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EMPIRICAL RELATIONSHIP BETWEEN TRENDS IN CASH CROP OUTPUT VOLATILITY AND AGRICULTURAL POLICYPERIODS IN NIGERIA

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ABSTRACT

The study analyzed cash crop output volatility in different agricultural policy programme periods from 1961 to 2010 in Nigeria. Descriptive analysis and analysis of variance model was used to analyze the specific objectives.The results reveal that, the Pre-Operation Feed the Nation period (1961-1976) and Structural Adjustment Programme (1986-1993) period were the most volatile policy periods for most cash crop outputs in the country. Whereas, cash crop outputs were most stable during the Operation Feed the Nation period (1976-1979) and Green Revolution period (1980-1985). The result further reveals that the mean cash crop output volatility during post structural adjustment programme period was significantly different from other policy periods for most cash crop exception of coffee. The result implies that the impact of the current post structural adjustment agricultural policy on Cotton, Groundnut, Cocoa, Rubber and Oil palm crop output volatility in the country differs significantly from some previous agricultural policy programme periods. The result established the fact that the agricultural policy programmes actually influenced key cash crop outputs and their volatility; but these influences were mixed and inconsistence across cash crop enterprises and policy programme periods in the country. Following the results, we recommend that government should formulate appropriate specific cash crop policy packages as part of the holistic agricultural policy programme. This kind of policy programme would ensure quick intervention and promote result oriented cash crop policy programme in the country.

Keywords: *Cash crop, Output, Volatility, Policy, Nigeria*

1.0 INTRODUCTION

In spite of the predominance of petroleum sub-sector in Nigeria's economic growth anddevelopment, agricultural sector still remains a major sourceof economic resilience (Ojo and Akanji 1996).Agriculture contributes to employment generation, poverty reduction through increase in food production, foreign exchange earnings and source of industry'sraw resources (CBN, 2002). In 2001, agricultural sector contributedabout 41 per cent to the country's GDP.Despite this fit, the sector's export was negligible and represent about 0.2 per cent of the total exports in the country. The major cause of the decline in agricultural exports had been linked to increase in investment in the oil sector. This has resulted to large inflows of foreign exchange andthe neglect of the agricultural sectors. Domesticfood production declined substantially, causing food import billsto attain a height of about $4 billion in 1982 and N98 trillion naira or $62.8 billion between 2007 -2010 (CNB, 2011). In 2010, alone Nigeria spent ₦632 billion or ($4.21b) on importation of wheat, ₦356 billion or ($2.37b) on importation of rice, ₦217 billion or ($1.45b) on sugar importation and ₦97 billion or ($0.65b) on importation of fish (CBN, 2011).

Agricultural related policy programmes were initiated and implemented by the federal government following the declining roles of agriculture in the economic growth and developmentof the country.Some of the development programmes and policies instituted to stimulate agricultural development in Nigeria were; The Agricultural Development Project (ADP) conceptualized in 1975 and was mandated to provide decentralized opportunities and resources in agriculture to small holder farmers; Operation Feed the Nation (OFN) set up in 1976 to 1979, to provide sufficient food for all Nigerian; Green Revolution (GR) was implemented in 1980 to 1985 to encourage the production of sufficient food and improved nutrition to all Nigerians; and Nigerian Agricultural Cooperative and Rural Development Bank established in 2000 to provide credit for production, processing and marketing of agricultural products among others (Udoh and Akpan 2007; Ukoha 2007; Akpan and Udoh 2009a; Akpan and Udoh, 2009b).

The cash crop subsector was the major area of government price intervention in the pre structural adjustment period (i.e., the period before 1986). The government replaced the Regional Marketing Boards, which controlled export cash crops prices from 1949 to 1976, with the National Commodity Board in 1977. Central machinery was evolved for the determination of producer prices of the crops. This measure was adopted in the belief that by improving commodity prices periodically, farmers' incomes and agricultural productivity would be enhanced (Akanji and Ukeje, 1995).Despite these incentives, it is observed that several agricultural policy programme periods implemented by the federal government of Nigeria accompany cash crop output variability (CBN, 2010). For example, the rate of cocoa output volatility decreased from 36.4% in the period 1971– 1976, fluctuating over the years to 4.20% in the period 1980–1985, then increased to 61.60% in 1986–1989 (Garba, 2000). Although, sustained growth is a rare achievement, especially in the sub Saharan Africa **(**Adedipe, 2004);Agénor*et al., (*2000) relates output volatility to policy inconsistency in developing countries. Essang (1973) and Muroi (1989) also correlate crop output volatility in Nigeria to poor policy on technology and land use Acts.

Surprisingly, the direct impact of agricultural policies on crop output volatility in Nigeria has receives limited attention in the empirical literature; in spite that increase output was among the primary goals of most past and present agricultural policy programmes (Ukoha 2007; Udoh and Akpan 2007, and Akpan and Udoh, 2009a and Akpan and Udoh, 2009b). The knowledge of output volatility relative to any agricultural policy under quasi market – oriented economy like Nigeria is imperative. Crop output volatility is an indispensable input to both agricultural policy makers and farmers especially on pattern of decision making. Increase in crop output and its volatility could be an indication of the stimulating effect of the existing agricultural policy on crop production. But others argue that increase output volatility could increase farmers' income risks and uncertainties due to anticipating price volatility (Young and Shields 1996, Ukoha 2007). Resource allocation efficiency among farmers could be enhance as a result of increase in output volatility in a given policy regime provided that there is a guarantee minimum price for output of crops. Following the important of output volatility and its mixed correlation with other variables in the economy, the study specifically establish the statistical relationship among cash crop (cotton, groundnut, cocoa, rubber and palm oil) output volatility and agricultural policy programme periods in Nigeria.

1.1 Measuring Cash Crop Output Volatility

The GARCH model of the form GARCH $(p,q)_t$ for which p, q = 1 was specified and used to generate volatility for cash crop outputs in Nigeria. It was found that simple GARCH(1,1) process as specify in equation (2) provided a good approximation of the data generating process for Groundnut, Cotton seed, Coffee and Cocoa enterprises. However, Taylor and Schwert's GARCH(1,1) as specify in equation (3) was appropriate for Rubber and Oil Palm enterprises.The annual cash crop output was assumed to follow a primitive first-order autoregressive (AR) (1) process as follows,

$$\Delta Log(Y_t) = \lambda_0 + \lambda_1 \Delta Log(Y_{t-1}) + \upsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$Where\ \nu \sim iid\ (0,1).$$

Where (Y_t) *is* the output of cash crops (Groundnut, Cotton seed, Coffee, Cocoa Rubber and Palm oil) and υ is the stochastic disturbance term. The general assumption is that disturbances from Equation (1) are not auto correlated. Therefore, equation 1 is the mean equation from which the GARCH process was derived as shown in equations (2) and (3).

$$Vol_t = \delta + \alpha \sum \varepsilon^2{}_{t-1} + \beta \sum h_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$\text{Vol}_t = \delta + \alpha \sum/\varepsilon^2{}_{t-1}/+\beta \sum h_{t-1}$ ……. (3)

Equation (2) shows that the conditional variance of the error term in equation (1) which is a proxy of output volatility *(Vol$_t$)* at period 't' is explained by the past shocks or square of error term (ARCH term i.e. ε_{t-1}) as describe in equation (1) and past variance or volatility term (the GARCH term i.e. h_{t-1}). For equation (2) and (3) to be stationary, $\delta > 0$, $\alpha \geq 0$, $\beta \geq 0$ and the persistent of volatility shocks ($\alpha + \beta$) should be less than 1. As sum of α and β becomes close to unity, shocks become much more persistent (Bollerslev, 1986). The inclusion of lagged conditional variances captures some sort of adaptive learning mechanism (Bollerslev 1986, Crain and Lee 1996 and Yang *et al.,* 2001). The estimates of equation (2) and (3) were used to test the persistence of volatility in the selected cash crop in the study period.

2.0 MATERIALS AND METHOD

2.1 Study area and data source: The study was conducted in Nigeria; the country is situated on the Gulf of Guinea in the sub Saharan Africa. Data used in the study were from FAO crop production database for Nigeria and publications of the Central Bank of Nigeria (CBN). The data covered the period 1961 to 2010.

2.2 Analytical Technique: To investigate the influence of agricultural policy and programme regimes on cash crop output volatility in Nigeria, we employ combination of analytical tools including descriptive statistics and analysis of variance (ANOVA) model involving dummies (Gujarati, 2004). The ANOVA model is described in equation (4).

$$Vol_t = \delta_1(PREOFN)_t + \delta_2(OFN)_t + \delta_3 Ln(GR)_t + \delta_4(SAP)_t + \delta_5(PSAP)_t + U_t \quad \text{(4)}$$

Where;

VOL$_t$= cash crop output volatility generated from the GARCH model (Cotton, Groundnut, Coffee, Cocoa, Rubber and Oil palm)

PREOFN$_t$= dummy variable which takes the value 1 during period of pre Operation Feed the Nation (1961-1975) and zero otherwise

OFN$_t$ = dummy variable which takes the value 1 during period of Operation Feed the Nation (1976-1979) and zero otherwise

GR$_t$= dummy variable which takes the value 1 during period of Green Revolution (1980- 1985) and zero otherwise

SAP$_t$= dummy variable which takes the value 1 during period of Structural Adjustment Programme(1986-1993) and zero otherwise

PSAP$_t$ =dummy variable which takes the value1during period of Post Structural Adjustment Programme1994-2010) and zero otherwise

U$_t$= stochastic error term and$U_t \sim iid\ (0, \delta^2 u)$.

Note: In order to avoid the dummy variable trap or the case of perfect collinearity among dummy variables specify in equation (4), the dummy variable ***PSAP*** was omittedduring estimation of the equation for the respective cash crop enterprise. The PSAP dummy was used as a benchmark dummy from which the differential intercept slope coefficients from other dummy variables were compared for each cash crop output volatility equation. The choice of the PSAP era was based on the fact that, Nigeria's agricultural sector is currently regulated by the PSAP agricultural policies.As such it is meaningful to compare the deviation impact of other policy periods from the PSAP policy as regards to cash crop output volatility in the country.

3.0 RESULTS AND DISCUSSION

The estimates of the GARCH models are presented in Table 1. The time varying pattern of the cash output volatility was confirmed because at least one of the coefficients of the GARCH models was significant for all six cash crop enterprises.

Table 1: The GARCH model estimates for equation 2 and 3

Variable	Cotton	Groundnut	Cocoa	Rubber	Palm Oil	Coffee
Mean Equation						
Constant	11.97(9.31)***	14.08(15.3)***	12.41(25.3)***	11.03(7.90)***	15.62(7.30)***	-0.043(-1.45)
Conditional Variance equation						
Constant	0.14(1.10)	0.03(1.20)	0.016(0.25)	0.03(3.92)***	0.008(0.72)	0.027(1.69)*
ARCH (α)	0.56(1.76)*	0.89(2.55)**	0.82(2.25)**	0.91(7.74)***	0.65(7.13)***	0.83(2.65)***
GARCH (β)	0.001(1.69)*	0.11(2.52)**	0.12(0.04)	0.004(2.04)*	-0.24(-1.87)*	0.16(1.59)
Diagnostic tests						
Persistence	0.56	0.92	0.94	0.91	0.89	0.99
AIC	98.01	88.44	27.12	33.31	-37.60	39.90
HQC	107.47	97.90	34.69	40.88	-30.04	43.44
SBC	101.59	92.03	29.99	36.18	-34.73	49.26
Loglik	-44.01	-39.22	-9.56	-12.66	22.80	-14.95

Source: Computed by authors from data analysis.

The sum of α and β measures the persistence of cash crop output volatility. In all the six cash crop enterprises, the sum of α and β was close to but less than unity, thus implying the persistent volatility effect of shocks on cash crop output volatility in Nigeria. The GARCH parameters were significant at various levels of probability for each of the cash crop enterprise. Exception of cocoa and coffee enterprises, the β coefficient was significant in cotton, groundnut, rubber and Oil Palm enterprises.

3.1 Unit Root test for Variables used in the Analysis

To ascertain the stationarity of the variables specify in the model, an improved ADF – GLS test for unit root was performed on the assumption that variable to be tested have non-zero mean (Elliott, Rothenberg and Stock (1996). Test statistics for each variable in levels and first differences are presented in Table 2.

Table 2: Result of the Unit Root test for Variables Used in the Analysis

Variables	ADF-GLS test for unit root					
	With Trend			Without Trend		
	Level	1st diff.	OT	Level	1st diff.	OT
VCot	-3.34**	-7.04***	1(0)	-2.27**	-7.05***	1(0)
VG/N	-2.12	-6.94***	1(1)	-1.29	-6.81***	1(1)
VCocoa	-2.93*	-7.71***	1(0)	-2.48**	-7.62***	1(0)
VRubber	-2.65	-6.06***	1(1)	-1.52	-6.03***	1(1)
VOilplm	-2.47	-10.1***	1(1)	-1.09	-9.07***	1(1)
VCoffee	-5.64***	-9.89***	1(0)	-4.69***	-9.76***	1(0)

Note: OT means order of integration. Asterisks*, **, and *** represent 10%, 5% and 1% significance levels respectively. VCot, VG/N, VCocoa, VRubber, VCoffee and VOilpalm are volatility of respective crops.

The test result reveals that at levels, some variables used in the analysis were stationary and some were non-stationary. All variables were stationary at first difference. Since the regression model consist of only one quantitative variable for each of the crop enterprise, we therefore estimated equation (4) at the level of the dependent variable.

3.2 Descriptive Analysis of Cash Crop Outputs and Output Volatility in Various Agricultural Policy Programme periods in Nigeria

Table 3 shows the result of the computed mean outputs and the mean growth rate of outputs as well as the coefficient of variability of six cash crop outputs in various agricultural policy programme periods in Nigeria. In the PREOFN era (1961-1975), the result reveals that the outputs of cotton, groundnut, cocoa and Oil palm as well as coffee had negative growth rates and relatively high coefficient of variability. The output variability index of groundnut (27.3%), cotton (31.7%) and coffee (35.4%) were high, indicating that the outputs of these cash crops were relatively unstable during period of PREOFN in the country. However Rubber (11.6%) and Oil palm (11.6%) outputs witnessed minimal variability during this period. The results obtained during this period could be explained by the influenced of the devastating effect of the Nigeria's civil war on agricultural production in the country.

Table 3: Mean Annual Cash Crop Output (tons) and Growth rate of output in Various Agricultural policies and Programmes Regimes in Nigeria (1961 - 2010)

Food Crop	PRE-OFN (1961-1975)			OFN (1976-1979)			GR (1980-1985)			SAP (1986-1993)			PSAP (1994-2010)		
	Output '000'	GR %	CV%	Output '000'	GR %	CV%	Output '000'	GR %	CV%	Output '000'	GR %	CV%	Output '000'	GR %	CV %
Cotton	141.97	-10.5	31.7	161.4	-17.5	39.1	60.25	-22.2	34.9	218.3	11.4	38.7	408.7	5.45	24.0
G/nut	1585	-23.4	27.3	567.5	-0.05	18.9	536.2	2.35	11.9	1095.4	8.21	21.5	2749.2	4.14	22.1
Cocoa	230.8	-1.86	16.5	170.5	-10.0	11.6	157.3	0.48	7.07	239.6	4.38	24.9	351.4	-2.02	19.8
Rubber	64.68	0.18	11.6	56.31	-5.99	5.09	53.0	-0.80	13.6	111.1	7.2	35.7	126.3	-0.34	13.7
Oil P.	5775	-1.92	11.6	5343.8	1.97	5.85	5283	-0.52	7.96	6312.5	2.82	6.64	8200.1	1.01	5.13
Coffee	2.82	-2.89	35.4	3.10	1.59	2.65	3.75	8.37	31.3	2.50	-37.8	37.8	3.69	-8.00	27.1

Note: Data from FAO production data base for Nigeria (2011) and Central Bank of Nigeria (2010 and 2011). CV means coefficient of variability of output in each policy period.

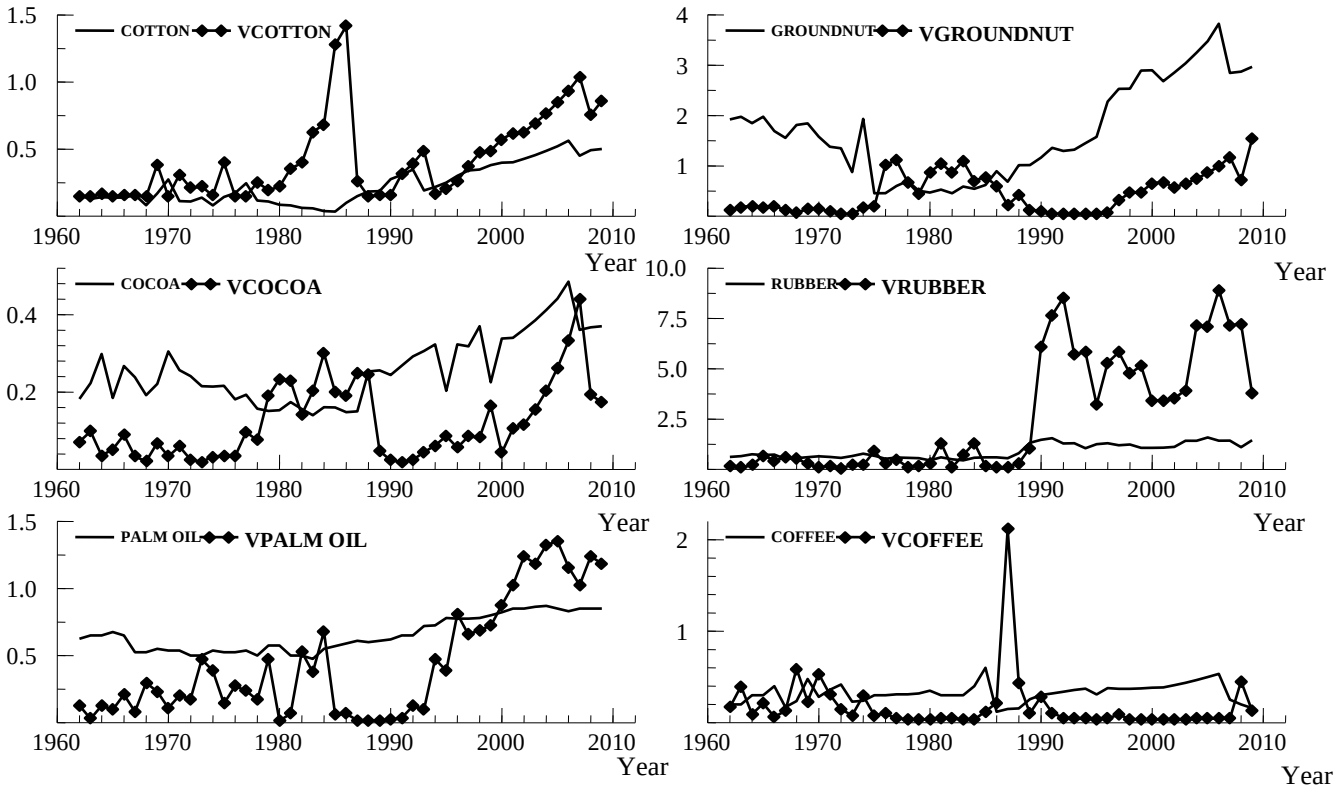
The result also reveals that, the growth rate of most cash crop outputs during period of Operation Feed the Nation (OFN) (1976-1975) was negative. Only Oil palm and Coffee outputs had positive growth rates. Alternatively the production of groundnut, cocoa and cotton were crammed with uncertainties manifested through increasing instability in their respective outputs and negative growth rate. In addition, the result indicates that Rubber (5.1%), Oil palm (5.9%) and Coffee (2.7%) had minimal variability in their output during OFN era in the country.

Furthermore, the result shows that some cash crop productions were boosted during Green Revolution period (1980-1985). For instance, outputs of groundnut, cocoa and coffee indicated an improved growth rate compared to the previous policy period. Contrary, Cotton, Rubber and Oil palm output growth rates deteriorated during this period. The output coefficient of variability of cocoa (7.1%) and Oil palm (7.9%) were relatively low, indicating that output of these cash crops had less fluctuation during Green Revolution in Nigeria.

During Structural Adjustment Programme (SAP) period (1986-1993), some cash crops production (cotton, groundnut, cocoa, rubber and Oil palm) witness improvedpositive growth rate compared to the immediate previous policy period. Only coffee output had a negative growth rate during this period. Outputs of cotton (38.7%) and Rubber (35.7%) were highly unstable during this period. However Oil palm (6.6%) exhibited minimal instability compared to other cash crop during this period.

Also in the PSAP era (1994-2010) the outputs of Cocoa, Rubber and Coffee had negative growth rates. The result provided clear evidence that, human activity such as urbanization was encroaching plantation estates of most cash crop enterprises in the country. Cotton (5.45%), groundnuts (4.14%), and oil palm fruit (1.01%) witnessed reduce growth rate compared to the immediate policy period. The result further justified the decreasing roles of cash crop production in the country. In this period, Cash crop output variability coefficients were double digits for all cash crops exception of Oil palm. The summary of the descriptive analysis reveals that, most cash crop outputs in the country were volatile during thePREOFN and SAP sub periods.On the other hand, mostcash crop outputs were stable during the OFN and GR sub periods. Also, the mean cash crop output for cotton, groundnut, rubber, cocoa and oil palm fruit enterprises indicatedincrease in tones across the policy programme periods in the country.

Figure 1: Trends in Cash crop outputs and Output Volatility in Nigeria



(Note: Output are measure in tonnes, for output axis, Cotton = $*10^6$ tons; Groundnut = $*10^6$ tons; Cocoa = $*10^6$ tons; Rubber = $*10^5$ tons; Palm Oil = $*10^7$tons; and Coffee = $*10^4$ tons. Volatility axis for Rubber = $*10^1$ and Palm Oil = $*10^1$. Also, VCotton = Volatility of cotton, VGroundnut= volatility of groundnut; VCocoa= volatility of cocoa; VRubber = volatility of rubber; VPalm Oil = volatility of Palm oil; VCoffee = volatility of coffee).

Figure I show the graphical representation of the selected cash crop outputs and their respective GARCH (1, 1) volatility indices from 1961 to 2010. The result reveals average downward fluctuations of output and output volatility in cotton, groundnut, coffee and rubber crop enterprises during period of pre structural adjustment programme (i.e. 1961 to 1985). There was noticeable variability in both output and output volatility of rubber, groundnut and cotton during periods of SAP (1986-1993) and PSAP (1994-2010); whereas coffee enterprises exhibited minimal variability in output and output volatility during the SAP (1986-1993) and PSAP (1994-2010) periods. On the other hand, the output and output volatility of cocoa and palm oil enterprises showed average upward trends during pre-liberalization period. These trends for cocoa and palm oil continue during period of liberalization and post liberalization in the country.

3.3 Results from Analysis of Variance Model (ANOVA) for each Cash Crop Enterprise

Table 4 presents the estimates of the ANOVA model for each cash crop enterprise. The dependent variable wascash crop output volatility generated from the GARCH model for each crop enterprise. The diagnostic test (F-cal) and the information criteria for each cash crop equation suggest the appropriateness of the Ordinary Least Squares technique and the significant of the specify dummy variables in each cash crop equation.

In the analysis, the ***PSAP*** dummy was used as a benchmark or control variable from which all other differential intercept slope coefficients from other dummy variables were compared. The value of the constant (δ_0) in each cash crop equation represents the mean output volatility of respective cash crop enterprise in ***PSAP*** policy period in the country. The coefficients of PREOFN, OFN, GR and SAP dummies in each of the equation represent the differential of the mean of output volatility in these policy periods from the benchmark dummy coefficient.

Table 4: Estimates of ANOVA equation involving Dummies for each cash crop Enterprise

Variable	Cotton	G/nut	Cocoa	Rubber	Oil Palm	Coffee
Constant	0.605	0.625	0.160	0.536	0.096	0.075
	(8.99)***	(9.14)***	(7.84)***	(11.79)***	(17.54)***	(0.99)
PREOFN	-0.399	-0.489	-0.112	-0.502	-0.077	0.163
	(-4.05)***	(-4.88)***	(-3.73)***	(-7.56)***	(-9.58)***	(1.47)
OFN	-0.418	0.191	-0.061	-0.508	-0.067	-0.021
	(-2.78)***	(1.25)	(-1.34)	(-5.00)***	(-5.48)***	(-0.12)
GR	-0.012	0.270	0.058	-0.471	-0.067	-0.021
	(-0.089)	(2.06)**	(1.47)	(-5.41)***	(-6.41)***	(-0.15)
SAP	-0.187	-0.423	-0.054	-0.166	-0.091	0.344
	(-1.608)	(-3.57)***	(-1.53)	(-2.12)**	(-9.61)***	(2.63)**
R^2	0.34	0.56	0.36	0.64	0.76	0.18
F-cal	5.47***	13.61***	5.91***	18.76***	34.59***	2.29*
AIC	14.89	16.52	-99.53	-22.81	-225.96	26.30
HQC	18.43	20.06	-95.99	-19.21	-222.42	29.84
SBC	24.25	25.88	-90.18	-13.45	-216.61	35.66
LogLik	-2.45	-3.26	54.77	16.40	117.98	-8.15

Note: Asterisks *, **, and *** mean significant at 10%, 5% and 1% level respectively. Variables are as defined in equation 4.Figures in bracket represent t-values**.**

The empirical results reveal that, statistically the mean output volatility of cotton during the period of ***PSAP***was 0.605 and was statistically different from the slopes obtain during PREOFN and OFNpolicy periods. The results implies that the cotton output volatility mean during PREOFN and OFN periods was statistically and significantly lower than the mean volatility during PSAP by 0.399 and 0.418 units respectively. This result implies that the effect of PSAP, PREOFN and OFN policy period impact on cotton output volatility in the country differs significantly. The impact of PSAP, GR and SAP periods on cotton output volatility in the country was similar as shown by statistical similarity in mean output of cotton volatility during these periods.

For Groundnut enterprise; the mean output volatility in PREOFN, GR and SAP periods was significantly different and lower than that of PSAP (0.625)period by 0.489, 0.423 and 0.270 respectively. The result shows that the mean groundnut volatility in PREOFN, GR and SAP periods was about 0.136, 0.895 and 0.202 units and was statistically different from 0.625units in PSAP period. However the mean groundnut volatility was statistically around the same during PSAP and OFN periods. The result implies that, the impact of PSAP and OFN on groundnut production in Nigeria was statistically similar but was statistically different during PSAP, PREOFN, GR and SAP periods.

Also the mean output volatility of cocoa in **PSAP** was statistically different from the mean volatility during PREOFN period. The mean cocoa output volatility was 0.048unit for PREOFN periods (i.e. 0.160 - 0.112) compared to 0.160unit in PSAP period. On the other hand, the mean cocoa output volatility during PSAP policy period was around the same in OFN, GR and SAPpolicy periods. The result means that the influence of PSAP, OFN, GR and SAP policy periods on cocoa output volatility was statistically similar, but different during PSAP and PREOFN policy periods.

In addition, the output volatility of coffee in PSAP period was not statistically significant. This implies that the volatility of coffee in PSAP period was relatively low compared to other policy periods. The differential intercepts with respect to PREOFN and SAP policy periods were positive and significant; meaning that volatility in these periods was higher than PSAP period. On the other hand, the mean volatility of coffee during GR and OFN policy periods was 0.021 units each less than the mean coffee volatility of 0.075unit during the PSAP policy period. The result denotes that the agricultural policy impact on coffee output volatility during PSAP policy period statistically did not differsignificantlyfrom PREOFN, OFN, GR and SAP policy periods in the country.

Furthermore, the mean rubber output volatility was significantly different among the specify policy periods. The mean rubber output volatilityin PREOFN period was0.502unit less than 0.536uits in PSAP. This implies that the

mean output volatility of rubber during PREOFN was around 0.034.Also the mean rubber output volatility during OFN, GR, and SAP policy periods were 0.508, 0.471 and 0.166 statistically lower than 0.536 in PSAP policy period respectively. The result reveals that each policy regime impacts on rubber output volatility was significantly different. The result however indicates the inconsistency in agricultural policies formulation and implementation directed towards the rubber sub sector in the country.

The result further reveals that the mean volatility of oil palm was statistically and significantlydifferent between PSAP period and the other policy periods specify. The differential intercept coefficients with respect to PREOFN, OFN, GR and SAP were 0.077, 0.067, and 0.091 respectively. These coefficients were negative and statistically significant at various levels of probabilities. This implies that, the differential coefficients with respect to PREOFN, OFN, GR and SAP policy periods are statistically and significantly less than 0.096 during PSAP period by the value of their coefficients.This means that the impacts of PSAP, PREOFN, OFN, SAP and GR policy periods on oil palm volatility were significantly different.

4.0 CONCLUSION

The study analyses cash crop output volatility in different agricultural policy programme regimes in Nigeria. The major cash crop consider were; Cotton, Groundnut, Coffee, Cocoa, Rubber and Oil palm.The resultsfrom the descriptive analysis shows that, cash crop output volatility were most volatile during the PREOFN and SAP sub periods. On the other hand, cash crop outputs volatility were most stable during the OFN and GR sub periods. The result of the ANOVA reveals that the mean cash crop output volatility during PSAP period was significantly different from other policy periods for most cash crop exception of coffee. The result implies that the impact of the current agricultural policy ***(PSAP)*** on Cotton, Groundnut, Cocoa, Rubber and Oil palm crop output volatility in the country differs significantly from some previous agricultural policy pogramme regimes. Alternatively, the ANOVA model also reveals that the mean volatility of cash crop during *PSAP* was similar to some agricultural policy programme periods. The result denotes that the impact of the current agricultural policy ***(PSAP)*** on some cash crop output volatility in the country also shares some similarities with the previous policy programme. The result prove the fact that the agricultural policy programmes actually influenced key cash crop outputs and their volatility; but these influences were mixed and inconsistence across cash crop enterprises and policy programme regimes in the country. Following the results of the study, we recommend that government should formulate appropriate specific cash crop policy packages as part of the holistic agricultural policy programme. This kind of policy programme would ensure quick intervention and promote result oriented cash crop policy programme in the country. Also agricultural policy contents during PREOFN and SAP periods should be used as a basis for stimulating cash crop output volatility in the country. Finally, the federal government of Nigeria should as a matter of policy promote long term planning in the agricultural sector and equally try to avoid *ad hoc* or short term policies especially in cash crop sub sector.

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