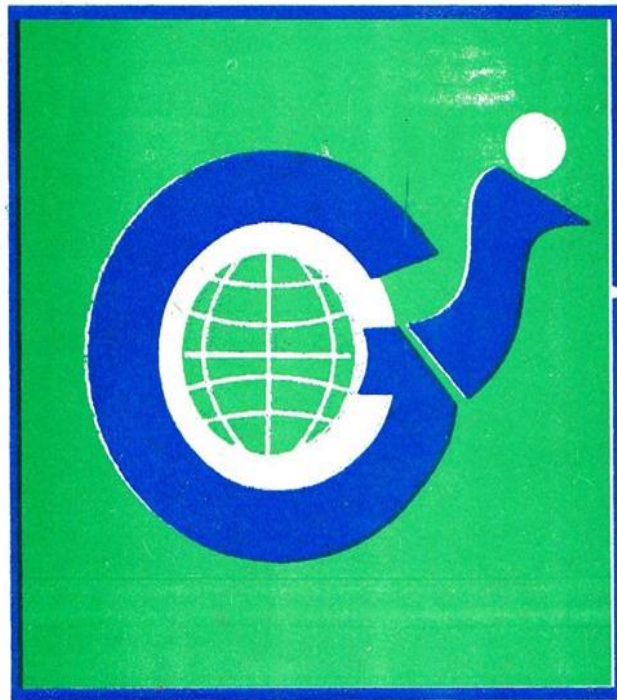


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NIGERIA: MACROECONOMIC ENVIRONMENT AND THE PERENNIAL CROPS

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ABSTRACT

This paper examines the impacts of macroeconomic environment on the output performances of perennial crops – namely cocoa, rubber, palm oil and palm kernel in Nigeria. The time series data used for the analysis reveals agricultural policy/programme instability. Ordinary Least Square estimation shows that most macroeconomic policy variables – exchange rate, interest rate, government expenditure, credit are negatively related to outputs. Technological change and policy shift variables are negative for cocoa but positive for other crops. Collectively, the variables explain between 70 and 85% of the variation in the outputs of the crops considered.

Key Words: Macroeconomic environment, perennial crops, Nigeria.

INTRODUCTION

The centrality of agriculture to the development of least developed countries or developing economies is now beyond dispute. A vast body of knowledge had accumulated, assigning a phenomenal role to agriculture in the development process in nation's early stage of industrialization. In Sub-Sahara Africa in general, agriculture has continued to play a dominant role in the provision of food, raw materials for the industries, employment for a large number of the population and foreign earnings, which are used in financing development activities.

In Nigeria, agriculture used to be the mainstay of the economy and except for groundnut, foreign exchange earnings were largely from the export of perennial crops namely; cocoa, palm produce, and rubber. This was the case until immediately after the discovery and subsequent exploitation of petroleum in the 1970s. The collapse of world oil price at the beginning of the 1970 decade created distortions in the Nigerian economy. This in turn, reverberated on all sectors of the economy (including agriculture) which virtually depended on the proceeds from oil exports for all its activities.

In order to reverse the misfortunes of the

economy, successive Nigerian administrations adopted series of policies aimed, first, at preventing the total collapse of the economy and subsequently targeted at short-to-medium-term adjustments to ensure sustainable growth of the economy. Public policies on agriculture were important parts of budgets and development plans. For instance, among other objectives, the second, third and fourth development plans were aimed at expanding the production of exports crops in order to diversify foreign exchange earnings (Garba, 2000). The Structural Adjustment Programme (SAP) which was adopted in 1986 was supposedly designed to induce structural and institutional changes necessary to reorganize the productive structure of the economy in order to induce non oil exports (Kwanashie, *et al*, 1998). Policy response also included a combination of instruments ranging from agricultural extension and technology transfer, agricultural mechanization, water resources and irrigation development, agricultural cooperatives, agricultural research and land use.

Generally, policy environment in Nigeria include changes in policy regimes and switching between regulation and deregulation and even regulation on key areas of the economy. These changes are likely to impact on the different sectors and sub sectors of the economy. Jaeger

(1990) states that countries that adopted or maintained favourable policy environments (FPEs) experience agricultural output and export growth and higher overall economic growth than those with unfavourable policy environments ((UPEs). If the change in policy regime is part of a larger macroeconomic policy package that reduces overall relative variability, then one would expect the response (agricultural supply response) to follow in the same direction. However, this may not always be. For instance, Schiff and Montenegro (1997) argue that recent economic reforms have not only always had the expected impact on agricultural output. To support their position, they cited cases of Chile and New Zealand where the output response to economic reform was dampened by the fall in world prices and exchange rate appreciation. It could also be reasoned that a policy environment may not impact equally on all the sub sectors of agriculture. The questions that arise are: How has the perennial crop sub sector fared under various policy environments? Does policy change (instability) affect the performance of the crop sub-sector as typified by the perennial crops? The thrust of this paper is to examine the impacts of macroeconomic environment (vis a vis policy instruments) on the performance of a select group of perennial crops in Nigeria. The specific objectives are to: (a) examine agricultural related macroeconomic policies and the performance (using output measures) of cocoa, rubber, palm oil and palm kernel (1970 – 1998); (b) specify and estimate a model of the impact of the policy variables on the output of the crops and; (c) derive policy measures that are supportive of higher performance of the perennial crop sub sector in Nigeria.

The paper is divided into sections. The section that follows is the theoretical framework and literature review. Section III presents the results and discussions while section IV contains policy implications, recommendations and conclusions.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Macroeconomic policy involves the

deliberate manipulation of a number of policy instruments such as fiscal, monetary, exchange rate and income policy measures to achieve specified or identified objectives. These objectives may include; full employment of productive resources, reasonable price stability, acceptable rate of economic growth, equitable distribution of income, stability of external trade relations, and balance of payment equilibrium (Bamidele and Englema, 1998; Olaniyi, 2000). They could also be to enhance the output of a particular sector such as agriculture. However, the effectiveness of macroeconomic policy tools depends on the ability of the policy makers to choose appropriate policy mixes that soothes the prevailing economic and political conditions. It also depends on the ability of governments to influence human factor (in agriculture, i.e. the farmers) and the institutional characteristics that affect delivery capacity.

Theoretical literature posits three arguments for the response of agriculture to policy in general: One, that economic agents (e.g farmers) are responsive entirely to price variables. Second, that because of the structural rigidities that are the dominant characteristics of less developed economies, price mechanisms are less capable of inducing significant response among economic agents. Third, that economic agent responds simultaneously to price and non-price variables (Binswanger, 1989; Oyejide, 1990; Killick, 1990).

Since literature has shown that putting prices right alone is not sufficient, empirical studies have introduced non-price factors into agricultural response models. Empirical studies have shown that Nigerian crops respond significantly to price and non-price incentives (Phillips, 1987; Kwanashie *et al* 1998). Kwanashie *et al* argue that agricultural response to policy in Nigeria manifests itself through channels other than prices. They maintain that putting prices right is not sufficient to expand primary exports, government policies which have been targeted at agricultural production and growth, impact on agriculture directly and indirectly. For instance, increase in loans to agricultural sector, according to the authors, is

expected to increase agricultural output directly, while government expenditures on agriculture are supposed to affect agriculture indirectly. Their estimation which was in the Nerlovian spirit, employed the Two Stage Least Square (TSLS) and Seemingly Unrelated Regression Method (SURM) reveal that shorter policy lags, more efficient infrastructural support to small farm households, and less corruption in the design and implementation of agricultural policies would raise the production possibility frontier of farmers. In a study of export supply response of Nigeria's major agricultural export, Ayichi (1997) found only local cocoa grinding, real exchange rate and the dummy, which he called liberalization variable, to be statistically significant at 5 percent level. The study showed that real exchange rate, current price ratio, lagged price ratio, domestic processing capacity and the dummy variable significantly impacted on palm kernel as well as rubber export.

Elsewhere, studies have also shown the impacts of price and non-price variables on agricultural outputs. For example, Dercon (1992) analyzed cotton supply response in Tanzania and reported that price level was overshadowed in the late 1970s and 1980s by macroeconomic variables such as tax inflation and rationing in explaining producers behaviour in Tanzania. Similarly, Amin (1996) evaluated the effects of exchange rate policy on agriculture in Cameroon. The results of the study show that exchange rate fluctuation reduce agricultural output. Most past studies on the response of crops to policies tended to play down on the importance of policy instability. In the present study while price and non-price variables are captured in the analysis, policy shifts that characterize the Nigerian economy is considered as well.

Implicitly, it is given as: $Q = b_0 E^{b1} G^{b2} \dots \dots Dum^{b6}$ (1)

The linearized form of the function as used in this study is:

$LnQi = b_0 + b_1 LnEr + b_2 LnGE + b_3 LnIR + b_4 LnCR + b_5 LnT + b_6 DUM + ui$ (2)

Where:

Qi = output of the crop (cocoa, rubber, palm kernel); **ER** =Exchange rate nominal); **GE** = Government Expenditure; **IR** = Interest rate; **CR** = Credit to Agricultural Sector; **T** = Time trend representing technological change over time; **DUM** = Dummy (1 = SAP years, 0 = otherwise); **ui** = stochastic error term to be estimated. *A priori*, exchange rate, government expenditure, credit and technological change should be positively related to output while interest rate should have inverse relationship with output. The effect of policy shift represented by dummy (DUM) should be indeterminate.

METHODOLOGY

Data and Data Sources

Three indicators of agricultural policy in Nigeria can be adduced. They are prices, expenditure on agriculture and credit. These are indicators of price, fiscal and monetary policies (Garba, 2000). Expenditure on agriculture consists of budget allocations and actual expenditures while credit variables are approved allocations and loans to agriculture from commercial banks and merchant banks. Data on these were collected and used for the analysis.

Exchange rate is also important in determining the activities in the exportable crop sector (Fosu 1992). Exchange rate was also used as one of the independent variables in the analysis. Data on the output of cocoa, rubber, palm oil and palm kernel were collected for the period 1970-1998. These were used as the dependent variables. The main sources of the data were the Central Bank of Nigeria's Annual Report and Statement of Account (various issues) and Federal Office of Statistics Annual Abstract of Statistics (various issues).

The Model

In analyzing the impact of macroeconomic environment on the perennial crop sector, this study employed the ordinary least square (OLS) method. A dummy variable was introduced in the model to test if the differences observed in the result could be attributed to chance shifts in Nigeria with the adoption of Structural Adjustment Programme (SAP) in 1986. The model was estimated in the Cobb – Douglas form.

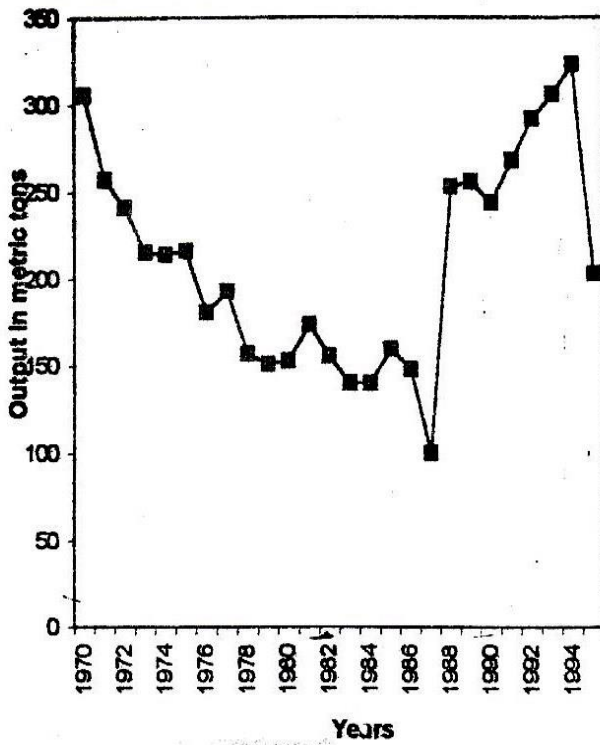


Fig. 1: Cocoa Output in Nigeria (1970-1995)

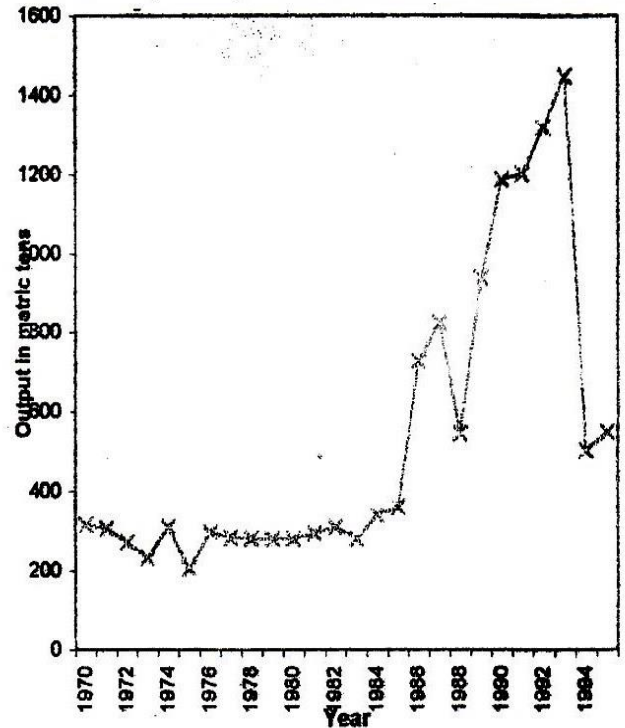


Fig. 3: Palm Kernel Output in Nigeria (1970-1995)

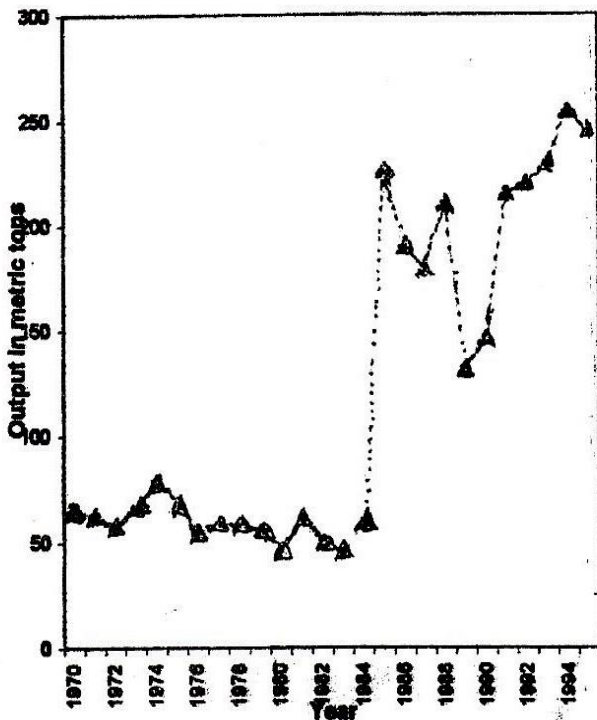


Fig. 2: Rubber Output in Nigeria (1970-1995)

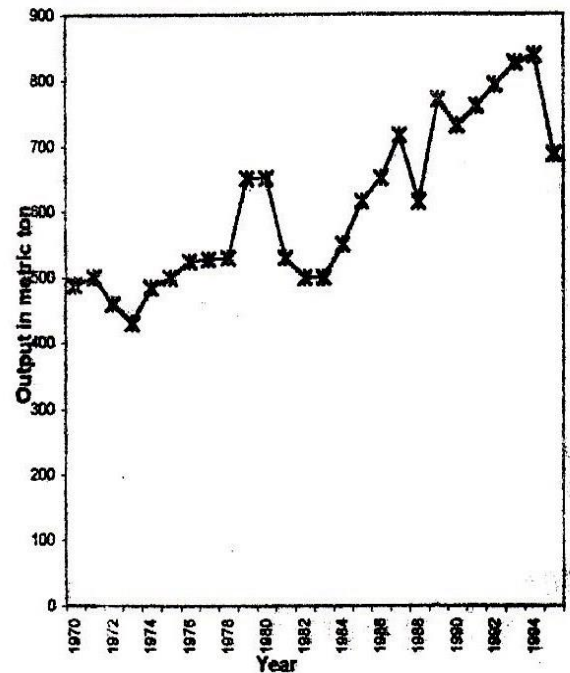


Fig. 4: Palm Oil Output in Nigeria (1970-1995)

RESULTS AND DISCUSSION

Major Agricultural Policies (and programmes) in Nigeria: Stylized Facts.

According to Olayemi (1989), the pre-

1970 Nigeria agriculture was characterized by minimum direct government intervention. It was the era of *laissez faire*, when, government largely played a supportive role because of the private sector, the small traditional farmers produced the bulk of food and exports, and the country was virtually self-sufficient in food. However, starting from the 1970s, the country has witnessed a

Table 1: Major agricultural policies and projects (1970 – 2000)

No.	Policies and Projects/Programmes	Commencement Date
1.	Agricultural Development Project (ADPs)	1972
2.	National Accelerated Food Production(NAFPP)	1975
3.	Tree Crop programme	
4.	Reorganization of Agricultural Research Institutes	
	Research Institutes Decree 33	1973
	Research Institutes Establishment Order	1975
	National Science and Technology Development Agency Decree 3.	1975
5.	Commodity Boards Decree 29	1977
6.	River Basin Development Authorities Decree 25	(Amended 1977, 1979)
7.	Farm Input Subsidies (Fertilizer Subsidy Programme)	1976
8.	Strategic Grain Reserve Scheme	1976
9.	Farm Credit:	
	Nigerian Agricultural and Cooperative Bank	1973
	The Rural Banking Scheme	1973
	Agricultural Credit Guarantee Scheme	1978
10.	Operation Feed the Nation	1976
	Subsidies on Fertilizer, livestock products and inputs	
	Fisheries inputs, seeds, etc.	
11.	The Green Revolution Programme	1980
	The National Food Production Plan	
	Universities of Agriculture (UNAAB, UAM)	1981
12.	Agricultural Policy Initiatives and Reforms	1985-1993
13.	Directorate for Food, Roads and Rural infrastructures (DFRRI)	1986
	Streamlining of River Basin Development Authorities	1986
	Economic deregulation and disengagement of government from direct involvement in agricultural production and distribution.	1991
	National Agricultural Land Development Authority (NALDA)	
	(i) Privatization of government (disengagement of government from fertilizer procurement and distribution	
	(ii) Withdrawal of fertilizer subsidies	
	(iii) Scrapping of Commodity Boards	
	(iv) Transfer of Agricultural Research Institutes from Federal Ministry of Science and Technology to the Federal Ministry of Agriculture.	mid 1990s
	(v) Support for Farmer Association and the formation of Farmer's Associations of Nigeria (FOFAN)	1992
14.	Agricultural Policies under the Obasanjo Administration (as Civilian Head of State)	1999
	i). Restoration of fertilizer subsidies at 25%	
	ii). Establishment of Department of Fertilizer	
	iii). FMA Restoration of Production Price Support Scheme for Grains.	

Sources: Central Bank of Nigeria's Statistical Bulletin and Statement of Accounts (various issues), Idachaba, F. (2000).

plethora of agricultural policies and programmes which represent the macroeconomic environment that was intended to influence the performance of the sector. These policies and programmes are

summarized in table 1. Of the three decades which the report covers, the 1970s seems to have the highest number of policies and programmes, among which are those directly concerned with

Table 2: Perennial Crop Production Trend ('000 tonnes) (1970-1995)

Crops	1970-74	1975-80	1981 - 85	1986 - 91	1992 - 95
Cocoa	246.4	175.2	156	185.8	131
Rubber	65.6	56.5	87.8	81.2	252
Palm kernel	286.6	285.7	316.6	509.5	714.5
Palm oil	452.5	597.1	539.0	581.5	814.3

Source: Central Bank of Nigeria Statistical Bulletin and Statement of Accounts, (various issues)

tree (perennial) crops. These include the Tree Crop Programme, the Commodity Boards Decree 29 and the Farm Input Subsidies (Fertilizer Subsidy Programme). The formulation of several number of policies during this period can be understood from the standpoint of the country's immediate socio-political past. This was a period

that the country was recovering from a thirty month civil war which destroyed the gains of the immediate post colonial era of a healthy agricultural economy. Therefore, in the spirit of "reconstruction and rehabilitation" of the post war economy, efforts were directed at returning the agricultural sector to its high level performing position. The tree crop management programme in particular was meant to reactivate activities in the agricultural management activities already embarked upon under this programme which included the World Bank assisted oil palm, cocoa and rubber development programmes in such states as Ondo, Old Oyo, Old Bendel, Old Rivers and Old Cross River States (Okunmadewa, 1993).

The 1980s witnessed reversal of policies that had direct bearing on the perennial crop sub sector. There was disengagement of government from fertilizer procurement and distribution, withdrawal of fertilizer subsidies and the scrapping of the Commodity Boards. These were fallouts of the liberalization of the economy through the adoption of the World Bank/IMF informed Structural Adjustment Programme (SAP) in 1986. The SAP was intended to restructure the Nigerian economy by diversifying the productive base; expanding non-oil exports, among others. A combination of fiscal, monetary, trade and exchange as well as institutional policy instruments were employed in an effort to achieve the stated policies. Such policy instruments included but not limited to: (a) five year tax free

period for profits of companies engaged in agricultural production and processing; (b) increase in capital expenditure by the government inspite of a general tight fiscal policy; (c) increase of grace period for the repayment of commercial bank loans and advances for long gestation cash crop from 4 to 7 years and increase in investments in mechanized large scale farms from 5 to 7 years.

Most of the activities in the agricultural policy arena in the 1990s was a continuation of the SAP policies started in 1986. All the policy maneuvers were expected to boost agricultural production. But, how did the perennial crops fare under these policy regimes? Table 2 as well as figures 1,2,3,4 and 5 indicate the performance of the perennial crop sector for the period 1970-1995 using cocoa, rubber, palm oils and kernel output as indicators of performance. For cocoa, there was a boom in production in the 1970s. The crop recorded the highest output ever (2,464,000 tons) between 1970 - 1974. Thereafter, it witnessed fluctuating output performance with marginal increases recorded in 1986 to 1991 (1,858,000 tons in 1986 - 1991 as against 1,752,000 tons and 156,000 tons in 1975 - 1980 and 1981 - 1985 respectively). It is to be noted that the boom in the 1970s would have been a response to the policy of Farm Settlement Programme of the then Western Region (the main cocoa producing area in Nigeria). The downward trend which started in 1970s corresponded to the oil boom period which witnessed the abandonment of cocoa farms and agriculture, generally. This trend can also be seen in the output of other crops (rubber, palm kernel and palm oil). For most commodities except palm oil, the lowest outputs were recorded in the 1975 - 1980 period. This downward trend in agricultural output, alongside the crisis in other sector of

economy, necessitated the adoption and implementation of the Structural Adjustment policies in mid 1986. The thrust of the SAP policies was to diversify the economic base of the country which hitherto depended on crude oil for her revenue. As is indicated in table 2, the decreasing rate of production of cocoa, palm kernel and palm oil was reverse in the early years of SAP (1986 - 1991). The increase output of cocoa immediately after adoption of SAP policies could not, however, be sustained up to the 1990s as it fell from 1,858,000 tons in 1986 - 1991 period to 131000 tons in 1992 - 1995 period. The "boom" had been described as "fallacy of composition" which was partly as a result of farmers being faced with low pre-SAP input cost while reaping SAP benefits of increased output prices (Okunmadewa, 1993).

Changes in the rules and in economic bodies supporting agriculture have consequences on the performance of the sector. It is obvious

from this study and available literature (Garba, 2000) that the Nigerian agricultural sector is characterized by shifts in the general rules and shifts in economic bodies directly concerned with agriculture. Results in table 1 points to the fact that sectoral programmes do not outlast regimes that introduced them. For instance, Operation Feed the Nation of Obasanjo administration was replaced with Green Revolution of the Shagari administration: policy of fertilizer subsidy was replaced in 1986. Agricultural outputs also tend to oscillate with changes in those policies and programmes. It is therefore, instructive that programme and policies should be allowed to run their full course if the objectives of starting them in the first place are to be achieved

MACROECONOMIC DETERMINANTS OF PERENNIAL CROPS' PERFORMANCE:

Results of the regression analysis of the

Table 3: Regression Results

Coefficient of variables	Cocoa	Rubber	Palm Oil	Palm Kernel
b ₀ (Constant term)	4.776 (9.748)***	5.394 (6.341)***	6.054 (24.27)***	3.685 (5.577)***
b ₁ (Exchange Rate)	0.142 (2.285)**	0.270 (2.511)**	1.833E-02 (0.582)	-7.31E-02 (0.875)
b ₂ (Government Expenditure)	0.160 (1.983)*	-0.309 (-2.205)**	-8.80E-03 (0-2.214)	-1.26E-02 (-0.116)
b ₃ (Interest Rate)	0.373 (1.663)	-2.252 (-0.648)	3.073E-02 (0.269)	1.097 (3.630)***
b ₄ (Credit)	-9.01E-02 (-1.7519)*	0.116 (1.303)	2.669E-02 (1.020)	-5.79E-02 (-0.834)
b ₅ (Time Trend)	-0.350 (-2.950)***	0.250 (1.212)	4.254E-02 (0.704)	5.899E-02 (0.369)
b ₆ (Dummy)	-0.165 (-0.650)	0.475 (1.078)	0.114 (0.887)	0.255 (0.745)
R ²	0.70	0.80	0.82	0.85
F Value	7.84***	13.36***	15.02***	18.30***
Durbin- Watson	2.62	1.68	1.29	1.30

Figures in parentheses are the calculated t-statistics. *** = Significant at 1% probability level; ** = Significant at 5% probability level; * = Significant at 10% probability level

macro-economic determinants of the performance of the output of perennial crops in Nigeria are presented in table 3. The trend variable was included in the model to account for technological change over time. In addition, a dummy variable was included to capture policy shifts. There was policy re-engineering in 1986 when Structural Adjustment Programme was adopted, the dummy was intended to take care of the effect of such policy change.

Generally, the results show that the variables included in the model explain 70%, 80%, 82% and 85% of the variation in the output of cocoa, rubber, palm oil and palm kernel, respectively. Judging by the F-values, the variables included in the model collectively impact on output of the perennial crops (1% probability level). Durbin-Watson statistic also confirms the absence of multicollinearity among the variables.

On individual crop basis, exchange rate, government expenditure, credit and technological change significantly affect cocoa output for the period under study. The negative sign carried by the credit and time trend (technological change) tend to be contrary to a *priori* expectation. It would have been expected that as time passed and as more credit goes into the agricultural sector, cocoa farmers would adopt new technologies. This should translate into increase production. However, the negative impact of credit can be explained by the fact the more credit tends to draw people away from the farm. It has been documented elsewhere that most farmers in Nigeria would rather invest extra funds in non-agricultural ventures. This may take farmers, particularly, the able body ones away from the farmer, thus adversely affecting output.

Rubber output is significantly affected by exchange rate as well as government expenditure (5% probability level). However, while exchange rate positively impacts on rubber output, there is inverse relationship between any of the macroeconomic variables included in the model and palm oil output and they do not deserve further discussion. Nonetheless, it could be mentioned that beginning from the 1980s, Nigeria's palm oil output has fallen drastically.

Thus, Nigeria has turned from being the largest world producer and exporter to a net importer of palm oil – an indication that policies and programmes put in place were not favourable to the oil palm industry. Similar impact could be observed on the palm kernel, where, except interest rate which is significant at 1% level, and technological change (time trend), all other variables are inversely related to output.

POLICY IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

The analyses of agricultural policies and the performance of output of perennial crops show inconsistency and instability in agricultural policy formulation and implementation, and fluctuation in perennial crops outputs. These have implications not only for the agricultural sector but for the Nigerian economy as a whole. From time, agriculture has been the bedrock for industrial transformation and ultimate development of nations, the world over. For Nigeria, the economic boom enjoyed in the 1960s was a product of the healthy agricultural sector of that period. The consistency in agricultural policy formulation and implementation evidence from this study implies that there will continue to be food crisis in the country, underutilization of installed capacity of agro-based factories or rising import bill from inadequate domestic output unless the situation is addressed. Again, that most of macroeconomic variables had adverse impact on the crops output suggest the use of inappropriate policy instruments for the perennial crops as targets. This may persist unless the right policy instruments are applied to policy targets. In order to serve agricultural sector and in particular the perennial crop subsector from further reversals in performance, it is necessary that government ensures policy/programmes stability. It is to be mentioned that Nigeria has witnessed a number of changes of government. New policies have often come with new administration. Therefore, one of the ways of reducing policy inconsistency is to ensure stability of administration. In addition, marching appropriate policy instruments with

policy targets is desirable from government angle. Again, there is the need to budget and release adequate funds on time for the implementation of agricultural projects and programmes. Farmers themselves and other operators in the agricultural sector have a crucial role to play by ensuring that funds for farming and other agricultural activities are used for the purposes which they are meant. In this way, increase output and productivity can be achieved in the perennial crop sub sector.

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