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Impact of Export Promotion Programmes on Agricultural Growth in Nigeria.

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Abstract

This paper examines the impact of export promotion programmes on the growth of agriculture in Nigeria and develops an index of export promotion strategy capturing the important dimensions of the agricultural production reform process. Employing an ARDL cointegration technique, impulse-response functions and variance decompositions, the results indicate a negative effect of the agricultural export promotion programmes on agricultural growth in the short and long run. Land and openness have positive effect on agricultural growth both in the short and long run. However, labour has an inverse relationship with agricultural growth. The findings highlight the need to modify some of the existing export promotion programmes to impact positively on agricultural growth. It has also highlighted the need to restructure the production system to make the sector respond to export promotion programmes in the country.

JEL classification: F17; Q17.
Keywords: Export promotion programmes, agricultural growth, ARDL, Nigeria

1. Introduction

The role of agriculture in the economic development process of a nation has been emphasized in the economic development literature (Johnston and Mellor, 1961; Johnston, 1970). Agricultural productivity is fundamental for sustainable development (Lewis, 1954, Rostow, 1960). Several ways through which agriculture contributes to development of an economy have been identified in the literature. First, it supplies high quality labour to the manufacturing and the service sub-sectors. Second, the sub sector supplies food for consumption and raw materials for industries. Third, it generates foreign exchange earnings to finance domestic production. Finally, it assists in raising rural income.

The view towards agriculture growth and economic development informed the emphasis placed on agricultural development in Nigeria at independence. As a matter of fact, agriculture was the mainstay of the Nigerian economy in the 1960s. The sub-sector contributed over 80 per cent of the earnings and employment; about 58 per cent of the GDP (gross domestic product) and about 50 per cent of the government revenue, despite the subsistence nature of production in the sector (Federal Republic of Nigeria, 2016).

However, the discovery and production of oil in large quantities in the 70s led to the total neglect of agriculture. Consequently, the contribution of agriculture along with allied sectors of fisheries and forestry dropped remarkably from 58.2 per cent in 1960 to 31.5 per cent in 1972 and further down to 19.2 per cent in 1979. As a result of the oil glut in the early 80s and the attendant economic crisis in the economy, agriculture as percentage of GDP experienced upward trend in the 80s and early 1990s.The percentage contribution of agriculture to GDP from 2000 and 2014 hovered consistently around 30-35 per cent. Agriculture contributed 21.26 per cent to nominal

GDP during the fourth quarter of 2016 as against 22.56 per cent in the corresponding period in 2015 (National Bureau of Statistics, 2017). Indeed as at the end of the year 2016, the country is faced with two key gaps in agriculture namely; an inability to meet domestic food requirement, and an inability to export at quality levels required for market success (Federal Ministry Agriculture and Rural Development, 2016).

As part of the efforts to boost agricultural production and exports, several export promotion policies and projects have been instituted by the government since early 1980s. These policies and plans include the establishment of National Accelerated Food Production Projects (NAFPP), Agricultural Development Projects (ADP), River Basin Development Projects (RBDA), National Fadama Development Projects (NFDP), Root and Tuber Expansion Programme (RTEP), and National Special Programme in Food Security (NSPFS) (Iwuchukwu and Igbokwe, 2012). Other quantifiable measures include increased credit to agriculture through Agricultural Credit Guarantee Scheme Fund, exchange rate liberalisation, increased capital and recurrent expenditure on agriculture and increased foreign investment into agricultural sector (Efobi and Osabuohien, 2011; Zakaree, 2014).

In the literature, studies have examined the impact of some of these agricultural projects and policies on agricultural output and exports (Efobi and Osabuohien, 2011; Ijaiya and Bello, 2009; Oyakhilomen, Omodachi and Zibah, 2012; Shane, Roe and Sowaru 2008 and Oyakhilomen, Falola and Rekwot 2014). However, the normal practice in existing studies is to examine the effect of either an agricultural project or policy on economic growth. No known study has comprehensively examined the impact of various components of export promotion policies on agricultural growth in Nigeria. Hence to fill this gap, this paper develops a composite index of export promotion programmes using principal component analysis, which is used to ascertain the

impact of export promotion strategy on agricultural growth. This index covers important measurable dimensions of the export promotion measures introduced by the government in Nigeria.

The paper is organised as follows: section 2 provides a summary of export promotion policies in Nigeria. Section 3 provides the review of literature. Section 4 discusses the methodology and data issues. Section 5 discusses the empirical results. Section 6 shows the dynamic relationships among the variables. The conclusion is contained in section 7.

2. Export Promotion Strategies and Agricultural Output Growth in Nigeria

Before the advent of oil in large quantities in the 1970s, export promotion policies, in form of various export subsidies (such as duty drawback, direct subsidies and tax holiday) were implemented to promote local industries and thus local production and export of goods and services (Ugwu and Kanu, 2012). Basically, these policies were instituted to advance the course of import substitution development strategy of the government of Nigeria. Moreover in order to stimulate growth in the agricultural sector in support of the import substitution strategy, many agricultural programmes and projects were instituted by the government. Some specific projects and programmes designed to promote increase agricultural output and export included National Accelerated Food Production Programme (NAFPP), Agricultural Development Projects (ADP), River Basin Development Authorities (RBDAs), Operation Feed the Nation (OFN) and Green Revolution (GR). Others are the National Fadama Development Project (NFDP), Root and Tuber Expansion Programme (RTEP) and National Special Programme on Food Security (NSPFS) (Iwuchukwu and Igbokwe, 2012). Many of these projects and policies were instituted before the introduction of the structural adjustment programme in mid 1986.

However, sequel to the economic crisis that faced the economy in the early 80s, the country moved from the import substitution strategy to export promotion strategy of development. Specifically, the Federal Government of Nigeria introduced the comprehensive economic reform programme tagged 'Structural Adjustment programme' in mid 1986 (Akinlo, 1986 and Fawade, 2009). Basically, the reforms package contained measures designed to enhance efficiency in production and competition. Measures designed to encourage agricultural production and export included among others, exchange rate liberalisation, increased credit to the agricultural sector, increased foreign and domestic investment in the sector. Asides, several institutions were established by the government to assist the export trade sector. It is true that some of these institutions do not directly involve in production and trade activities; they however, provide organisational support to producers and exporters.

In terms of agricultural sector output growth as proxied by its contribution to GDP, the trend tells a somewhat different story of how it should move following the institution of export promotion programmes. Agricultural output as a percentage of GDP averaged 50.2 per cent during the period 1960-70. Thereafter, the contribution of the sector to GDP declined persistently, reaching a low level of 21.8 per cent in 1976-1980 before an upward swing to 39.6 per cent in 1981-1985. However for the period 1986-90, the average contribution of agriculture to GDP increased to 41.2 per cent. This probably reflected the increased attention paid to agriculture following the oil glut of early 80s and the introduction of structural adjustment programme in 1986. With SAP, several measures were introduced including exchange and interest rate deregulation, reduction of tariffs and subsidy removal to enhance agricultural production and exports. The average contribution of agriculture to GDP for the period 1991-98 declined to 38.7 per cent. The figure

declined further to 23.97 per cent for the period 2000-2009. The average contribution of agriculture to GDP for the period 2010 increased to 25.74 per cent (Central Bank of Nigeria, 2014).

In terms of the growth rate of the sector, available statistics revealed that the sector recorded an average negative growth rate of about 2.6 per cent, during the pre 1970-1980. The figure increased to 2.6 per cent in 1981-85. The sector's average growth for the period 1986-1990 was 10 per cent but declined about 7.5 per cent in the period 1991-1998. The average growth rate of the sector for period 2011-2015 was 4.1 per cent. The decline in agriculture contribution to GDP and production index for some period could be attributed partly to the neglect of the sector as a result of the discovery and production of oil in large quantity and partly to the subsistence nature of production in the sector. Also very important was the relative price distortions that made Nigeria's agricultural products uncompetitive in the international market. Other problems confronting the sector include inadequacy of critical farm inputs, inadequate working capital, low rate of adoption of appropriate technology, poor harvesting technology and land constraints. It follows, therefore, serious attention must be devoted to addressing these problems for the sector to experience growth and contribute more to Gross Domestic Product in Nigeria.

3. Literature Review

Economic development literature is replete with theoretical and empirical studies on the role of export in promoting economic growth. The various channels through which more aggregate exports positively impact economic growth include generation of foreign of foreign exchange, increased competition it engendered, and positive externalities. However, the finding of positive

effect of exports on economic growth is derived majorly from studies based on aggregate economic growth and total exports. Will the same conclusion hold for agricultural promotion policies and agricultural growth? Few empirical studies have attempted to answer this question. These studies include Wang (2005), Caballero and Corbo (1990), Opara (2010) and Efobi and Osabuohien (2011). Specifically, the study by Wang (2005) assessed two export promotion strategy programs for rice namely; the Foreign Market Development Program (FMDP) and the Market Access Program (MAP). The three major U. S. rice importing countries included in the study were Mexico, Costa Rica and Honduras. The results of the single equation model estimated showed that export promotion programmes were effective in Mexico and Honduras but not in Costa Rica.

Yutaka (2005) reported on sectoral growth and export promotion strategies for Niger showed limited success in terms of growth. Various reasons were advanced for the limited success of export promotion strategies in promoting Niger's agricultural product. These include lack of support infrastructure and facilities, weak market information, lack of contractual arrangements, weak products' recognition abroad and distortional taxes and subsidies.

The study by Lan (2001) for Singapore showed that export promotion strategy and foreign capital had positive impact on export and economic growth. According to him, export promotion strategy helped in accumulation of physical capital through forced national saving and policies to attract foreign capital. The concentration of foreign capital in the manufacturing and service sectors facilitated increased exports.

Few other studies that examined specific components of export promotion strategy and exports include Cabarello and Corbo (1990), Haque and Kemal (2007), Helmers and Trofimenko (2009), Girma et al. (2009), Opara (2010), and Efobi and Osabuohien (2011). The study by Caballero and Corbo (1990) found that exchange rate liberalization had significant positive effect on agricultural exports. Although, the consensus in the literature seems to be that exchange rate depreciation positively impact both manufactured and agricultural exports; most previous empirical studies have reported significant negative effect of exchange rate volatility on exports (Honroyiannis, et al. 2008, Ozturk and Kalyonzu, 2009 and Chit, 2008).

Some other export promotion strategies that have been found effective in promoting agricultural export growth are export subsidies (Haque and Kermel 2007, Kelmers and Grofinenkp (2009). In the same way, Opara (2010), Fu and Gao (2007) , and Baltensperger and Herger (2009) reported that export marketing, export incentives, export processing zones and insurance scheme have significant stimulative effect on export promotion. The study by Efobi and Osabuohien (2011) found that Agricultural Credit Guarantee Scheme Fund (ACGSF) had significant positive effect on Nigeria's agricultural sector.

Generally, as per the discussion above, it can be emphasized that very few empirical studies have been devoted to test the effect of agricultural export promotion strategy on agricultural growth. Most existing studies have focused on aggregate export and economic growth. Moreover, in few cases where agricultural export promotion strategy has been focused, only one or the other component has been examined. No known study has developed a comprehensive measure of the export promotion policies. Therefore and as already indicated, the aim of the present paper is to

construct a more comprehensive measure of export promotion strategy and examine its role on agricultural growth in Nigeria.

4. Methodology

This section presents a cointegration method to demonstrate any long term relationship between agricultural growth and and export promotion strategy in Nigeria over the period1980-2014. The study applies the ADRL–bounds testing approach developed by Pesaran *et. al* (2001) to investigate the primary objective of the paper. The following model is estimated:

$$AGDP_t = \propto_0 + \beta_1 XP_t + \beta_2 ALN_t + \beta_3 LAB_t + \beta_4 CAP_t + \beta_5 INFL_t + \beta_6 OPN_t + \mu_t \qquad (1)$$

where $AGDP_t$ is agricultural GDP. This is share of agriculture in the national output. XP_t is the index of export promotion strategy generated using principal component analysis, ALN_t is the amount of arable land for farming, LAB_t is the agricultural labour input, CAP_t is the gross capital formation, $INFL_t$ is the rate of inflation and OPN_t is the trade openness; and μ_t is the error term. It is expected that the coefficient of export promotion index (β_1) be positive. The main reason for this is that agricultural production and export promotion programmes are designed to serve as incentives to farmers to produce and export more output. Essentially, they are designed to reduce cost of production and enhance efficiency and productivity in the agricultural sector. However, where agriculture operates majorly at subsistence level as obtained in the Nigerian economy, response to incentives by the operators in the sector might be very slow and weak. Consequently, export promotion programmes may not produce the expected outcomes particularly in the short run.

An estimate of β_2 is expected to be positive since the more arable land that are available for agricultural use, the more the level of agricultural output. Farmers enjoy the economies of large production with an increase in the available arable land. Agricultural labour force is expected to impact positively on agricultural output growth. The coefficient of gross capital formation β_3 is expected to be positive. Inflation and agricultural growth are expected to be inversely related. Hence, β_4 should be negative. Inflation is a measure of macroeconomic instability. When the economic environment is seen as unstable, the level of investment (domestic and foreign) in the sector will reduce. Moreover, high rate of inflation tends to increase costs of inputs and ultimately the costs of production. Trade openness is expected to be positively related to agricultural growth. Openness is a measure of how friendly a country is to foreign investors. More open economy is expected to attract more foreign investment into the agricultural sector. This, in turn, is expected to lead to high level of production in the sub sector.

Based on the bounds-testing approach proposed by Pesaran and Smith (1998) and Pesaran et al. (2001), the long run relationship is given by the equation:

$$\Delta AGDP_t = \beta_0 + \sum_{i=1}^{q_1} \gamma_i \Delta AGDP_{t-i} + \sum_{i=0}^{q_1} \partial_i \Delta XP_{t-i} + \sum_{i=0}^{q_2} \delta_i \Delta ALN_{t-i} + \sum_{i=0}^{q_3} \rho_i \Delta LAB_{t-i} + \sum_{i=0}^{q_4} \vartheta_i CAP_{t-i} + \sum_{i=0}^{q_5} \theta_i \Delta INFL_{t-i} + \sum_{i=0}^{q_6} \psi_i \Delta OPN_{t-i} + \varphi_0 AGDP_{t-1} + \varphi_1 XP_{t-1} + \varphi_2 LN_{t-1} + \varphi_3 LB_{t-1} + \varphi_4 CAP_{t-1} + \varphi_5 INFL_{t-1} + \varphi_6 OPN_{t-1} + \varepsilon_t \quad \ldots(2)$$

where q is the optimal lag length and Δ refers to the first difference of variables.

The hypothesis for testing the existence of any long run cointegration among the proposed variables in the paper are given thus:

H_0: $\varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = \varphi_6 = \varphi_7 = 0$ 3

H_1 : $\varphi_1 \neq 0,\ \varphi_2 \neq 0,\ \varphi_3 \neq 0,\ \varphi_4 \neq 0,\ \varphi_5 \neq 0,\ \varphi_6 \neq 0,\ \varphi_7 \neq 0$

This states the joint null hypothesis of no cointegration against the existence of a valid relationship between agricultural growth and the set of explanatory variables.

Given that there is cointegration, the short run model is stated as:

$$\Delta AGDP_t = \beta_0 + \sum_{i=1}^{q_1} \gamma_i \Delta AGDP_{t-i} + \sum_{i=0}^{q_1} \partial_i \Delta XP_{t-i} + \sum_{i=0}^{q_2} \delta_i \Delta ALN_{t-i} + \sum_{i=0}^{q_3} \rho_i \Delta LAB_{t-i} + \sum_{i=0}^{q_4} \vartheta_i CAP_{t-i} + \sum_{i=0}^{q_5} \theta_i \Delta INFL_{t-i} + \sum_{i=0}^{q_6} \psi_i \Delta OPN_{t-i} + \lambda ECM_{t-1} + \mu_t \quad \ldots(4)$$

The coefficients $\gamma_i, \partial_i, \delta_i, \rho_i, \vartheta_i, \theta_i,$ and $\psi_i$denote the short run dynamics of the variables, while the coefficient φ_1(i=1, 2, 3, 4, 5, 6) denote the long-term dynamics. The term λ is the coefficient of correction in disequilibrium.

Data Sources and Measurement

This paper adopts annual time series data ranging from 1980 to 2014. AGDP is the agricultural output share of gross domestic product. This comprises output from crop production, forestry, livestock and fishery. ALN is amount of arable land for farming which is represented by agricultural land (sq. km). LAB is the agricultural labour force. CAP is capital investment proxied by Gross Fixed Capital Formation and INFL is the rate of inflation measured as the consumer price index. OPN represents openness which is measured as the ratio of export and import to gross domestic product. XP is an index for export promotion which is computed by

principal component analysis. Many export promotion policies have been introduced in Nigeria. It is possible to assess the effect of these policies simultaneously; however this may not be plausible as these variables are often correlated. Hence, there is the need to construct a comprehensive measure of export promotion strategy. In this study, five different aspects of export promotion package are selected. The five components include: agricultural Credit Guarantee Scheme Fund, exchange rate, government capital expenditure in the agricultural sector, government recurrent expenditure in agricultural sector and foreign direct investment in the agricultural sector. Before undertaking the PCA, we need to check the factorability of variables with the Barlett's test for sphericity and Kaiser-Meyer-Oklin (KMO) coefficient. The Barlett's test converts the calculated determinants of the matrix to a χ^2 statistic, which is tested for significance. The null hypothesis of the test is that variables are collinear. The Kaiser-Meyer-Oklin (KMO) test, on the other hand, entails the comparison of the size of the variables' correlation coefficients with the size of the partial correlation coefficients. In the KMO test, a minimum value of 0.60 is necessary for an acceptable PCA. The results in table 1 show the results from Barrlett's and KMO tests as well as the PCA. The results show that the five variables may be assembled into another set of factors using the PCA. Thus, the values of the first PCA are used to calculate the weights for the export promotion index.

Table 1: Construction of export promotion index

Test for factorability	
Determinant of the matrix of correlation	
Barlett's test for sphericity	127.591 (0.000)***
Kaiser-Meyer-Oklin measure	0.807

Principal Components/Correlation — Number of Obs = 35

Number of comp. = 5
Trace = 5
Rotation: (unrotated = principal) Rho = 1.0000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.56086	2.76563	0.7122	0.7122
Comp2	0.795231	0.447877	0.1590	0.8712
Comp3	0.347354	0.133642	0.0695	0.9407
Comp4	0.213713	0.130874	0.0427	0.9834
Comp5	0.0828382	---	0.0166	1.0000

Principal Components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Unexplained
ACGSF	0.4552	0.3658	0.3360	-0.7387	0.0224	0
EXC	-0.3166	0.8820	0.1063	0.2947	0.1537	0
AFDI	0.4964	0.0981	0.3026	0.4723	-0.6553	0
AEXP	0.4400	0.2614	-0.8589	0.0093	0-0174	0
AMACH	0.5026	-0.1014	0.2158	0.3800	0.7390	0

Source: Authors' Computation

Data were sourced from World Bank, World Development Indicators, 2014 Edition, United Nations Conference on Trade and Development (UNCTAD) Statistics, a database, Central Bank of Nigeria Statistical Bulletin, 2015 edition. Specifically, data on Agricultural Credit Guarantee Scheme fund, exchange rate direct investment in agriculture and government recurrent expenditure were sourced from Central Bank of Nigeria Statistical Bulletin 2015 edition. Data on gross capital formation, trade openness and consumer price index were sourced from World Bank, World Development Indicators 2015 edition. Data on agricultural labour force and agricultural land area were sourced from Nigeria, National Bureau of Statistics publication.

Before examining the ARDL results, we present the descriptive statistics and correlation matrix of all the variables used in the empirical model in tables 2 and 3 respectively. Table 2 shows that for all variables, the mean and median values are very close, which indicates symmetry. All variables are positively skewed. From the kurtosis statistic, the table shows that the distribution of all the variables except gross capital formation is flat relative to normal as their kurtosis is less than 3. The variable gross capital formation is peaked relative to the normal with kurtosis exceeding 3.

Table 3 shows the correlation among the variables under consideration. The results show that agricultural growth is positively correlated with other variables except agricultural labour input. The correlation between agricultural growth and export promotion programmes is very high above 95 per cent. However, care must be exercised while interpreting the correlation matrices. This is because they cannot provide a reliable indicator of association in a manner which controls for additional explanatory variables. Examining simple bivariate correlation in a conventional matrix does not take account of each variables correlation with other explanatory variables. This explains the use of multivariate model.

Table 2: Descriptive Statistics

	AGDP	INFL	CAP	XP	LAB	ALN	OPN
Mean	183.0838	43062.4	850.48	0.00012	12425.1	666485.9	51.8804
Median	155.9348	28632	231.7	0.45855	12426	688000	53.0302
Maximum	365.2774	158815.3	4012.919	1.14487	12583	780000	81.8129
Minimum	80.97877	424	8.79948	-1.9751	12301	472191.7	23.6089
Std. Dev.	87.48499	4764.28	123.5785	0.00011	80.1322	92555.79	15.8001
Skewness	0.725252	0.974511	1.464475	-0.5746	0.28151	-0.71761	-0.2186
Kurtosis	2.267064	2.823306	3.766558	1.85047	2.34343	2.408935	2.18158
Jarque-Bera	3.851684	5.585287	13.367610	3.85328	1.09094	3.513438	1.25559
Probability	0.145753	0.061259	0.001251	0.14564	0.57957	0.17261	0.53377
Sum	6407.934	1507184	29766.9	0.00416	434877	23327007	1815.81
Sum Sq. Dev.	260223.2	7.72E+10	51915224	34.0078	218320	2.91E+11	8487.9
Obs	35	35	35	35	35	35	35

Source: Authors' Computation

Table 3: Correlation matrix

Vrbs	AGDP	ALN	CAP	INFL	XP	LAB	OPN
AGDP	1						
ALN	0.8932	1					
CAP	0.55747	0.21516	1				
INFL	0.95068	0.94846	0.37708	1			
XP	0.97546	0.94282	0.45597	0.97973	1		
LAB	-0.479	-0.7291	0.0154	-0.5892	-0.6169	1	
OPN	0.28928	0.486	0.03248	0.43667	0.38591	-0.6358	1

Source: Authors' Computation

5. **Data Analysis and Empirical Results**

The starting point for the examination of time series properties of any data is to check for the presence of unit root or stationarity/non-stationarity in the data[1]. To achieve this, we employ

[1] This exercise is equally important to verify the applicability of the ARDL bounds method.

Augmented Dickey-Fuller (ADF) (1979) and Phillip-Peron (1988) tests. Table 4 reports the unit root tests for all the variables employed in the study.

Table 4: Unit root test result

Vrb	Augumented Dickey-Fuller			Philip-Peron		
	Levels	1st Diff	Rmks	Levels	1st Diff	Rmks
AGDP	-0.466726	-2.772213***	I(1)	1.447186	-2.66248***	I(1)
OPN	-2.187878	-7.96822*	I(1)	-2.124124	-7.950048*	I(1)
CAP	0.220285	-1.861109***	I(1)	-0.328874	-5.271599*	I(1)
INFL	7.8623	-1.810199***	I(1)	6.918639	-1.668336***	I(1)
XP	-2.8374***	--	I(0)	-2.8374***	--	I(0)
LAB	-7.723366*	--	I(0)	-1.163893	-2.138526***	I(1)
ALN	-1.621509	-6.421342*	I(1)	-1.67853	-6.367981*	I(1)

Notes: *,**, *** indicates level of significance at 1%, 5% and 10% respectively. Unit root was conducted with intercept and no trend
Source: Authors' Computation

The results in table 4 show a mix of both l(1) and l(0) variables which allows for the use of ARDL approach. As shown in table 4, export promotion index and agricultural labour input are stationary at level while the remaining variables namely, agricultural growth, openness, capital formation, inflation rate and agricultural labour input are stationary at first difference. The results obtained with Philip-Peron unit root test are similar to ADF unit root test except that agricultural labour input is stationary only at first difference.

Next, we test the presence of long-run relationships among the variables used. Table 5 reports the results of the ADRL bounds cointegration tests. The Wald tests (*F* tests) for joint null hypothesis that the coefficients of the lagged variables in level form are zero (no cointegration between the variables), and the results of the calculated *F*-statistics and the values for both upper and lower bound are presented in Table 5. The computed *F*-statistic 9.3412 is higher than the upper critical bound at 5% (3.8007) and 10% (3.2260) critical values as indicated in Table 5. The

study therefore concludes from the ARDL bounds test that there is long-run relationship among the variables. We obtained the long-run and short-run dynamic parameters for the variables once long-run cointegration relationship has been established.

Table 5: ARDL Bound test for cointegration

Model	F-Statistic
F(ALN, CAP, LAB, XP, OPN, INFL)	9.3412

Critical Values	Upper Bound	Lower Bound
K=5; n=35		
10%	3.8007	2.3707
5%	3.2260	1.9614

Source: Authors' Computation

For the long run dynamics, we estimates equation (4) using the following ARDL (1, 0, 1, 0, 1, 0, 1) specification. The results of the estimation are presented in table 6. As shown in table 6, the coefficient arable land is positive and significant. The results show that a 1 per cent increase in arable land will increase agricultural output by 0.0004 per cent in the long run. The result is consistent with that of Huang and Ma (2010). In the same way, the coefficient of inflation is positive and significant. This possibly suggests that increase in price possibly serves as incentive for increased agricultural output. However, labour input has a significant negative effect on agricultural output in the long run. An increase in agricultural labour-input by 1 per cent decreases agricultural output growth by 0.014 per cent in long run. One main feature of the agricultural sector in Nigeria over the years is large rural labour surplus. Hence, there is always high level of underemployment. In an economy characterized with high rate of underemployment, an increase in labour may not translate into increased output. This finding is consistent with the agricultural economic literature in Nigeria, which show that wage has consistently remained low in the sector.

In the long run, openness has significant positive effect on agricultural output growth. A 1 per cent increase in the degree of openness increases agricultural output by 0.5 per cent. This shows that the more friendly a nation is to trade, the more the growth in agricultural output. This could mean that openness helps to attract high foreign investment to the sector. The coefficient of export promotion index is negative and significant at 10% level. This shows that export promotion policies tend to depress agricultural output growth. This is contradictive to a priori expectation that export promotion leads to increase agricultural output growth. The adverse effect promotion index could be due to the subsistence nature of the agricultural sector. The subsistence nature of the sector makes response of agents to incentives extremely slow. In the long run, agricultural growth is clearly correlated with capital stock. The estimated parameter 0.028 for capital stock is positive and significant. This implies that a 1 per cent rise in capital stock will generate about 0.028 rise in agricultural GDP. This means that capital investment plays an important role in agricultural production in Nigeria. This result is similar to the findings of Huang and Ma (2010), Huang and Rozelle (1996) and Jin, Ma, Huang, Hu and Rozelle (2010).

The short run results shown in table 7 confirm the depressing effect export promotion index on agricultural output growth though the coefficient is not significant. Land has a significant positive on agricultural output growth while labour input has negative impact in the short run. Although inflation has a negative effect on agricultural output growth (contrary to what obtains in the long run estimates), the coefficient is not significant. Finally, the coefficient of error-correlation terms comes out to be -0.4516 and is significant at 1%. The negative sign of error-

correction term is correctly specified and if the system deviates from its equilibrium position, it will converge back to equilibrium with an adjustment speed of 45%. The adjustment is quite high considering the sluggish nature of the Nigerian economy.

To check for the stability of the model, we applied the CUSUM and CUSUMSQ tests. The plots of the two tests are as shown in figures 1 and 2 respectively (Appendix 1). In both cases, the statistics lie within the critical bounds, implying that all the coefficients in the estimated model are stable. The figures also indicate that there is no evidence of any structural instability and parameter stable over time[2].

Table 6: Estimated ARDL Long-Run Coefficients. Dependent **Vrb: AGDP ARDL(1, 0, 1, 0, 1, 0, 1)a**

Regressor	Coefficient	T-Statistic
ALN	0.0004083***	4.3442
XP	-2.0758*	-1.7311
CAP	0.0279340***	4.1004
LAB	-0.013517**	-2.511
INFL	0.0010644***	5.2177
OPN	0.52554**	2.0665

a. Selected based on Schwarz Bayesian Criterion
Source: Authors' Computation

[2] The results of the diagnostic test show that the model does not suffer from any kind of serial correlation or heteroscedasticity problem.

Table 7: Error Correction Representation for the Selected ARDL Model ARDL (1,0,1,0,1,0,1)*

Regressor	Coefficient	T-Statistic	p-Value
dALN	0.0001844***	4.0528	0.000
dXP	-9.0663*	-1.5617	0.103
dCAB	-0.0007579	-0.40597	0.688
dLAB	-0.0061044**	-2.5617	0.016
dINFL	-0.0001264	-0.30526	0.763
dOPN	0.062757	0.60969	0.547
ecm(-1)	-0.4516***	2.6742	0.001

ecm= AGDP - 0.0004083*ALN + 2.0758*XP - 0.027934*CAP
- 0.013517*LAB - 0'0010644*INFL - 0.52554*OPN

R-Squared	0.77576	R-Bar-Squared	0.69167
S.E. of Regression	4.7614	F-Stat. F(6,27)	13.83[.000]
Mean of Dependent Variable	7.5340	S.D. of Dependent Vrb	8.5748
Residual Sum of Squares	544.093	Equation Log-likelihood	-95.3808
Akaike Info. Criterion	-105.38	Schwarz Bayesian Criterion	-113.0126
DW-Statatisic	2.1468		

Source: Authors' Computation

6. Assessing the Dynamic Interactions of the Variables

To further assess the relationship between the variables, we estimated a multivariate error-correction model, treating the variables as endogenous. Figure 3 (Appendix 2) shows the Cholesky impulse-response functions. As reveal in Figure 3, a one standard deviation shock applied to export promotion index produces a negative impact on agricultural output growth both in the short- and long-run periods. This finding corroborates the result obtained using the ARDL approach. In the same way, a one standard deviation shock to labour input shows a sharp drop in the first two periods and thereafter a slight improvement in medium- and long-run though negative for all the periods. Capital stock has no discernible impact on agricultural output growth

in the first two periods but produces negative impact in the medium- and long-run though the negative impact tends to taper off in the long-run. A one standard deviation shock to arable land assumes a constant level in all the periods except in the seventh period when it produces slightly negative impact. In the case trade openness, the impact of a one standard deviation shock has no impact on the first two periods but produces slight and persistence negative effect both in the medium- and the long-run periods. Finally, a one standard deviation shock to inflation shows a small but persistence negative effect after the first two periods.

Impulse-response functions are very useful in determining the direction of the effects but not their magnitude. Hence to ascertain the magnitude of the effect, we analyze the variance decompositions. The variance decompositions show the proportion of the forecast error in a given variable that is accounted for by innovation in each endogenous variable. The results of the variance decompositions are as shown in table 8. It shows that export promotion index has no impact on the agricultural output growth in the first period but the magnitude of the impact increases in the second and third periods accounting for about 12 per cent and 21 per cent respectively. The impact increases with an increase in the time horizon accounting for about 29 per cent of the variation in the agricultural output growth in the long run. The results show that labour had two periods delay but moderately high impact on agricultural output growth.

Table 8: Variance Decomposition

Variance Decomposition of ADGP								
Period	S. E.	ADGP	XP	LAB	CAP	ALN	OPN	INFL
1	0.042250	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.055748	86.95238	11.74942	0.752788	0.022157	0.344533	0.106161	0.072561
3	0.065914	65.71203	21.47881	10.57241	0.503653	0.261354	0.813715	0.658036
4	0.077688	62.44429	20.58784	12.95588	1.654151	0.188234	1.381339	0.788259
5	0.088687	57.37723	26.44151	11.34006	2.143699	0.147620	1.591940	0.957934
6	0.096238	52.23678	29.46123	11.44035	2.485412	0.203636	3.036756	1.135838
7	0.102908	53.41932	28.44800	10.87135	2.427119	0.326028	3.322694	1.185498
8	0.108055	53.45858	29.05671	10.35439	2.412100	0.297191	3.218800	1.202218
9	0.112726	52.18236	29.96646	10.58188	2.380341	0.276911	3.392502	1.219540
10	0.118325	52.65351	29.75702	10.44962	2.265007	0.267908	3.385360	1.221570

Source: Authors' Computation
Note: Cholesky Ordering: ADGP, XP, LAB, CAP, ALN, OPN and INFL

The magnitude of the effect increases in the medium term accounting for about 12 per cent of the variation in agricultural output growth. However in the long-run, it accounts for about 10 per cent of the variation in agricultural output growth. The proportion of the variance explained by capital stock is very low. The same applies to the proportion of variances of land, openness and inflation. The proportion of variance explained by land, openness and inflation individually accounts for less than 4 per cent in all the periods. This clearly indicates that these variables have no significant impact on agricultural output growth. These results are quite consistent with the Autoregressive Distributed Lag (ARDL) and Impulse-response functions analyses. It is true that the estimated results can be sensitive to ordering of the variables; however we check for the robustness of the results by re-estimating the model by reversing the order of the first and the last variables. The results obtained were not significantly different from the one presented here.

7. Conclusion

The paper examined the impact of export promotion policies on agricultural output growth in Nigeria using time series data from 1986-2014 employing the ARDL cointegration technique. The paper generated a composite index of export promotion programmes for Nigeria taking into consideration important dimension of the export promotion policies. The empirical findings lead us to conclude that export promotion policies have significant negative effects on agricultural output growth in Nigeria, while the impact of land and openness appear to be positive both in long and short run. The impact of inflation is positive and significant only in the long run. The impact of labour is negative both in the long and short run.

Our results have several policy implications. First, there is the need for government to ensure that more arable land is made available to investors in the agricultural sector. Second, the findings of positive impact of capital formation on agricultural growth and negative labour input on agricultural growth suggest that in order to enhance agricultural production productivity in Nigeria must increase capital investment in agriculture. Infrastructural facilities such as good rural roads, rural electricity and good post-harvest technology must be provided to boost agricultural production productivity. Also, the result brings to fore the need to revisit some of the export promotion policies implemented over the years. In particular, there is the need to address the high exchange rate volatility that arose from the exchange rate deregulation. In sum, increased arable land area coupled with increased capital formation will help to reduce the high level underemployment in the agricultural sector and thus increased agricultural contribution to the GDP.

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Appendix 1

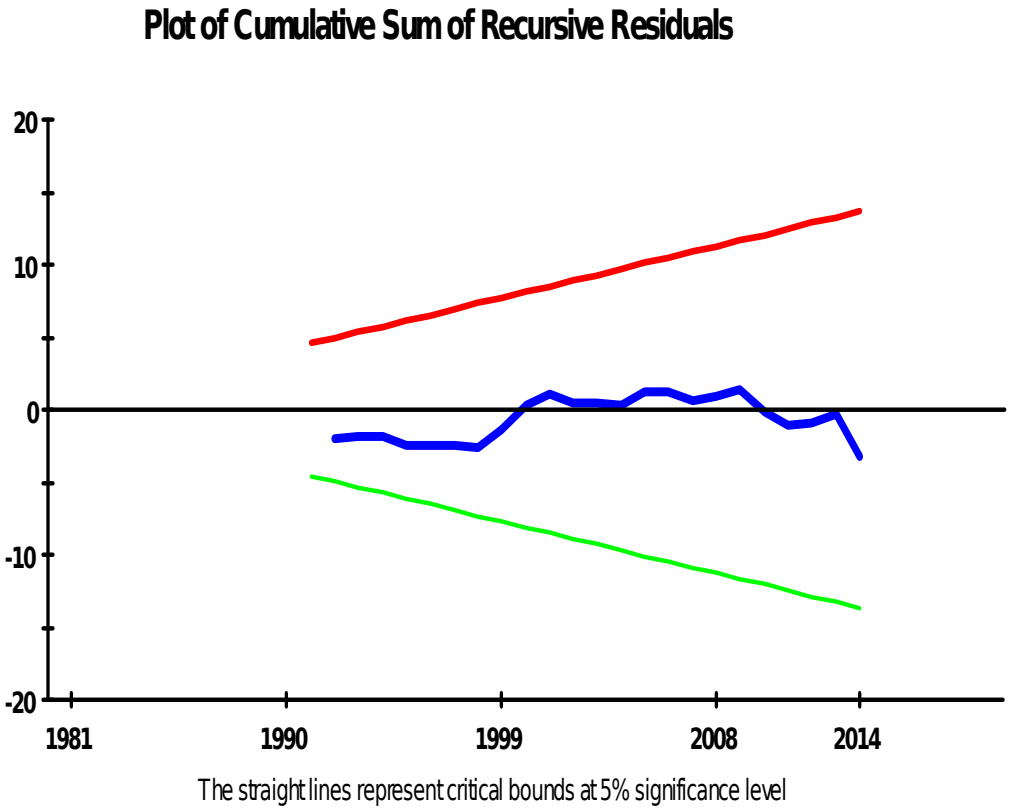

Figure 1: Cummulative Sum of Recursive Residuals

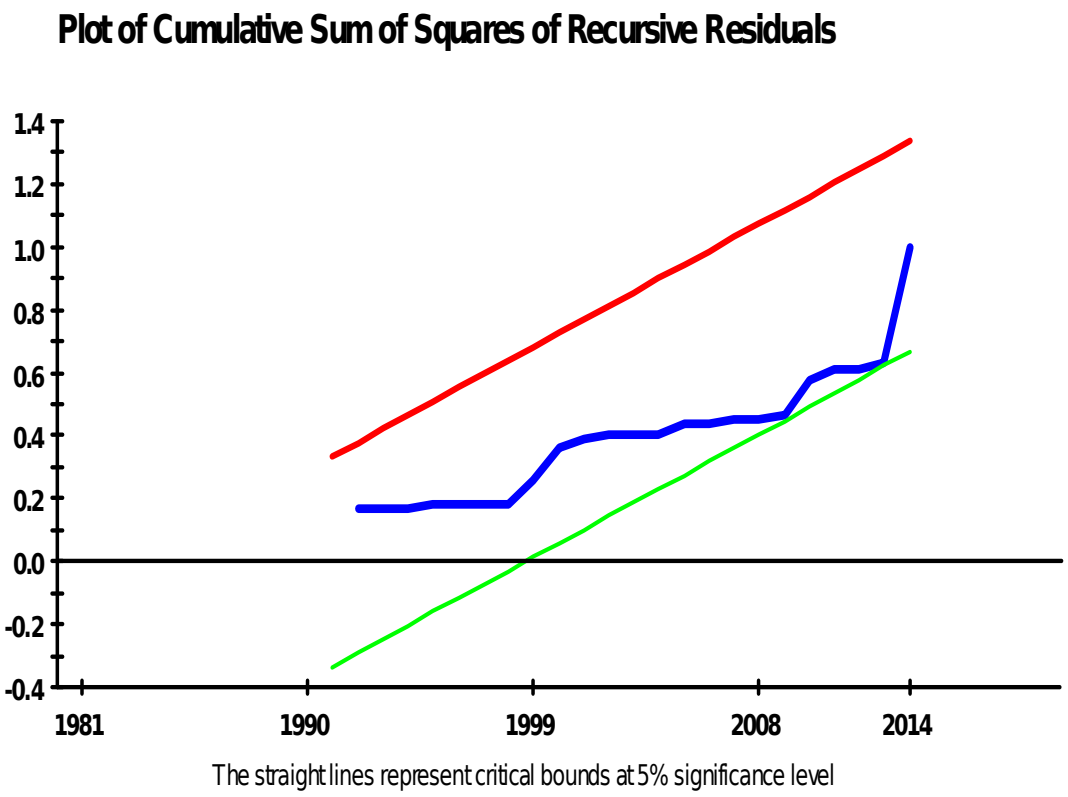

Figure 2: Cummulative Sum of Square of Recursive Residuals

Appendix 2

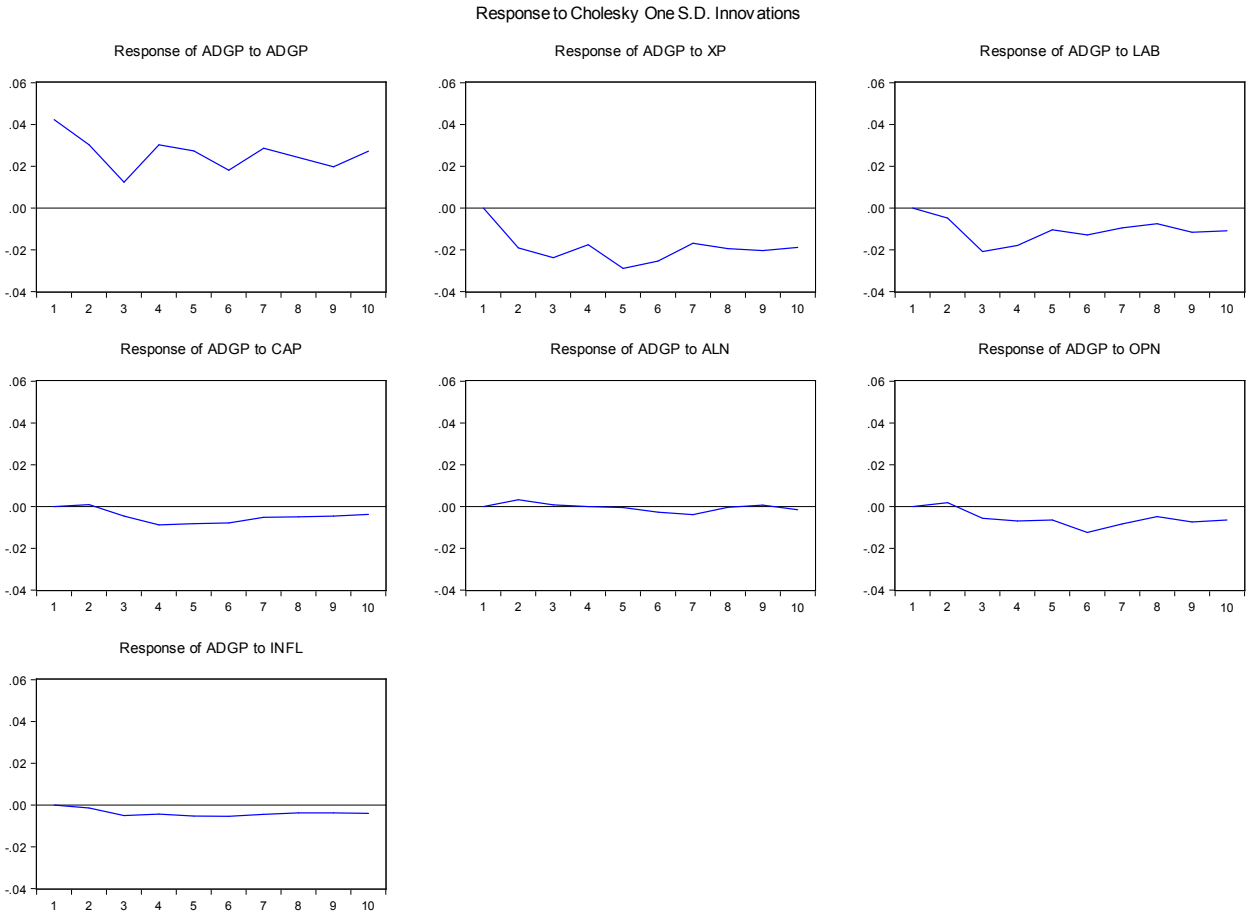

Figure 3: Plot of the Impulse-response Function