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CAUSAL RELATIONSHIP BETWEEN EXPORT INCENTIVE SCHEMES AND AGRICULTURAL EXPORT PERFORMANCE IN NIGERIA

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ABSTRACT

Export has been considered a tools for achieving sustainable development and favorable international trade is necessary to achieve national and international stability. Hence, many developing economies, including Nigeria, have chosen export incentive schemes as tools for achieving a favorable foreign trade balance. The current study investigates the causal relationship between export incentive schemes and agricultural export performance in Nigeria. The augmented Dickey Fuller test (ADF) and Philips Perron (PP) test were also used to determine the order of integration of the variables. Thereafter, the study employed Johansen cointegration and the modified version of the Granger causality test proposed by Toda and Yamamoto (TY) (1995) to determine the direction of causality. The cointegration reveals a long-run relationship between agricultural export and export incentive schemes. The TY Granger causality test revealed bidirectional causality between manufacture in bond scheme and agricultural exports, while unidirectional causality was observed running from export expansion grants (EEGs) to agricultural exports (AGRXs), from export development funds (EDFs) to agricultural exports (AGRXs), and from agricultural exports (AGRXs) to agricultural credit guarantee scheme funds (ACGSFs). Thus, the government of the Republic of Nigeria should continue increasing the export incentive scheme especially manufacture in bond schemes, as there is simultaneous causes and effects between agricultural exports and manufacture in bond schemes based on the results of this study.

Keywords: *Export, Export incentive scheme, Agricultural export, Nigeria*
JEL Classification Code: *F0, F4, Q10, N47*

1.0 Introduction

It is generally believed that there is a significant positive relationship between exports and economic growth (Mosikari & Eita, 2020). Export growth is regarded as the major determinant of productivity and employment in any economy (Ramos, 2011). Exports also contribute to increased technological progress, as well as the liberation of trade and capital markets worldwide (Umar, 2022). Emerging market countries and developed economies have achieved remarkable success in economic growth due to the optimum priority they place on export diversification. These countries have enhanced their exports to cover different goods and services as well as different markets across the world (United Nations Conference on Trade and Development, 2015).

It is important to keep in mind that Nigeria was once the most prominent exporter of several agricultural products, including groundnuts, rubber, cocoa, and palm kernels, to both Africa and other nations (Nwadioha & Igoni, 2021). Trherefore, this leadership position has since been forfeited. Because of this, the government has established a number of agricultural policies and programs with the goal of stopping the sector's collapse and then aiming for short- and medium-term adjustments to assure the industry's long-term growth. Thus, the following are some of the agricultural policies and programs established by the Nigerian government to ensure the rapid growth of Nigerian agricultural output and exports: Commercial Agriculture Credit Schemes (CACSs) in 2009; the Agricultural Credit Support Scheme (ACSS); the Anchor Borrowers Program (ABP) in 2015; and the Agri-business, Small and Medium Enterprises Investment Scheme (AGSMEIS) in 2017 (Nwadioha & Igoni, 2021).

Despite the implementation of the aforementioned programs, the performance of agricultural exports from Nigeria was not encouraging. The Nigerian Bureau of Statistics (NBS, 2022) shows that over the past ten years, the country's agricultural exports have remained extremely low as a share of its overall exports, at just 2% as a percentage of the total country's exports. Consequently, oil revenue continues to account for more than 80% of the total value of annual exports, and Nigeria earned 0.53 trillion naira from agricultural exports between 2016 and 2018. In contrast, the country's total agricultural imports over the same period were N2.39 trillion. Hence, the Nigerian agricultural trade deficit stood at N 1.86 trillion (NBS, 2022). In view of the challenges mentioned above, one may begin to doubt the effectiveness of the export incentive schemes being adopted by Nigeria.

Despite various the studies conducted on the nexus between export incentive schemes and agricultural export performance in Nigeria, these studies are not without the gaps which that this study intends to fill. For instance: Gatawa Dantama and Sani (2017) examined the impact of export incentive schemes on the performance of Nigerian agricultural exports. Additionally, their study suffered from methodological loopholes in which study intend to fill. Also their study ignored some important variables that should be included, such as agricultural credit guarantee schemes fund exchange rate and inflation rate. In addition, the study applied conventional Granger causality instead of modern Granger causality inform of Toda Yamamoto causality procedure. Similarly, Anthony and Igoni (2021) investigated the impact of agricultural credit on the Nigerian economic growth. However, the study applied only the Philips Perron unit root test and ordinary least squares test. These statistical procedures were not appropriate for making inferences. Hence, appropriate and recent statistical techniques need to be applied. Additionally, the study suffers a serious limitation in respect of its theoretical and conceptual issues. In addition, Fanta and Tashale (2014) examined the trend of export incentive schemes and their impact on Ethiopian export growth. Real GDP financial incentives and export growth were used as variables in the study. The main limitations of their study were the small sample size and the small number of variables. Thus, the sample size should be enlarged, and the number of variables should be extended.

Therefore, this study intends to bridge the gaps in abovementioned literature by adopting both the augmented Deckey Fuller and Philips Perron unit root tests for the stationarity status of the variable Johansen cointegration and canonical cointegration and further applies a recent Granger causality test inform of Toda Yamamoto technique to examine the causal relationship between export incentive schemes and agricultural export performance in Nigeria. To order to achieve the objective of this study, the paper is structured into five sections. Section one discusses the introduction, while section two contains a literature review. The methodology, empirical results, conclusion and recommendations are presented in sections three, four and five, respectively.

2.1 Literature Review and Stylized Facts

2.1.1 Concept of Export

Export is the practice through which enterprises from one nation sell their output to clients or customers in another nation. This means that enterprises can expand their prospective market quickly, increase their revenue, and expand their businesses (Adenugba & Dipo, 2013). Also, Ande (2017) sees export trade as the act of selling goods and services to other countries. Moreover, an export in external trade is a product produced in one nation that is sold into other nations or a service rendered in one nation by citizens of another nation. The supplier of such products or services provider is an exporter; the buyer is an importer (Fanta & Teshale, 2014). In a nut shell, exports are goods and services that are produced in one country and sold to buyers in another country. Along with imports, export make up international trade.

2.1.2 Concept of Export Promotion

Export promotion is defined as an incentive programme created to persuade businesses into the export process by providing assistance in product and market identification and development, prescription and postshipment, financing, training, payment guaranty schemes, trade fairs, trade visits, foreign representation, etc. (Business Dictionary, 2007).

An export promotion strategy is defined by Todaro (1996) as government efforts to expand the volume of a country's exports through export incentives in the form of public subsidies, tax rebates, special credit lines, and other kinds of financial and nonfinancial measures designed to promote a greater level of economic activity in export industries to generate more foreign exchange and improve the current account of the balance of payment.

2.1.3 Agricultural Export

Agricultural export is the act of shipping any agricultural product, whether finished or unfinished, from a country's port or marketing agricultural products made in the home country abroad (Yifiru, 2015). Additionally, agricultural exports may be defined as the evacuation of any agricultural produced from one country to other foreign countries in order to establish a market (Ande, 2017). In general, agricultural exports consist of exporting agricultural commodities such as crop production, forestry, livestock and fishery from one economy such as Nigeria to other economies such as Ghana.

2.2 Empirical Review

Turning to the empirical ground, a plethora of studies have been conducted on the impact of export incentive schemes on agricultural export performance using different approaches, samples and methodological frameworks in Nigeria and outside of Nigeria. For instance, Fiaz, Waseem, Khurshid and Satti (2021) evaluate the asymmetric effect of exchange rate fluctuations on the agricultural sector in Pakistan. The study covered the period from 1970 to 2019. The ARDL and NARDL techniques were also adopted to determine the asymmetric impact. The study results indicate that exchange rate appreciation has a negative and significant effect on agricultural production, while depreciation has a negative effect. Similarly, investment and imports have positive and significant impacts on agricultural production whereas primary exports and exports affect agricultural production negatively.

Furthermore, Christopher and Adeolu (2021) assess the impact of trade policies on the exportation of agricultural products (cocoa, cashew and ginger). The study used cross sectional data, with 370 samples selected using a simple random sampling technique with the use of a structured questionnaire. Descriptive statistics and multiple regression analysis were applied to analyze the data. The findings of the study indicated that the main agricultural

trade policy actions that positively impact export commodities are ancho lending policies and incentives for agricultural lending.

In another study, Sani and Salihu (2020) apply an autoregressive distributed lag model and Granger causality econometric techniques to examine the effect of export incentive schemes on the promotion of manufactured exports. The study used quarterly data for twenty five years (1990-2014). The bounds test adopted indicated the absence of a long run equilibrium nexus between the export incentive scheme and manufactured export performance in Nigeria. Furthermore, the Granger causality tests reveal the existence of a unidirectional relationship between manufactured exports and export expansion grants. All the remaining variables indicated no causal relationship. Additionally, Kazungu (2020) evaluated the moderating effect of export promotion on the relationship between entrepreneurship training and the performance of handicraft exporting micro and small enterprises in Tanzania. The study applied a cross-sectional survey design. The target population comprised 108 handicrafts exporting MSEs in Tanzania. To achieve the study's objectives, purposive sampling and proportionate stratified sampling techniques were adopted. The structured questionnaires and interviews were used as tool of data compilation. Thereafter, moderated multiple regression (MMR) was used to test whether there are moderating effect of home market export promotion on entrepreneurship training and performance of handicrafts exporting MSEs in Tanzania. The impact of home market export incentives and entrepreneurship training was found to be significant at the 5% level.

Adekunle and Innocent (2019) investigate the impact of the exchange rate on agricultural output performance in the Nigerian economy using data from 1981 to 2016. The study employed the linear autoregressive distributive lag technique. The study revealed that the real exchange rate, real appreciation and depreciation, the industrial capacity utilization rate and government expenditure on agriculture are significant drivers of agricultural output. However, agricultural credit scheme funds had a positive and insignificant influence on agricultural output.

In another study, Ahmed and Sallam (2018) investigated the effectiveness of Egyptian agricultural exports on the agricultural share of GDP. The study covers a period of 44 years (1970-2013). The study applied the Johansen cointegration technique and an ECM GARCH model. The findings show a positive link in the short and long term between agricultural exports and the agricultural share of GDP. Additionally, the inverse trend in agricultural exports was followed by an increase in the agricultural share of GDP.

Again, Gatawa, Dantama and Sani (2017) examine the impact of export promotion schemes on agricultural export performance in Nigeria between 1990 and 2014. The study applied an autoregressive distributed lag model (ARDL) and Granger causality. The study outcomes indicate that export development funds have a strong direct and significant influence on agricultural exports in Nigeria over the period covered.

Similarly, Bakari (2017) empirically examined the effect of vegetable exports on the economic growth of Tunisia. The study obtained data from the World Bank for the period 1970 to 2015. The VECM cointegration procedure was adopted. The results of the study indicated that vegetable exports had a strong impact on economic growth in the both short and long run.

Moreover, Kromtit, Kanadi, Ndangra and Lado (2017) look at the nonoil export contribution to the economic growth of Nigeria between 1985 and 2015. Using autoregressive distributed lag techniques to examine the relation between non-oil and GDP. The bound test adopted revealed the existence of cointegration. The ARDL outcome revealed a strong and positive

relation between non-oil export and gross domestic product. Furthermore, the results also showed that the exchange rate had an inverse but not a significant relation with GDP.

In another study, Egwu (2016) again examines the macroeconomic impact of agricultural financing on agricultural sector output, economic growth and poverty alleviation in Nigeria. The study used time series annual data for a period of 31 years (1980-2010). Johansen cointegration was also adopted for investigating the long run relationships between the variables. The results of the study showed that commercial bank credit to the agricultural sector and agricultural credit guarantee scheme fund loans to Nigeria's agricultural sector were the major determinants of agricultural sector output. Additionally, there is a long run relationship among the variables in Nigeria for the period of study.

In another study, Kang (2015) empirically examined the impact of agricultural exports on economic growth in major rice exporting countries (Thailand, Vietnam, India and Pakistan). The study cover the period spanning from 1980-2010. The study applied Johansen cointegration, Granger causality and ECM econometric analysis. The outcomes of the study reveal that rice exports are an important means of stimulating economic growth in Thailand, Vietnam, India and Pakistan.

Moreover, Wahid, Abrar and Muhammed (2015) evaluate the effect of agricultural exports on the economic performance of Pakistan. The study used time series data from 1972-2008. The study applied the Johansen technique, and the results of the study indicate that agricultural exports are indirect related to the economic growth of Pakistan, although nonagricultural exports are directly related to Pakistan's economic growth.

In addition, Akpaeti, Bassey & Ibok (2014) re-evaluate the impact of financial sector reforms on agricultural export performance in Nigeria using time series data spanning from 1970-2009. The study adopted Johansen cointegration and ECM econometric tools of analysis. The empirical findings revealed that financial sector reforms extensively influence major agricultural export commodities in Nigeria both in the short and long run.

Moreover, Verter and Becvarona (2014) assess the determinants of cocoa exports in the Nigerian economy in the trade liberalization era. The study utilized data from 1990-2011. The study applied Johansen cointegration and OLS regression methods. The findings of cointegration reveal the presence of a long term equilibrium relation between the dependent and independent variables. In addition, the OLS regression results suggest that cocoa exports are positively related to world price, trade openness, the real effective exchange rate and the quantity of world cocoa exports. Nevertheless, the results reveal an indirect relationship between cocoa exports and internal cocoa consumption. The results further reveal that Nigeria has a relative benefit on the export of cocoa.

2.3 Stylized Facts

The stylization facts are presented in this study subsection, as illustrated in Figure 1.

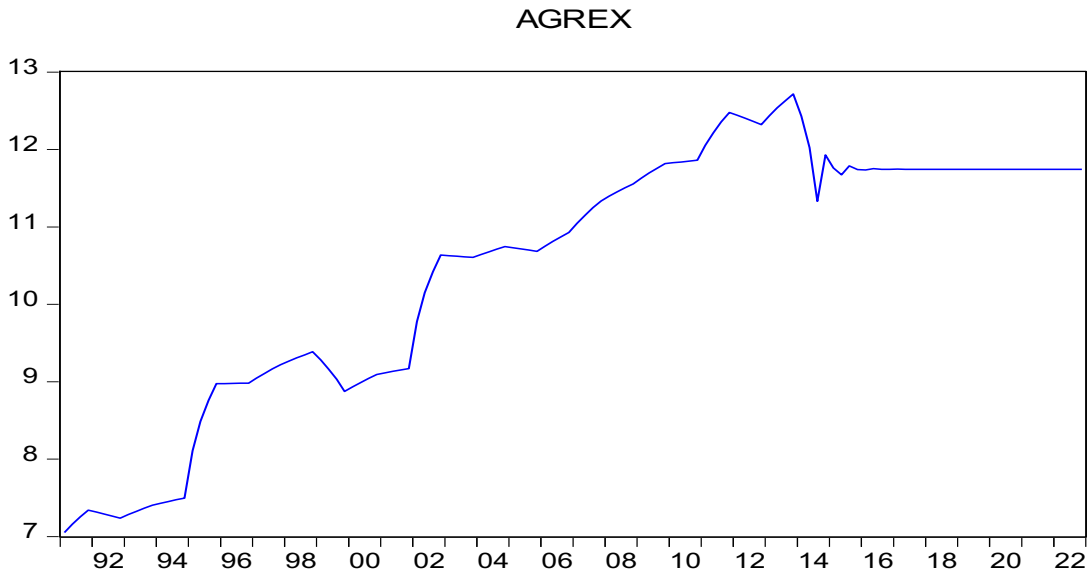

Figure 2.1 Trend of Agricultural Exports in Nigeria from 1991 to 2022

Source: Author's computation using Eviews 10

Figure 1 shows the trend of agricultural exports between 1991 and 2022. Agricultural exports indicate the share of agricultural raw materials in terms of the proportion of total merchandise exports. Nigeria was renowned for being the world's top producer and exporter of important food crops prior to its independence. Nigeria ranks third in groundnut production, second in cocoa production to Ghana, and the largest exporter of palm oil and items made from palm kernels (Ijirshar, 2015). The trend of agricultural exports (AGRX) has fluctuated in terms of growth. There was an upwards trend in the values from the 1991 first quarter to the 1991 fourth quarter, and the growth decreased after the 1991 fourth quarter until the 1993 first quarter and then increased after again from the 1993 second quarter to the 1993 fourth quarter. This undulating trajectory was maintained; the continuous increase in agricultural exports can be attributed to the impact of the Structural Adjustment Programme (SAP) in 1986. The agricultural export percentage of merchandise exports increased to more than one hundred percent from the 1994 fourth quarter to the 1998 fourth quarter. However, from 1998 to 1999 fourth quarter the agricultural exports experienced a continuous decline. According to (Bakare, 2011), Nigeria became an importer of the basic food items formerly exported. This could also be the result of a shift in attention to oil exports which led to the agrarian section being given poor attention.

Between 1999 and 2013 the growth of Nigerian agricultural exports reached its highest level. This is unsurprising because it was within the period when civilian administration took over and executed policies and programs such as the National Economic Empowerment Development Strategy (NEEDS), National Agricultural Policy (NAP) and Rural Sector Strategy (RSS) that enhanced Nigerian agricultural output and export. However, Nigerian agricultural export earnings declined from the 2013 fourth quarter to the 2014 third quarter due to global market price volatility (Osabuohien et al., 2018). Compared to manufactured goods imported from developed nations worldwide, which cause trade deficits and also significantly affect Nigeria's economic growth, which is proportional to agricultural exports. However, as Figure 1 illustrates, the agricultural sector's share of exports has been rising since

2014, albeit slowly. This may be the consequence of the different intervention programs, such as social protection policies and programs, which have emerged over time with the aim of bringing the farm industry back to life (Osabohien, 2018). Despite this, the agricultural industry is still expanding slowly and not making the most of its potential.

3.0 Methodology

3.1 Types and Sources of Data Collection

Secondary types of data were used for this study. In particular, the time series data and corresponding data were sourced from the Central Bank of Nigeria Statistical Bulletin, The Incentives Unit of the Nigerian Export Promotion Council (NEPC), for various years and from World Development Indicators. These sources were used because they are more reliable and efficient sources of useful information relevant to this study.

3.2 Variable Measurement

This study addresses the causal relationship between export incentive schemes and the performance of agricultural export in Nigeria. The variables captured in the model specified for this study are measures as agricultural exports (AGX), export expansion grants (EEG), export development funds (EDF), agricultural credit guarantee schemes (ACGS), manufacture in bond schemes (MBS) and exchange rates (EXC). Agricultural export (AGX) was used as a proxy for agricultural export following the works of Zahir (2012), Sunday, Daniel and Ali (2016) and Loto (2011). An Export Expansion Grant (EEG), an Export Development Fund (EDF), the Manufacture in Bond Scheme (MBS), the Agricultural Credit Guarantee Scheme (ACGS), the Exchange Rate (EXC) and the Inflation rate are used as independent variables for the study. Export Expansion Grant (EEG) refers to the aggregate monetary incentives provided annually to exporters by the Nigerian Export Promotion Council, as described by Gatawa, Sani and Dantama (2017) and Bello and Abdullahi (2020). Export Development Fund (EDF) is expressed as the total monetary incentives administered yearly to exporters by the Federal Ministry of Finance in collaboration with the Nigerian Export Promotion Council and the Central Bank of Nigeria, as measured by Mohammed (2010) and Gatawa, Sani, and Dantama (2017). Manufacture in Bond Scheme (MBS) refers to the total monetary incentives administered annually to exporters by the Federal Ministry of Finance in collaboration with the Nigerian Export Promotion Council, the Central Bank of Nigeria, the Standards organization of Nigeria and Nigerian Customs Services as measured in Bello and Abdullahi (2020) and Muhammed (2010). The Agricultural Credit Guarantee Scheme (ACGS) is defined as the total agricultural credit loan provided to farmers by the Agricultural Credit Guarantee Scheme Fund Board and Central Bank of Nigeria, as measured in Okunlola and Akinlo (2021). The exchange rate (EXC) is the rate at which one country currency, such as Nigeria, is exchange for another country currency such as the USA. As measured by Okunlola and Akinlo (2021) and Ushahemba (2015). The inflation rate is proxied by the consumer price index and refers to the annual percentage change in the cost to the average consumer of obtaining goods or services that may be fixed or changed at precise intervals, such as annually (World Development Indicators).

3.3 Model Specification:

The following model is formulated for the study.

$$AGX = F(EEG, EDF, MIB, ACGS, EXC, INF) \quad (1)$$

where:

AGX =Agricultural Export

EEG = Export Expansion Grant
EDF = Export Development Fund
MIB = Manufacture-in-Bond Scheme
ACGS= Agricultural Credit Guarantee Scheme
EXC= Exchange rate and
INF = Inflation

The model is expressed in an econometric equation as follows:

$$AGX_t=\beta 0+\beta 1(EEG_t)+\beta 2(EDF_t)+\beta 3(MIB_t)+\beta 4(ACGS_t)+\beta 5(EXC_t)+\beta 6(INF_t)+\mu_t \text{.....(2)}$$

where:

μ_t is the error term, and β_i is the parameter coefficient.

The functional relationship of the model consists of six variables, among which agricultural exports are used as the dependent variable, while export expansion grant, export development fund, manufacture-in-bond scheme, agricultural credit guarantee scheme, exchange rate and inflation as explanatory variables.

The log linear specification of equation (3) is as follows:

$$\text{LogAGX}_t = \beta_0 + \beta_1\text{LogEEG}_t + \beta_2\text{LogEDFt} + \beta_3\text{LogMIB}_t + \beta_4\text{LogACGS}_t + \beta_5\text{EXCt} + \beta_6\text{INF}_t + \mu_t \text{.....(3)}$$

Here, β_0 is the constant intercept; β_1-β_6 are the coefficients of the explanatory variables to be estimated; t is the time dimension; *LogAGX*, *LogEEG*, *LogEDF*, LogMIB, and LogACGS are the natural logarithms of the variables; and μ_t denotes the error term in the model.

3.4 Cointegration testing

After determining that all the variables have the {I(1)} order of integration, a cointegration test was applied to check the long-run associations among the different variables. This study employed the Johansen cointegration test proposed by Johansen and Juselius (1990) and Johansen (1995), which are regarded as the most consistent and more appropriate when a small dataset is used; that is, at least 40 observations are used (Shahbaz, 2013; Merlin and Chen, 2021), thus making this test more appropriate for this study. The result of the Johansen cointegration test provides two statistics; trace statistics and max eigenvalues. The null hypothesis states that H0: There is no cointegration among the variables, while the alternative hypothesis is the opposite.

3.5 Toda- Yamamoto Granger Causality Test

The Toda-Yamamoto (TY) causality technique was employed to examine the causal relationship between export incentive schemes and agricultural export performance in Nigeria. The TY is the modified version of the conventional Granger causality model. The justifications underlying the study's use of the TY causality technique are as follows: Since, it does not matter whether the variables are combinations of I(0) or I(1), which are superior to conventional Granger causality. Hence, the TY helps in overcoming the problem of asymptotic critical values when causality tests are performed in the presence of nonstationarity or no cointegration. Moreover, the TY technique is applicable for any arbitrary amount of variable integration and for minimizing the risks associated with the possibility of wrongly identifying the order of integration of the variables (Chiawa *et al.* 2012; & Rauf *et al*. 2012).

To test for TY causality, the following VAR (k) model is constructed:

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} Y_{t-i} + \sum_{i=k+1}^{d_{max}} \beta_{1i} Y_{t-i} + \sum_{i=1}^{k} \gamma_{1i} X_{t-i} + \sum_{i=k+1}^{d_{max}} \delta_{1i} X_{t-i} + \varepsilon_{1t} \qquad (20)$$

$$X_t = \alpha_0 + \sum_{i=1}^{k} \gamma_{2i} X_{t-i} + \sum_{i=k+1}^{d_{max}} \delta_{2i} X_{t-i} + \sum_{i=1}^{k} \alpha_{2i} Y_{t-i} + \sum_{i=k+1}^{d_{max}} \beta_{2i} Y_{t-i} + \varepsilon_{2t} \qquad (21)$$

where k is the optimal time lag on the initial VAR model; ε_{1t} and ε_{2t} are the VAR error terms; and d_{max} is the maximum order of integration based on the original specification of the Toda–Yamamoto procedure (Cervantes *et al.* 2020). Therefore, in Equation (21), causality in the sense of Granger causality between X and Y will be identified, provided that a_{1i}, ≠ 0 for every *i;* and, on an identical basis, Equation (21) will imply causality in the sense of Granger between X and Y if a_{2i} ≠ 0 for every *i*.

3.6 Robustness analysis

The study used the canonical cointegrating regression (CCR) model as a reliable verification approach to examine the consistency of the results. Following the work of Inuwa, et al. (2022) and Wasiu and Osi (2019), this study used canonical cointegration regression (CCR), created by Park (1992). The study used CCR because, in addition to correcting asymptotic bias and having the ability to eliminate endogeneity caused by long-term correlations between stochastic regressor innovations and cointegration equation errors, it also has the ability to do so for long-term dependence between the cointegrating equation and the stochastic variable.

4.0 Empirical Results

It is essential to check for the stationarity of the data series to be used. This approach is important for obtaining an unbiased estimation and because the bounds test is used only when the variables are 1(0) or 1(1) or when both I(0) and I(1) are combined. For the purpose of this study, both the augmented Dickey Fuller test (ADF) and Philips Perron (PP) test were conducted to determine the order of integration of the variables. A summary of the test results regarding the order of integration based on ADF and PP is given in Table 1 and Table 2, respectively.

Table 1. **Augmented Dickey Fuller (ADF) Unit Root Test Results**

Variables	T-Statistics	Critical Values		Remarks
		5%	10%	
LAGREX	-7.9517	-3.4459	-3.1479	I(1)
LEDF	-8.1948	-3.4477	-3.1489	I(1)
LEEG	-8.1837	-3.4459	-3.1479	I(1)
LMIBS	-8.0083	-3.4459	-3.1479	I(1)
LACGSF	-11.4225	-2.8845	-2.5791	I(1)
EXCR	-3.7412	-2.8851	-2.5794	I(1)
INFR	-11.1355	-2.8845	-2.5791	I(1)

Source: Author's calculation using Eviews 10

Table 2. **Philips-Perron (PP) Unit Root Test Results**

Variables	T-Statistics	Critical Values		Remarks
		5%	10%	
LAGREX	-8.2805	-2.8845	-2.5791	I(1)
LEDF	-10.8206	-2.8845	-2.5791	I(1)
LEEG	-8.1833	-2.8845	-2.5791	I(1)

LMIBS	-7.7837	-2.8845	-2.5791	I(1)
LACGSF	-11.2841	-2.8845	-2.5791	I(1)
EXCR	-12.0055	-2.8845	-2.5791	I(1)
INFR	-11.1405	-2.8845	-2.5791	I(1)

Source: Author's calculation using Eviews 10

According to the ADF and PP unit root test results in above tables 1 and 2, respectively, all the variables are nonstationarity at the level values. However, the stationarity property is found after taking the first difference of the variables at the 1% and 5% critical levels. As stated earlier, it is necessary to first perform unit root tests on the variables in order to ensure that none of the variables are integrated into order two 1(2) or beyond. Therefore, the variables are qualified to run for both Johansen cointegration, canonical cointegration and TY Granger causality.

Table 3: **Johansen cointegration test**

Hypothesized		**Trace**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.350552	154.4664	125.6154	0.0003
At most 1*	0.283467	101.3756	95.75366	0.0194
At most 2	0.187350	60.37590	69.81889	0.2240
At most 3	0.131737	34.85890	47.85613	0.4555
At most 4	0.077863	17.48389	29.79707	0.6043
At most 5	0.058745	7.513283	15.49471	0.5188
At most 6	0.000542	0.066692	3.841466	0.7962

Maximun-Eigenvalue

Hypothesized		**Max-Eigen**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.350552	53.09086	46.23142	0.0080
At most 1 *	0.283467	40.99968	40.07757	0.0393
At most 2	0.187350	25.51700	33.87687	0.3509
At most 3	0.131737	17.37501	27.58434	0.5479
At most 4	0.077863	9.970609	21.13162	0.7474
At most 5	0.058745	7.446591	14.26460	0.4377
At most 6	0.000542	0.066692	3.841466	0.7962

* Denotes rejection of the hypothesis at the 0.05 level

Source: Author's compilation using Eviews 10.

4.1 Toda –Yamamoto Causality Test Results

This study adopted the technique of Toda and Yamamoto (1995) to test the causal relationship between export incentive schemes and agricultural exports in Nigeria.

*Table 4.***Toda –Yamamoto Causality Test Results**

Null Hypothesis	Chi-Sq	Prob.	Direction of Causality
LEEG does not Granger cause LAGREX	62.0572	0.0000	Unidirectional
LAGREX does not Granger cause LEEG	6.4281	0.9545	No causality
LEDF does not Granger cause LAGREX	116.4625	0.0000	Unidirectional
LAGREX does not Granger cause LEDF	6.9003	0.9385	No causality
LMIBS does not Granger cause LAGREX	34.8800	0.0015	Bidirectional
LAGREX does not Granger cause LMIBS	29.8613	0.0080	Bidirectional
LACGSF does not Granger cause LAGREX	11.9521	0.6102	No causality
LAGREX does not Granger cause LACGSF	58.0774	0.0000	Unidirectional

Source: Author's computation using Eviews 10

Table 4.13 presents the results of the Toda Yamamoto Granger causality test of agricultural exports (AGRX) as the dependent variables, export expansion grant (EEG), manufacture in bond scheme (MIBS), export development fund (EDF) and agricultural credit guarantee scheme fund (ACGSF) as components of export incentive schemes in Nigeria. Based on the F-statistics and P values, the results reveal proof of causality running from an export expansion grant (EEG) to agricultural export (AGRX), from an export development fund (EDF) to an agricultural export (AGRX), and from agricultural export (AGRX) to an agricultural credit guarantee scheme fund (ACGSF), all of which have the same p values (0.0000) and thus signify unidirectional causality. Moreover, the bidirectional causality is observed from the manufactured in bond scheme (MIBS) to agricultural export (AGRX) and from agricultural export (AGRX) to the manufacture in bond scheme (MIBS), with p values of 0.0015 and 0.0080, respectively, which signify bidirectional causality.

The model was subjected to diagnostic tests to ensure that the model was statistically effective. The residuals should be normally distributed, homoskedastic and not serially correlated. The normality test carried out by Jarque-Bera (JB) showed that the residuals were normally distributed, while the Breusch-Pegan-Godfrey heteroskedasticity test results revealed that the residuals were homoskedastic. The results of the Breusch-Godfrey serial correlation LM test reveal that the residuals are serially uncorrelated.

4.2 Robustness analysis

To check for the consistency and reliability of the estimated results, this study applied the canonical cointegrating regression (CCR) model as a robust estimation procedure. The outcomes of the canonical cointegrating regression are presented in Table 7.

Table 5. Robustness analysis estimation using the canonical cointegrating regression model

Variables	LACGSF	LEDF	LEEG	LMIBS	EXCR	INFLR	C	R^2
Coefficients	0.0476	0.1495	0.3594	0.4707	6.5100	-0.0002	-1.2807	0.9520
	(0.0000)	(0.0897)	(0.0001)	(0.0104)	(0.4472)	(0.6762)	(0.0267)	

Source: Author's compilation using Eviews 10.

The results reveal that the CCR model results are consistent with the previous estimation methods, i.e., Johansen cointegration, in which only the coefficient varies slightly. The results indicated that a 1% change in the agricultural credit guarantee scheme fund (ACGSF) increases agricultural exports by 0.048%. The coefficient of the EDF is also positive but insignificant at the 5% significance level. A 1% increase in EDF increases agricultural exports by 0.15%. EEG was also positive significant at the 5%. A 1% change in EEG, increases

agricultural exports by 0.36%. The coefficient of MIBS is also positive and statistically significant at the 5% significance level. A 1% changes in MIBS leads to a 0.471% increase in agricultural exports in Nigeria. The EXCR results indicated that a 1% change in EXCR increases agricultural exports by 6.51%. The coefficient of INFLR is negative and statistically insignificant, and a 1% change in INFLR reduces agricultural exports by 0.0002%.

5.0 Conclusion and Recommendations

This study empirically examined the causal relationship between export incentive schemes and agricultural exports in Nigeria using quarterly time series data for the period 1991-2022. The bounds test for cointegration proposed by Pesaran et al. (2001) was employed to test for cointegration between variables, which is a necessary but insufficient condition for determining causality. The bounds cointegration results reveal a long-run relationship between agricultural export and export incentive schemes. This study utilized the modern version of the Granger causality test proposed by Toda and Yamamoto (TY) (1995) because of its superiority to ordinary Granger causality.

The major finding from the Toda-Yamamoto (TY) Granger causality test is that there is bidirectional causality between the manufactured in bond scheme (MIBS) and agricultural exports (AGRX). Additionally, the results reveal unidirectional causality running from an export expansion grant (EEG) to agricultural export (AGRX), export development fund (EDF) to agricultural export (AGRX), agricultural export (AGRX) to agricultural credit guarantee scheme fund (ACGSF). The policy implication for these findings is that the federal government of Nigeria should continue increasing expenditures on export incentive schemes, especially manufacture in bond schemes as there are simultaneous causes and effects of agricultural exports and manufacture in bond schemes, which in turn can help the country meet its long term economics plan.

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