Effect of Market Reforms on Cotton Agriculture in Nigeria (1960-2010)

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Abstract

This study examined the effect of market reform on cotton agriculture in Nigeria using time series data on cotton production from a period of 1960 to 2010.The Autoregressive Distributed Lags (ARDL) modeling approach to co-integration analysis was employed to analyze the data. Results based on co-integration and error correction specification indicated that the exchange rate, import price, external reserve and SAP are the major determinants of cotton production in the long-run while exchange rate and SAP are the major determinant in the short-run. Findings indicated that market reform has a positive and significant effect on Nigeria's cotton production both in short-run and long-run.

KEYWORDS: Cotton, SAP, ARDL, Co-integration.

1.0 Introduction

The role of Agriculture in transforming the economic framework of any economy cannot be over emphasized given that it is the source of food for man and animal and provides raw material for industrial sector. Thus it plays a significant role in reduction of poverty (Nwankwo, 1993). In addition, agriculture provides employment opportunities for the teeming population, and contributes to the growth of the economy (Izuchukwu, 2011). Although Nigeria has been an agricultural economy and has targeted the agricultural sector as the principal source of growth and revenue, the role of agriculture in the economy has since independence seem to be experiencing a downward trend due majorly to lack of finance and neglect of the sector (Hammond, 2003).

Agriculture accounted for 60-70% of Nigeria's export in the 1950s and 1960s. Nigeria was then a major exporter of cocoa, cotton, palm oil, palm kernel, groundnut and rubber. Average annual growth rate of 3-4% were achieved for export and food crops. Government revenues depended heavily on agricultural export taxes, and both the current account and fiscal balances depended to some extent on agriculture. The average annual growth rate of agricultural exports declined by 17% from the mid 1970s through to the mid 1980s and agriculture fell from the second largest sector of the Nigerian economy; falling from 48% of GDP on 1970 to 20.6% in 1980; 2% of export in 1996 and only 23.3% of GDP in 2005. Agricultural exports today are negligible and still movements is still on the downwards trend.

The major consequence of neglect of the agricultural sector in Nigeria during the oil boom years (1970-1980s) was the decline in total food and fibre production and the astronomical rise in input prices. These general problems of agricultural sector also affect the cotton industries which has hitherto played an important role in the economy.

Cotton production has a relatively long history in Nigeria. The cultivation of the crop started well before the colonial era even though it was not produced in commercial quantities until the onset of the activities of the British Growing Association in 1903, since then considerable attention and resources have been devoted to the improvement of cotton production and utilization by both the public and the private organisations. Cotton is grown as a cash crop by about 0.8 million farmers on a total estimated area ranging from 0.6-08 million hectares. The major feature of cotton production in Nigeria is that about 80% of total production is by peasant farmers under rainfed conditions with simple tools and animal drawn implements (Onu and Atala, 1992; Adeniji, 2002)

Cotton (Gossypium hirsutum L.) is an important cash crop in Nigeria which produces lint and seed that serve as raw materials for the local textiles and seed crushing industries. In addition, cotton seed provides edible oil for human consumption while cotton seed cake are used as raw materials for livestock feeds due to high protein content. Until recently, cotton was the fifth most important export crop and a major source of foreign exchange for the country. Nigeria today is the 23rd largest producer of cotton and the major buyers from Nigeria includes China, United Kingdom, Pakistan, etc. Cotton production has long been a good contributor to the gross domestic product of Nigeria and for decades has being a driving force for economic development of Nigeria.

Cotton in Nigeria is mainly rain fed and according to Idem (1999), cotton production started from the southwest zone of Nigeria but commercial cotton production in the 50 years of its production is carried out in the savanna region of the Northern state in the area extending from 70N to 130N latitude which are the three major cotton producing zones in the country. Of the main three cotton zones, the Northern zone accounts 60% of total production, the eastern zone 35%, and the southern zone the remaining 5% (Adeniji, 2002). The peak period of cotton production in Nigeria was as far back as 1976/77 when about 453,126 bales were produced (Olukosi and Isitor, 1990)

Unfortunately, total production remains far below the national requirements of the textile and the oil mills. This is as a result of low average yield of the crop on farmers plot of about 400-500 kg seed cotton per hectare which is below the genetic yield potential (2.5-3.0) tons seed cotton/ha, of the varieties being grown and yield that are obtainable on research plots (1.5-2.5 tons ha^{-1}) (Ogunlela, 2004).

One of the most dramatic events in Nigeria over the past decade was the adoption of a Structural Adjustment Programme (SAP) in 1986. Nigeria launched structural adjustment programme (SAP) in 1986 to redefine the state of the economy with the main aim of reversing the downward trend of the agricultural sector. The sector was deregulated by abolishing marketing board, eliminating price control, privatization of public enterprise and devaluation of naira in other to aid the competitiveness of the export sector (Binuomote and Ajetomobi, 2012). Before SAP was introduced, Nigeria economy was characterized by a weak economic structure arising from frequent changes in economic and financial policies, bad implementation of gigantic agricultural projects, rise in food importation, fall in oil price, increase in foreign debt, and others (Umebali and Akubuilo, 1992).

The period following SAP implementation was also characterized by currency overvaluation partly due to oil boom. This led to Nigerian agricultural exports being uncompetitive in the world market. Factors of production such as land and labour migrated out of the rural agricultural sector to the urban industrial sector. This was because construction, manufacturing and service sectors, booming at the period, were paying higher returns on those factors. The increased migration of able-bodied youths from the rural to urban areas later dealt a blow to agricultural sector (Idachaba, 2006,Ojiako, 2008). Despite the adoption of development plans and various agricultural policies, Nigerian economy behaved sluggishly and population grew by leaps and bounds unchecked having one of the highest growth rates in the world (3-5.5%) (Umebali and Akubuilo, 1992).

The reason for deregulation as the policy trust of SAP and other aforementioned programmes was to put the agricultural sector and the economy on a sustainable growth path. This has not been achieved as intended since food supply could not meet up with demand. When SAP policies were executed as intended by the IMF, the Nigerian economy actually did grow as was expected. The growth manifested between 1986 and 1988, with the export sector performing especially well. However, the falling real wages in the public sector amongst the urban classes, along with a drastic reduction in expenditure on public services, set off waves of rioting and other manifestations of discontent that made sustained commitment to the SAP difficult to maintain (Umebali and Akubuilo, 1992).

The deregulation (liberalization) of the cotton marketing sector in 1986 as with the case of other export crops was to remove all forms of barriers to participation in the market and establish a state of effective competition in the market. Realistically, as a result of the liberalized nature of the market, it was expected that there will be high number of potential new entrants. Studies showed that about 82 and 96% of the sellers and buyers of cotton respectively had spent over 20 years in the cotton business which reveals that majority of the traders started the cotton trade after the disbandment of the cotton marketing board in 1986. This is a desirable condition in itself because large numbers of buyers and sellers will ensure competition. This does not mean however, that such numbers are always necessary since the effect has not been very laudable because it was discovered that more farmers had abandoned food crop production and have gone into cotton production (Onu and Okunmadewa, 2000). The important question to ask however is if this has translated into increased production and export in the cotton sector?

At present Nigeria has lost its role as one of the world's leading exporters of agricultural commodities. In addition, the country is currently suffering from a declining as well as fluctuating income from its heavy dependence on oil exports. With the present situation in the oil market, it has become necessary for the country to reconsider and investigate the effect of market reform on cotton production Nigeria between 1960 and 2012 using the Bound Testing approach to co- integration and error correction modeling (ECM) to give policy recommendations which are aimed not only to ensure the revitalization of the cotton agriculture in Nigeria but also ensure its sustainable production and export.

2.0 Conceptual Framework and theoretical issues.

The core of market reform is the stimulation of the growth of export beyond that of import with a view to an overall improvement in the trade balance. The theoretical impact of exchange rate reform on trade is still highly controversial (Agboola, 2004). Three major approaches proposed the theoretical literature. They are the monetarist, elasticity and absorption approaches. The monetarist argued that devaluation changes the relative price of traded and non traded growth, thus improving both the trade balance and the balance of payment (Frankel and Rodriguez 1975). They propounded that devaluation results in a fall in the real supply of money, resulting in an excess demand for money. The effect is hoarding and an increase in trade balance (Upadhyaya and Dhakal 1997).

Robinson (1947) and Kreuger (1983) are the major proponent of the elasticity approach. At the heart of this approach is the point that transactions may dominate a short term change in the trade balance thereby resulting in deterioration in the trade balance (Upadhyaya and Dhakal, 1997). However, in the long run, export and import quantities adjust and this causes elasticity of exports and imports to increase and for quantities to adjust. This leads to the reduction in the foreign price of devaluating country's export but raises the price of imported goods and therefore lower its demand. The result is that the trade balance improves. Quite obvious from this argument is that the effect of devaluation on trade balance depends on the elasticity of exports and imports. This reasoning has been extended by Williamson (1983) noting that the higher import prices initiated by devaluation could stimulate increase in domestic prices of non traded goods such that the inflation raises with the potential effect of reducing the benefit of devaluation as manifested in the increase in trade balance.

The debate of the absorption approach may change the terms of trade, increase production, switch expenditure from following the domestic goods or have some other effects in reducing domestic absorption relative to production, and thus improving the trade balance (Alexandra, 1952; Johnson, 1967).

3.0 Methodology

3.1 Analytical techniques

3.1.1 Model Specification

Following the theory of productivity, it is hypothesized in this study that the productivity of cotton is a function of factors such as the relative price of cotton, external reserve – since the ability of a nation to import will be a function of her available reserve, import price of cotton, real exchange rate, policy reforms and other factors. Empirically, the model is stated as:

$$LQ = \alpha + \delta_1 LEX_t + \delta_2 LP_t + \delta_3 LR_t + \delta_4 LP_0 + \delta_5 SAP + \delta_6 T + \varepsilon_t \quad \text{........ (1)}$$

where LQ is the quantity of cotton produced in Nigeria, LEX is the real exchange rate, LP is the producer price of cotton, LR is rainfall, LP_0 is the price of crude oil, SAP is structural adjustment programme which is the market reform policy under consideration in this study, T is time trend and ε represents the error term. All the variables are expressed in the natural logarithmic form. The dummy variable SAP is included in this study to examine the effect of market reforms policies on cotton production in Nigeria. It is expected that market reform will increase domestic cotton production. Hence, it is theoretically expected that $\delta_1 \geq 0,\ \delta_2 \geq 0, \delta_3 \geq 0,\ \delta_4 \leq 0, \delta_5 \geq 0\ and\ \delta_6 \geq 0.$

ARDL Model Specification

As obtained in Fosu and Magnus (2008), in order to empirically analyze the long-run relationships and dynamic interactions among the variables of interest, the model has been estimated by using the Bounds testing (or autoregressive distributed lag (ARDL)) cointegration procedure, developed by Pesaran et al (2001). The procedure is adopted for the following three reasons. Firstly, the bounds test procedure is simple. As opposed to other multivariate cointegration techniques such as Johansen and Juselius (1990), as it allows the cointegration relationship to be estimated by OLS once the lag order of the model is identified. Secondly, the Bounds testing procedure does not require the pre-testing of the variables included in the model for unit roots unlike other techniques such as the Johansen approach. It is applicable irrespective of whether the regressors in the model are purely I (0) purely I (1) or mutually cointegrated. Thirdly, the test is relatively more efficient in small or finite sample data sizes as is the case in this study. The procedure will however crash in the presence of I (2) series. Following Pesaran et al (2001), we apply the bounds test procedure by modeling the long-run equation (6) as a general vector autoregressive (VAR) model of order p, in

$$z_t = c_o + \beta t + \sum_{i=1}^{p} \phi_i z_{t-i} + \varepsilon_t \ , \quad t = 1, 2, 3\ldots T \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

With c_o representing a (k+1)-vector of intercepts (drift) and β denoting a (k+1)-vector of trend coefficients. Pesaran et al (2001) further derived the following vector equilibrium correction model (VECM) corresponding to (6)

$$\Delta z_t = c_0 + \beta t + \pi z_{t-1} + \sum_{i=1}^{p} \Gamma_i \Delta z_{t-i} + \varepsilon_t \ , \quad t = 1,2,3,\ldots,T \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where the (k+1)*(k+1) matrices $\prod = I_{k+1} + \sum_{i=1}^{p} \psi_i$ and $\Gamma_i = -\prod = \sum_{j=i+1}^{p} \psi_i \ , i = 1, 2, \ldots$,p-1

contain the long-run multipliers and short-run dynamic coefficients of the VECM. Z_t is the vector of variables y_t and x_t respectively. y_t is an I(1) dependent variable defined as LQ and

$X_t = (LEX, LP, LR, LP_0, SAP, T)$ is a vector matrix of 'forcing' I (0) and I (1) regressors as already defined with a multivariate identically and independently distributed (i.i.d) zero mean error vector $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})$ and a homoskedastic process. Further assuming that a unique long-run relationship exists among the variables, the conditional VECM can now becomes:

$$\Delta y_t = C_{yo} \ \beta_t + \delta_{yy} y_{t-1} + \delta_{xx} x_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta y_{t-1} + \sum_{i=0}^{p-1} \xi \Delta x_{t-1} + \varepsilon_{yt}, \ t = 1,2,\ldots,T \quad \ldots\ldots\ldots (4)$$

On the basis of equation (4) above, the conditional VECM of interest can now be specified as

$$LQ = \alpha + \delta_1 LEX_t + \delta_2 LP_t + \delta_3 LR_t + \delta_4 LP_0 + \delta_5 SAP + \delta_6 T +$$

$$\sum_{h=1}^{p} \eta \Delta LQ_{t-n} + \sum_{i=1}^{q} \phi \Delta LEX_{t-d} + \sum_{j=1}^{q} w \Delta LP_{t-z} + \sum_{k=1}^{q} \varphi \Delta LR_{t-w} + \sum_{l=1}^{q} \ell \Delta LP_{0t-g} + \pi \ SAP \quad (5)$$

Where δ are the long run multipliers, c_0 is the drift and ε_t are white noise errors. Where all variables are previously defined.

There are 3 steps in testing the co integration relationship between rice import demand and its explanatory variables. First, we estimated equation above by ordinary least square (OLS) technique. The presence of co integration can be traced by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. That is, the null hypothesis

$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$ against the alternative.

Ha: δ_1 or δ_2 or δ_3 or δ_4 or δ_5 or $\delta_6 \neq 0$.

We denote the test which normalize on M by $Q = F_M\ (LEX, LP, LR, LP_0, SAP, T)$. Two asymptotic critical values bounds provide a test for co integration when the independent variables are I(d) (where 0≤ d ≤1): a lower value assuming the repressors are I(0) and an upper value assuming purely I(1) repressors. If the computed F- statistic is less than lower bound critical value, then we do not reject the null hypothesis of no co integration. Conversely, if the computed F- statistic is greater than upper bound critical value, then we reject the null hypothesis and conclude that there exists steady state equilibrium between the variables under study. However, if the computed F - value falls within lower and upper bound critical values, then the result is in conclusive. The appropriate critical values for the F-tests are obtained. Critical values for the I(0) series are referred to as the upper bound critical values while the critical values for the I(1) series are referred to as lower bound critical values.

For the second step, once the co integration has been established consequent upon which a unique long run relationship exists among variables of interest, we specify a conditional ARDL (P, q_1, q_2, q_3,q_4, q_5, q_6) long run model for LQ as

$$LQ = c + \sum_{h=1}^{p} \delta_1 LQ_{t-1} + \sum_{i=0}^{q} \delta_2 LEX_{t-i} + \sum_{j=0}^{q} \delta_3 LP_{t-1} + \sum_{k=0}^{q} LR_{t-1} + \sum_{l=0}^{q} \delta_5 LP_{0t-1} + \delta_6 SAP + \delta_7 T + \varepsilon \quad . \ (6)$$

The lags length in the ARDL model was selected based on Schwarz Bayesian criterion (SBC). For cotton, a maximum of 2 lags was selected.

In the final step, we obtain the short-run dynamic elasticity by estimating an error correction model associated with the long run estimates. This is specified as follows:

$$\Delta LQ = C_0 + \sum_{h=1}^{p} \eta \Delta LQ_{t-n} + \sum_{i=1}^{q} \phi l \Delta LEX_{t-d} + \sum_{j=1}^{q} w \Delta LP_{t-z} + \sum_{k=1}^{q} \varphi \Delta LR_{t-w} + \sum_{l=1}^{q} \ell \Delta LP_{0t-g} + \pi\ SAP + \lambda ECM_{t-1} \quad .$$

(7)

The symbols $\eta, \phi, \omega, \varphi, \ell and\ \pi$ are the short-run dynamic elasticity of the model's convergence to long-run equilibrium and λ is the speed of adjustment. Δrepresents the first difference operator and ECM_{t-1} is the one period lagged error correction term. The coefficient measures the speed of adjustment to obtain equilibrium in the event of shocks to the system. General – to – specific modeling technique of Hendry and Erricson (1991) is followed in selecting the preferred ECM. This procedure first estimate the ECM with different lag lengths for the difference terms and, then, simplify the representation by eliminating the lags with insignificant parameters. A correctly indicated ECM model has to pass a series of diagnosed tests. These include the Autoregressive LM (Lagrange multiplier) test and/or Durbin-Watson test for serial correlation in the residual, the Autoregressive LM test for normality distribution of the residuals in a regression model, the ARCH and the White test for heteroscedasticity in errors. These tests were conducted to ensure reliability of results.

3.2 Data Source

The data for this study are time series data at macro level spanning from 1960-2010. All the data were largely from Food and Agriculture Organization (FAO) statistical database, Central Bank of Nigeria (CBN) statistical bulletin and National Bureau of statistics (NBS)

4.0 Results and discussion

In this section, ARDL (Autoregressive Distributive Lags) is applied to test the co integration. For this procedure, it is essential to determine the order of lag on the first difference of the variables. Akaike Information Criterion (AIC) and Schwarz Bayesan Information Criterion (SBC) are applied to obtain optimal lag from unrestricted variable autoregressive model. Applying the steps stated in the section above, OLS regression is estimated for the first difference part of the equation and then tested for the joint significance of the parameters of the lagged level variable when added to the first regression.

Now, a long run relationship between the series is observed. According to the computed F-statistics from the Pesaran test reported in table 1 below, we can reject the null hypothesis of the integration at 1% significance level for effect of exchange rate in cotton productivity. The computed F- statistics

Fm $(LY/LEX, LP, LR, LP_0, SAP, T)$ = 4.955 and it is lesser than the upper bound critical value of 5.331 at the 1% level. This indicates that the alternative hypothesis of the existence of a unique co integration relationship between cotton productivity and its determinant can be accepted for Nigeria in this case. In other words, it had been proved that exchange rate, import price of cotton, crude oil price, Reserve and Structural Adjustment Program are bound together in the long run (co-integrated) when cotton gross domestic product is made the dependent variable.

Table 1: ARDL Co-integration test for long-run relationship

	Fm (LQ/LEX, LR, LP, LP_O, SAP) K=5	4.955
Critical values	Lower Bound	Upper Bound
1%	4.011	5.331
5%	3.189	4.329
10%	2.782	3.827

Notes: Case III critical values are extracted from Pesaran et al., (2001).

Long-run and Short-run Error Correction Results and Diagnostics

The solved statistics long-run equation for cotton productivity in Nigeria as well as its short-run equation is given in table 2 below. The R^2 value of 0.491 for the ECM in table 2 shows that the overall goodness of fit of the ECM is satisfactory. However, one other diagnostic test was carried out in order to test the validity of the estimates and their suitability for policy discussion.

The Autoregressive Conditional Heteroscedasticity (ARCH) test for testing heteroscedasticity in the error process in the model has an F-statistics of 7.915 which is statistically insignificant. This attests to the absence of heteroscedasticity in the model. From the battery of diagnostic tests presented and discussed above, this study concludes that the model is well estimated and that the observed data fits the model specification adequately, thus the residuals are expected to be distributed as white noise and the coefficient valid for policy discussions.

Table 2:Error Correction Modeling of Cotton in Nigeria estimated using the ARDL Approach

ARDL (1, 0, 1, 1, 0, 0) Selected Based on Schwarz Bayesian Criterion.

Static Long – run equation		**Short – run equation**	
Constant	-36.277 (-3.804)	Constant	-17.907 (-3.420)
LEX	0.517 (2.172)**	ΔLEX	0.255 (1.905)*
LP	1.232(2.061)**	ΔLP	0.104 (0.421)
LR	4.504 (4.227)***	ΔLR	0.017 (0.033)
LPo	0.603(0.256)	ΔLPo	0.031(0.260)
SAP	-3.419(-1.112)	ΔSAP	0.485(2.231)**
T	0.016(0.638)	$ECM(-1)$	-0.494(-4.973)***
		R^2	= 0.491
		AR LM F	= 0.070(0.462)
		ARCH F	= 0.095(0.101)
		Normality X^2	= 1.726(0.467)

ECM =LQ + 36.277 – 0.517LEX – 1.232LP – 4.504LR – 0.603LPo – 0.982SAP – 0.016T
Source: Data analysis, 2014

NB: * indicated significance at 1%**
**** indicated significance at 5%**
*** indicated significance at 10%**

The R^2 value of 0.491 for the ECM in table above 2 shows that 49.1% variation in cotton production in Nigeria is explained by the variables in the specified model. However, a number of other diagnostic tests were also carried out in order to test the validity of the estimates in the ECM for cotton production and their suitability for policy discussion. The Autoregressive Conditional Hetoroscedasticity (ARCH) test for testing heterscedasticity in the error process in the model has an F-statistic of 0.095, which is statistically insignificant. This attests to the absence of heteroscedasticity in the model. The Breusch – Godfrey Serial correlation Langrange Multiplier (LM) test for higher order - serial correlation with a calculated F – statistic of 0.070 could also not reject the null of absence of serial correlation in the residuals. The Jargue – Bera Normality test on the residuals has a χ^2 – statistic of 1.726 and it is not significant. This shows that the error process is normally distributed. From the battery of diagnostic tests presented and discussed above, this study concludes that the model is well estimated and that the observed data fits the model specification adequately, thus the residuals are expected to be distributed as white noise and the coefficient valid for policy discussions.

It could be observed from the results in table 2 that the coefficient of error correction term (ECM) carries the expected negative sign and it is significant at 1%. The significance of the ECM supports cointegration and suggests the existence of long – run steady state equilibrium between cotton supply and other determining factors in the specified model. The coefficient of -0.494 indicates that the deviation of cotton output from the long-run equilibrium level is corrected by about 49.4% in the current period.

The result in table 2 above shows that the real exchange rate has a positive impact on cotton production. The coefficient is 0.517 in the long-run and it is significant at 5% level of significance. In the short-run also, the coefficient of real exchange rate is 0.255 and it is significant at 10% level of significance. The result suggests that a unit increase in the real exchange rate in the long run will increase cotton production by 0.255 units. The result is in line with theoretical expectation, as the devaluation of the nation's currency, which is one of the components of SAP is expected to reduce import of cotton in the country and consequently improve local production. A proper implementation of SAP policy will decrease imports in the long-run and encourage local production through liberalization of inputs and output market.

An increase in the producer price of cotton is expected to reduce demand for imports. The coefficient for price elasticity of cotton (LP) in Nigeria in the long-run is 1.232 and it is significant at 5%. In the short-run, the coefficient for price elasticity of cotton (LP) in Nigeria is 0.104 and it is not statistically significant. The results supports the expectation that increase in the producer price (LP) of cotton in Nigeria will raise local production and discourage import significantly.

Rainfall (LR) has a positive impact on cotton production in the long run. The coefficient is 4.504 and it is significant at 1% level of significance. In short run also, the coefficient of rainfall is 0.017 but it is not statistically significant. The result suggests that a 1% rise in rainfall will result in 4.504% increase in cotton supply in the long-run. Although the result suggested that the rainfall significantly determine Nigeria's cotton production, production will nonetheless continue in the face of low rainfall supply as cotton is one of Nigeria's cash crops that thrive well under relatively low rainfall supply especially as it applies in the northern Nigeria.

Similarly, the table shows that the coefficient of crude oil price is 0.063 in the long-run and 0.031 in the short-run. Both are however not significant statistically. The result suggests that the crude oil price has no significant effect on cotton production both in the short-run and long-run. This negates the theoretical expectation that the increase in the world price of crude oil will (cause a shift away from cotton production) discourage local production of cotton production. This may be due to the fact that factors or government policies other than the movement in the world crude oil prices have more direct effects on the Nigerian cotton agriculture.

Structural Adjustment Program (SAP) has a positive effect on cotton production both in the long-run and short-run. The coefficient is 0.982 and it is significant at 10% in the long-run. In short-run however, the coefficient of SAP is 0.485 and it is significant at 5%. The result suggests that a proper implementation of the market reform policies of exchange rate, devaluation, input prices reforms but with a modification of marketing commodity board remaining in place to maintain the standard of export commodities will lead to significant increase cotton production and export as well as better producer prices for cotton growers in Nigeria.

Time Trend which represents technology was modeled with the series as represented by the time variable serving as a proxy for the impact of technological change on output i.e. to capture technical progress, positive and high yielding varieties has a positive coefficient of 0.016 but is not statistically significant. Time Trend is expected to reduce imports and increase local production. The positive shows that government efforts to improve cotton production have a favorable effect on production.

5. 0 Conclusion and Policy recommendation

The results of this study reveal that market reforms; namely the exchange rate devaluation and market liberalization of SAP has positive and significant effect on cotton production in Nigeria. The negative effect of the policy was actually in the blind implementation which removed structures which could have sustain the objectives for which SAP was implemented. There is therefore the need for the government to re-establish a well-functioning and organized marketing board that will provide a quality control system for the cotton farmers in Nigeria. This will guarantee a ready international market and also help not only to sustain production, but also increase Nigeria's cotton exporting capacity.

Policy actions and trade reforms aimed at sustaining good producer prices of cotton for the local farmers and consequently reducing cotton importation into the country should be formulated and implemented.

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