Cocoa Marketing in Nigeria, Economic Development Institute of the World Bank (EDI) Working Papers of Agriculture and Rural Development.Helleiner GK (1966). Peasant Agriculture, Government and Economic Growth in Nigeria, The Economic Growth Centre, Yale University. pp.??

Idachaba FS (1990). Philosophical Foundation of SAP. Business Times, Monday April 16th. p.13.

Idowu EO (1986). The Political Economy of Cocoa Production and Marketing in Nigeria: A Case Study of Ondo State. An Unpublished M. Phil Thesis, Obafemi Awolowo University, Ile-Ife, Nigeria. p. 201.

Idowu EO (1988).The Cocoa Industry and Employment Generation in Nigeria: The case of Ondo State,(in Employment Generation in Nigeria eds. Fabiyi et al). pp. 151-158.

Manyong VM, Ikpi A, Olayemi JK, Yusuf SA, Omona BT, Okoruwa, V, FS, Idachaba (2005) Agriculture in Nigeria: Identifying Opportunities for Increased Commercialization and Investment. USAID/IITA/UI. pp. 1-190.

Ojo MO (1994). Non-oils exports in Nigeria's changing policy Dispensation, Central Bank of Nigeria Bullion, Vol. 18, No. 2.

Olayide SO, Olatubosun D (1974). Effects of the Nigerian Commodity Marketing Board on the Output and Income of Primary Producers *(in Reading in Agricultural Marketing Eds. Adekanye TO)*. pp. 75-91.

Oni SA (1971). An Economic Analysis of Provisional and Aggregate Supply Response Among Nigerian Cocoa Farmers, *Ph.D Thesis*, University of Ibadan.

Oshikanlu JA (1982). Economics of Cocoa Production in Oranmiyan Local Government Area of Oyo State. *M. Sc. Thesis*, Department of Agricultural Economics, University of Ife, Nigeria.

United Nations System in Nigeria (2001). Nigeria: Common Country Assessment, UNDP, March 2001.