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DOES THERE EXIST CAUSALITY BETWEEN AGRICULTURAL EXPORTS AND ECONOMIC GROWTH IN OIL-PRODUCING WEST AFRICAN COUNTRIES?

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ABSTRACT

This study investigated whether causality exist between agricultural exports and economic growth in Oil-Producing West African Countries of Nigeria, Ghana, Cote d'Ivoire and Benin Republic, while also checking if the assumption of panel homogenous causality holds for these economies. The in using panel data as well as time series data in conducting appropriate causality test covering 1982 to 2016 found out a unidirectional causality running from agricultural exports to economic growth gaining prominence for the panel analysis, but mixed results holding in the country-specific analysis, which invalidates the assumption of panel causal homogeneity. The study therefore recommended that each country should adopt appropriate path to growth, however on improvement of regional economy, it is apt for these countries to intensify agricultural exports as a strategy towards achieving economic growth.

Key Words: Agricultural Exports, Economic Growth, Causality.

INTRODUCTION

In international trade, exports refers to selling of goods and services produced in the home country to other markets (Joshi, 2005). Agricultural exports refer to the selling of agricultural produce to other economies or markets of the world.

Jhingan (2007) defines economic growth as the quantitative sustained increase in a country's per-capita output or income which is accompanied by increase in labor force, consumption and volume of trade. Akin (1998) defines economic growth in two perspectives. Firstly, as the expansion of a nation's output as measured by real gross domestic output (GDP) regardless of whether output per-capita increases or not (which is termed extensive economic growth), secondly, as a situation in which there exist an increase in output per-person (called intensive economic growth).

For the purpose of this study, conceptualization of economic growth will be conceived as extensive economic growth as elicited by Akin (1998), which says it is the expansion of a output measured by real gross domestic output (GDP) regardless of whether output per-capita increases or not. To this end, such things which constitute determinants of economic growth include institutions (INS), technical innovation (TEK), agricultural exports (AXP), trade openness (OPENS), and exchange rate (EXR). While institutions, technical innovation, agricultural exports, labor and capital are the internal predictors of economic growth, trade openness and exchange rate operate as the external predictors of economic growth. The nature (whether positive or negative) of the effect they may have on growth of an economy may depend on their quality and or quantity (Kouassi, Kern, & Felix, 2004; and Omran, Gadda, Adel & Marwa, 2015).

West African countries aside been endowed with vast natural resources such as large arable lands, crude oil, iron ore, gold, diamond, and various crops, is also home to the production of varieties of agricultural products such as cocoa, palm oil, palm kernel, rubber, cotton, kola nut, groundnut, wood products, jewelry, pineapple, cashew, shea butter, cassava in commercial quantities. In this sense, the reportage of World Bank (2010) alludes that 60-80 percent of the population of African countries are within the employment bracket of agriculture. This sector further provides over 40% of their Gross Domestic Product (GDP) with about 20% of their total exports traceable to this sector. These statistics is further substantiated by Amoro and Shen (2013) who noted that agriculture been one of the most important single activity for Africans, as it seems to have its comparative advantage over most economies of the world, thus have remain major suppliers of raw materials (or agricultural materials) to western economies.

In this direction, the adoption of the trade liberalization policy in most West African countries in the 1980's following the Structural Adjustment Program (SAP) initiative of the World Bank and International Monetary Fund (IMF) further promoted the production and exportation of agricultural products, this policy was aimed to improve both the international and domestic competitiveness of the West African economies through free trade and relaxing of trade protective barriers, to enable them boost their capacities and compete favorably in the world market (Inang, 1995). This connected with international trade whose prominence is its significant role on the global economy. Thus, Trade accounts formed a significant share of most countries' Gross Domestic Product (GDP), for instance, it accounted for 57.3 percent of the global Gross Domestic Product (GDP) in 2007. During the same year, the world merchandise export was around 14 trillion dollars, while the world exports of commercial services were 3.5 trillion dollars (World Bank, 2011).

The foregoing supports the export-led growth hypothesis which advocates that export result in economic growth (Osisanwo & Okuneye, 2015). The proponents of this theory believed that exports expansion through enhanced productivity of production factors lead to economic growth. Although, there have been contentious views on the effectiveness of this hypothesis (i.e. export-led growth hypothesis) on economic growth such that some (Akeem, 2010; Chien-Hui & Huang, 2002; Mohsen, Maysam & Sima, 2012) argued that it is growth that leads to export (i.e. Growth-Led Export). Yet, some studies carried out by different scholars (Levin & Raut, 1997; Chien-Hui & Huang, 2002) have attributed the growth records of the Asian Newly Industrializing Countries (NICs) (Hong Kong, Singapore, Korea, Taiwan, Malaysia, Thailand and China) to their competitive increase in exports of manufactured goods, which is the trade transmission effects on growth.

The impact of oil to an economy cannot be overemphasized. This is expected to stimulate economic activities that will enhance growth. It is also noteworthy that oil is an exhaustible resource, as such an overdependence on it without using the accrued benefit, to diversifying into agriculture, which has the capacity to provide a leverage of enhanced growth and development, will be disastrous for future growth of these economies. It is towards this connection that four countries (Nigeria, Ghana, Cote d'Ivoire and Benin Republic) which currently produce crude oil in commercial quantity (Wumi, 2011) are selected for this analysis. Given the mixed results of the

empirical studies on export-led growth hypothesis, it is unclear whether export of agricultural products among these countries leads to economic growth or the other way round. Similarly, it is yet to be ascertained whether the assumption of panel Granger test of causal homogeneity holds amongst these oil-producing West African Countries on the exports of agricultural products or not.

Against this backdrop, this study seeks to investigate whether causality exists between agricultural exports and Economic Growth as well as whether the assumption of panel causal homogeneity holds for the Oil-Producing ECOWAS member countries or not, as this will help to avoid the flaw of making inferences on causal homogenous relationships in all the individual cross section units, used for the analysis.

REVIEW OF RELATED LITERATURE

This work is built on export-led growth hypothesis (ELDH) and growth-led export hypothesis (GLEH). Export-led growth hypothesis (ELGH) holds that exports stimulate economic growth (Idowu, 2005). It is founded on the beneficent effects of trade as argued in various trade theories like comparative cost advantage. The hypothesis is based on the premises that export expansion is associated with some positive externalities such as technological spill over, specialization, economies of scale, greater access to market and better allocation of resources which lead to improved factor productivity. Growth-led export hypothesis on the other hand argue that growth of the economy leads to increase in exports of a nation's products. Succinctly, Krugman (1984) and Lancaster (1980) advocate that economic growth leads to enhancement of skills and technology, and with this, increased efficiency, thereby creating a comparative advantage for the country that facilitates exports.

Using the Export-Led Growth Model within the VAR methodology, Osisanwo & Okuneye (2015) investigated whether the Nigerian economic growth is indeed export-led between the periods 1980 to 2013. The study revealed that Nigerian economy is positively and significantly export driven in the long-run and short-run. But since the study was country-specific with its peculiarities, it becomes limiting to transmit such findings across a group of countries within the same region space. However, the study has provided insight on country-specific analysis of export-led growth.

Investigating causality existing between non-oil exports and the GDP within a panel of some selected 11 oil-exporting countries by Mohsen, Maysam & Sima (2012) revealed a strong causation running in both the short and long run from oil exports, economic growth to non-oil exports. In essence, the driver of non-oil exports in these countries are oil and GDP. In as much as the results suggest the support for Growth-led Export hypothesis, it has failed to show within its analysis the unique impact of agricultural exports, which has the potentiality of serving as a vehicle of growth in developing economies.

Within panel framework, examining the impacts of trade openness on the economic growth in Africa, with the view to validate or otherwise the assumption of panel homogenous causality for the period 1980-2012, Cosmas (2015) found out that effective trade policy, good political will, facilitation of the private sector via credit provisions were precipitates of an enhanced intra and inter Africa trade. The findings also invalidate the assumption of panel homogenous causality. The study which did not investigate causality, and yet simply aggregate exports to

cover Africa as a whole, had its import also on the validation of the assumption of panel homogeneous causal relationship.

Taking a sample period from 1970 to 2007 for 73 developing economies, while studying the causality between non-oil export and economic growth within a panel framework, Mohsen & Bagher (2011) found out for the pairwise and multivariate models stipulated for estimation, there is bidirectional long-run causality between export and GDP growth for both groups categorized into oil dependent countries and non-oil dependent countries. Further findings reveal for the pairwise model, there is bidirectional short-run causality between export and GDP growth for the non-oil developing countries, while the reverse is the case for oil dependent countries, which exhibits no short run causality relationship between these variables. The comparative nature of this work is apt but becomes limiting given data aggregation problems, which has the capacity of stifling effects of some variables.

The conduct of a cross-country investigation of the Export-Led Growth Hypothesis using sample of ten developed and ten developing countries by Kouassi, Kern, & Felix (2004) found out Granger causality to be mixed at individual country level. For developing countries evidence suggest that export-led growth hypothesis hold for Argentina, Israel, Thailand and Venezuela while Growth-Led export hold for India, Indonesia, Israel and Venezuela. On the other hand, for developed countries, the export-led growth hypothesis hold for Italy, United States and United Kingdom while Growth-Led export hypothesis hold for Canada, Germany, Japan, United Kingdom and U.S.A. Finally, at panel level, the results clearly support the Growth-led export hypothesis for both samples of countries and reject the export-led growth hypothesis only for developed countries. The mixed results at individual country level suggest that exports or GDP cannot be taken as fully exogenous variables as such the need to constantly investigate the dynamics within various intercountry clusters.

Also, within VAR framework, Abou-Stait (2005) examined the existence of causality between exports, investment and economic growth in Egypt between 1977 and 2003 and found out that exports granger causes economic growth but does not granger cause investment. Apart from the fact that the study aggregates exports, it is a country specific in nature as such results therein cannot be generalized for other geographical settings with unique characteristics.

Exploring the effect of primary commodity and manufactured exports on economic growth from 1960-1997, while using panel data of eight Asian developing countries, Levin & Raut (1997) found out that manufacturing exports was the main source of economic growth, while exports of primary products had negligible effect. Additionally, a bi–directional causality was seen to exist between export growth and economic growth amongst the countries investigated. Even though the study was a panel work for developing economies, regional peculiarities could cause variations of results, as such giving credence to the current work.

Ousmanou (2003) conducted a causality study on the impact of exports and Economic Growth in 21 Sub-Saharan Africa countries built on export-led growth hypothesis for the period, 1980 to 2000. The results showed a unidirectional causation from economic growth to exports in five countries; manufactured exports caused economic growth in one country; bidirectional causality exists between economic growth and

total exports in three countries; bidirectional causality existed between economic growth and agricultural exports in one country and bidirectional causality exist between economic growth and manufactured exports in three countries during the import-substitution (IS) period. But that during the export promotion (EP) period, agricultural exports had a unidirectional causation with economic growth in nine countries; manufactured exports caused economic growth in three countries; economic growth caused agricultural exports in five countries; economic growth had unidirectional causation with manufactured exports in six countries and a bidirectional causality existed between economic growth and agricultural exports in three countries. The aggregation of exports and the mixed results within the Sub-Saharan African countries studied lays credence to the inconclusive nature of this investigation, given that country clusters or periods do affect result outcomes and the need for further research in this regards.

Chien-Hui & Huang (2002) used a two-regime multivariate threshold autoregressive model to investigate the relationship between export growth and output growth in five East Asian Countries (Hong Kong, Japan, Korea, Philippines, and Taiwan) for the periods, 1960-2000. The study was built on export-led growth hypothesis. The variables studied include GDP, export, import, and gross domestic product. The results indicate that, except for Hong Kong, for which the study failed to find evidence of export-led growth, however, the relationship of export-led growth was found for the remaining four countries under certain specified regimes. Among them, the authors could not find any export-led growth relationships for Korea, Japan (at least in the short-run) and the Philippines using the conventional one-regime model. The mix results for this study, which is within the Asian countries gives credence to the possibility of variegated results as it relates to West African countries.

METHODOLOGY

The study structured within panel data covering 1982-2016 and obtained through secondary source; World Bank Development Indicators. The equation for the study as anchored on export-led growth and growth-led export models are implicitly stated as follows

$$GDP_t = f(AXP_t) \quad \text{.....(1)}$$

$$AXP_t = f(GDP_t) \quad \text{.....(2)}$$

The modification of these models is predicated on works by Osisanwo and Okuneye (2015); Mohsen, Maysam & Sima (2012), and Mohsen & Bagher (2011) wherefore additional control predictors such as $OPEN_t$, EXR_t, LAB_t, KAP_t, TEK_t, INS_t are included. The modified explicit equations take the form of equations 3 and 4.

$$GDP_t = \Phi_0 + \vartheta_1 AXP_t + \vartheta_2 OPEN_t + \vartheta_3 EXR_t + \cdot \vartheta_4 LAB_t + \vartheta_5 KAP_t + \vartheta_6 TEK_t + \vartheta_7 INS_t + \mu_1 \quad (3)$$

$$AXP_t = \Phi_1 + \vartheta_8 GDP_t + \vartheta_9 OPEN_t + \vartheta_{10} EXR_t + \vartheta_{11} LAB_t + \vartheta_{12} KAP_t + \vartheta_{13} TEK_t + \vartheta_{14} INS_t + \mu_2 \quad (4)$$

Table 1: Description and Measurement of Variables

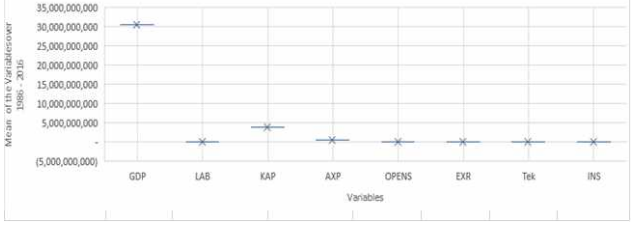
S/N	Variable	Description	Measurement/Proxies	Source
1	GDP	Gross Domestic Product	Nominal measured in US dollar	WDI
2	AXP	Agricultural Exports	Total Agricultural Commodities Merchandize Exports in US dollars	WDI
3	OPEN	Trade Openness	Exports + Imports/GDP in dollars	WDI
4	INS	Institutions	Rule of law index	WDI
5	Lab	Labor	% of Population of people between age 15-64	WDI
6	Kap	Capital	Gross fixed capital formation in US dollars	WDI
7	Tek	Technical progress	Innovation index/total investment in scientific research	WDI
8	EXR	Exchange rate	Local currency per US dollar	WDI

DATA ESTIMATION PROCEDURE AND ANALYSIS

Descriptive Statistics

The enormity of data on the variables, which is 140 observations used in this study has necessitated their compilation drawing descriptive measure principally from the summary of the mean whose results is reported on the box and whisker chart depicted on Figure 1.

GDP	LAB	KAP	AXP	OPENS	EXR	Tek	INS
30,488,253,892	53	3,839,798,000	526,649,425	6.81	333.66	2.69	(0.59)



A cursory look reveals that Gross Domestic Product (GDP) of the four countries averaged about $30.4billion over the period 1986 to 2016, with Agricultural Exports (AXP) and Gross Fixed Capital Formation (KAP) observed to average $526million and $3.8 billion respectively within the same time frame.

The Open Index (OPENS), Technical Progress Index (TEK) and Institution Index (INS) or rule of law did average 6.81, 2.69 and -0.59 basis points respectively over the period 1986 to 2016. The percentage of people available for work averaged about 53% of the total population of these countries where the rate at which the dollar had to be exchanged for the local currency of these countries has averaged 333.7 basis points over the period selected for this study.

Causality Analysis

This study employs pairwise granger causality test. Ordinarily, correlation does not necessarily imply causation in any meaningful sense and the econometric graveyard is full of magnificent correlations, which are simply spurious or meaningless. The Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. y is said to be Granger-caused by x if x helps in the prediction of y, or equivalently if the coefficients on the lagged x's are statistically significant. The equation can be stated as:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \ldots + \alpha_l y_{t-l} + \beta_1 x_{t-1} + \ldots + \beta_l x_{t-l} + \varepsilon_t \quad (5)$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \ldots + \alpha_l x_{t-l} + \beta_1 y_{t-1} + \ldots + \beta_l y_{t-l} + u_t \quad (6)$$

for all possible pairs of series in the group. The reported F-statistics are the Wald statistics for the joint hypothesis:

$$\beta_1 = \beta_2 = \ldots = \beta_l = 0$$

for each equation. The null hypothesis is that x does not Granger-cause y in the first regression and that y does not Granger-cause x in the second regression.

In order to use the causality test for investigation, there is need to determine the maximum order of integration amongst the variables of interest. These variables are subjected to panel unit root tests, using Levin, Lin and Chu (2002) (LLC), Im, Pesaran and Shin (2003) (IPS), ADF-Fisher Chi-square (ADF-F) and PP-Fisher Chi-square (PP-F) tests. The LLC assumes that the persistent parameters are common across cross-sections, while IPS, ADF-F and PP-F assume that the parameters vary freely across sections. These tests have therefore gained superior importance among the procedure of testing for unit root in panel data since emphasis in most instances is placed on the individual heterogeneity among the classes of data. The Panel unit root results obtained are reported in Table 2.

Table 2: Stationarity Test Results for the Panel Data									
Variables		Levels			First Difference				Order of
	LLC	IPS	ADF-F	PP-F	LLC	IPS	ADF-F	PP-F	Integration
GDP	4.4970	6.9635	0.0274	0.0652	-3.0572	-5.9244	50.1031	72.5497	I(1)
P-Value	1.0000	1.0000	1.0000	1.0000	0.0011	0.0000	0.0000	0.0000	
AXP	-1.3925	-0.9768	14.2480	13.3051	-10.2419	-12.3141	107.9000	121.3250	I(1)
P-Value	0.0819	0.1643	0.0755	0.1018	0.0000	0.0000	0.0000	0.0000	
LAB	-1.2005	1.5736	5.56959	2.9964	-2.6925	-1.9920	17.6497	11.4650	I(1)
P-Value	0.1150	0.9422	0.6953	0.9346	0.0035	0.0232	0.0240	0.1767	
KAP	0.6897	2.4072	1.3424	1.4024	-7.0363	-8.0032	67.9577	83.1215	I(1)
P-Value	0.7548	0.9920	0.9950	0.9942	0.0000	0.0000	0.0000	0.0000	
OPENS	-2.3270	-2.8332	23.0138	22.6786					I(0)
P-Value	0.0100	0.0023	0.0033	0.0038					
EXR	-2.7699	-1.6643	16.2451	43.0602					I(0)
P-Value	0.0028	0.0480	0.0390	0.0000					
TEK	-4.6778	-4.1928	31.9336	31.0236					I(0)
P-Value	0.0000	0.0000	0.0001	0.0001					
INS	-1.8534	-0.6842	9.3052	7.4633	-6.9677	-7.0598	60.1375	71.2749	I(1)
P-Value	0.0319	0.2469	0.3172	0.4876	0.0000	0.0000	0.0000	0.0000	
Source: Author's Compilation from E-Views 9 Output									

Table 2 reveals that the panel data variables OPENS, EXR and TEK were stationary at levels while GDP, AXP, LAB, KAP, and INS became stationary at first difference. This means that the trend deviations of these variables are of mixed order, which further lays credence to the use of T-Y causality test for the analysis. Further estimation procedure requires an estimation of the lag structure selection criteria whose results are presented on Table 3.

Table 3:VAR Lag Order Selection Criteria						
Endogenous variables: GDP EXR AXP INS KAP LAB OPENS TEK						
Sample: 1982 2016						
Included observations: 124						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1446.0370	NA	2.1153	23.4522	23.6342	23.5261
1	-110.1176	2477.915	2.61e-09	2.9374	4.5750*	3.6026*
2	-17.8795	159.1852	1.68e-09	2.4819	5.5751	3.7385
3	48.6495	106.2317*	1.66e-09*	2.4411*	6.9900	4.2890
4	98.2487	72.7988	2.22e-09	2.6734	8.6779	5.1126
Source: Author's Compilation from eviews 9 output						
Note: * indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

A look at Table 3 has shown that amongst the lag order selection criteria, majority of criteria has revealed selection of lag 3 as the optimal lag order given the indication asterisk. The interaction of the maximum order of integration and the optimal lag necessitates a re-specification of equations 3 and 4 into equations 7 and 8 respectively.

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \ldots + \alpha_3 y_{t-3} + \beta_1 x_{t-1} + \ldots + \beta_3 x_{t-3} + \varepsilon_t \quad (7)$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \ldots + \alpha_3 x_{t-3} + \beta_1 y_{t-1} + \ldots + \beta_3 y_{t-3} + u_t \quad (8)$$

Given that the optimal lag length K is 3 and dmax is 1, when interacted with equations 5 and 6 within the panelvar framework to enable the estimation of the causality analysis, the results are presented in table 4.

Table 4a: Toda-Yamamoto Panel Causality Test Results

Variables	Null Hypotheses	Chi-sq	P-Value	Remarks
Dependent Variable:				
GDP	Ho	30.6381	0.0000	AXP → GDP
AXP		4.3871	0.2226	GDP + AXP
GDP	Ho	2.1536	0.5411	LAB + GDP
LAB		7.0153	0.0714	GDP → LAB
GDP	Ho	2.6491	0.4489	KAP + GDP
KAP		5.8086	0.1213	GDP + KAP
GDP	Ho	0.4925	0.9205	OPENS + GDP
OPENS		1.1151	0.7734	GDP + OPENS
GDP	Ho	4.806	0.1866	EXR + GDP
EXR		9.5107	0.0232	GDP → EXR
GDP	Ho	15.0198	0.0018	INS → GDP
INS		3.1798	0.3647	GDP + INS
GDP	Ho	0.9121	0.8225	TEK + GDP
TEK		0.3737	0.9456	GDP + TEK
Source: Author's Compilation from eviews 9 output				
Note: the arrows indicate the flow of causation from one variable to another, while the cross represent no causation between the variables.				

Table 4b: Toda-Yamamoto Panel Causality Test Results

Variables	Null Hypo	Chi-sq	P-Value	Remarks
Dependent Variable:				
AXP	Ho	4.4367	0.2180	GDP + AXP
GDP		24.9319	0.0000	AXP → GDP
AXP	Ho	4.1583	0.2449	LAB + AXP
LAB		3.4959	0.3213	AXP + LAB
AXP	Ho	0.4401	0.9318	KAP + AXP
KAP		11.2275	0.0106	AXP → KAP
AXP	Ho	0.2986	0.9603	OPENS + AXP
OPENS		0.0980	0.9921	AXP + OPENS
AXP	Ho	2.6345	0.4515	EXR + AXP
EXR		9.0066	0.0232	AXP → EXR
AXP	Ho	2.4435	0.4856	INS + AXP
INS		5.6585	0.1295	AXP + INS
AXP	Ho	0.02745	0.9989	TEK + AXP
TEK		19.7362	0.0002	AXP → TEK
Source: Author's Compilation from eviews 9 output				
Note: the arrows indicate the flow of causation from one variable to another, while the cross represent no causation between the variables.				

Table 4c: Summary of panel Causations taken from table 4a and 4b

T-Y at GDP		T-Y at AXP
GDP= f(AXP, INS)		GDP=f(AXP)
LAB=f(GDP)		KAP=f(AXP)
EXR=f(GDP)		EXR=f(XP)
		TEK=f(AXP)
Decision: Export-Led Growth		Decision: Export-Led Growth

The panel results in Table 4a and 4b as summarized in table 4c lay credence to the export-led growth theory, meaning that export together with efficient and strong institutions has the capacity of stimulating economic growth. Economic growth in return can enhance employment and productivity of labour as well as dictate the appreciation or depreciation of the value of the currencies of the countries used in the panel. These results are tenable when estimations are done with economic growth serving as the principal endogenous variable.

On the other hand, when agricultural export serves as the endogenous variable, the primacy of export-led growth also plays out, with marginal variations in some of the control variables. These variations are seen in terms of gross capital formation and technical progress; which agricultural export do serve as a signal to their changes. Works by Cosmas (2015), Chien-Hui & Huang (20020 and Kouassi, Kern, & Felix (2004) have substantiated the potency of export-led growth.

Country-Specific Pairwise Granger Causality Analysis

The unit root test results for each of the countries within the panel namely Nigeria, Ghana, Cote d'Ivoire and Benin Republic, while using the ADF statistics as the test decision is reported on Tables 6a and 6b. The computation of the lag order selection structure for each of the individual countries was done with results presented on table 5. Based on the asterisks given the five (5) different lag order selection criteria, majority of them selected lag 2 for all the individual countries selected for this analysis. The interaction of the optimal lag order structure, with the maximum order of integration, as revealed by the unit root was in an effort to utilize the T-Y causality approach. This is because of its asymptotic efficiency over the pairwise granger causality test.

However, the optimal lag order in addition to the maximum order of integration led to so much a loss in the degree of freedom as such leading to a single matrix equation making estimation impossible, this has justified the use of the pairwise granger causality as the appropriate analytical tool in this mix.

Table 5: VAR Lag Order Selection Criteria
Endogenous variables: GDP EXR AXP INS KAP LAB OPENS TEK
Sample: 1982 2016

Country	Lag	LogL	LR	FPE	AIC	SC	HQ
Nigeria	2	426.9647	84.18123*	7.26e-18*	-17.63422*	-11.4668	-15.55907*
Ghana	2	489.1607	99.63414*	1.67e-19*	-21.40368*	-15.23625	-19.32852*
Cote d' Ivoire	2	512.3502	80.14013	4.11e-20*	-22.80911*	-16.64168	-20.73396*
Benin Republic	2	248.5464	101.2188*	3.61e-13*	-6.820996*	-0.653571	-4.745846*

Source: Author's Compilation from eviews 9 output

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 6a: Country-Specific (ADF) Unit Root Test Results

Variables	Levels	First Difference	Second Difference	1% Critical	5% Critical	10% Critical	Order of Integration
I. Nigeria							
GDP	0.6246	-5.0118		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.9884	0.0003					
AXP	-1.2263	-5.0118		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.6511	0.0003					
LAB	-2.7081	-4.0242		-3.6892	-2.9718	-2.6251	I(1)
P-Value	0.0853	0.0045					
KAP	-0.5754	-3.7923		-3.6617	-2.9604	-2.6191	I(1)
P-Value	0.8622	0.0073					
OPENS	-6.5451			-3.6702	-2.9639	-2.6210	I(0)
P-Value	0.0000						
EXR	-2.4164	-4.8793		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.1449	0.0004					
INS	-2.6277	-4.6635		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.0974	0.0007					
Tek	-0.1826	-5.5924		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.9314	0.0001					
II. Ghana	2.67619	-3.9670		-3.6537		-2.6174	
GDP					-2.9571		I(1)
P-Value	1.0000	0.0046					
AXP	-1.5948	-6.9110		-3.6537	-2.9571	-2.6174	I(1)
P-Value	0.4742	0.0000					
LAB	-2.0499	1.95821	-5.8532	-0.6537	-2.9571	-2.6174	I(2)
P-Value	0.2653	0.9997	0.0000				
KAP	-0.5894	-5.9859		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.8601	0.0000					
OPENS	-2.5203	-7.0077		-3.6537	-2.9571	-2.6174	I(1)
P-Value	0.1197	0.0000					
EXR	-3.8219			-3.6394	-2.9511	-2.6143	I(1)
P-Value	0.0063						
INS	-1.0745	-5.6874		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.7144	0.0000					
Tek	-3.4080	-7.0165		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.0178	0.0000					

Source: Author's Computation from E-Views 9 Output

Table 6b: Country-Specific (ADF) Unit Root Test Results

Variables	Levels	First Difference	Second Difference	1% Critical	5% Critical	10% Critical	Order of Integration
III. Cote d'Ivoire							
GDP	1.6699	-1.9135	-7.2111	-3.6537	-2.9571	-2.6174	I(2)
P-Value	0.9994	0.3223	0.0000				
AXP	-0.4692	-5.9501		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.8853	0.0000	0.0000				
LAB	-0.9270	-2.0922	-6.1124	-3.6537	-2.9571	-2.6174	I(2)
P-Value	0.7668	0.2489	0.0000				
KAP	0.45267	-4.3647		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.9824	0.0016					
OPENS	-1.5543	-5.7141		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.4945	0.0000					
EXR	-1.4016	-5.1099		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.5699	0.0002					
INS	-1.3612	2.5383	-6.3124	-3.6793	-2.9678	-2.6229	I(2)
P-Value	0.5859	0.9999	0.0000				
Tek	-3.0319	-6.2436		-3.6537	-2.9571	-2.6174	I(1)
P-Value	0.0419	0.0000					
Iv. Benin Republic							
GDP	1.4134	-5.7525		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.9987	0.000					
AXP	-3.8736			-3.6394	-2.9511	-2.6143	I(0)
P-Value	0.0055						
LAB	1.7105	-2.1913	-6.4737	-3.6537	-2.9571	-2.6174	I(2)
P-Value	0.9994	0.2130	0.0000				
KAP	0.0583	-7.6202		-3.6702	-2.9640	-2.6210	I(1)
P-Value	0.9568	0.0000					
OPENS	-3.9392						I(0)
P-Value	0.0047						
EXR	-1.4016	-5.1099		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.5699	0.0002					
INS	-1.7045	-7.7735		-3.6463	-2.9540	-2.6158	I(1)
P-Value	0.4200	0.0000					
Tek	-3.1705	-6.5098		-3.6537	-2.9571	-2.6174	I(1)
P-Value	0.0307	0.0000					

Source: Author's Computation from E-Views 9 Output

The results for Nigeria reveal that while OPENS is stationary at levels, the series of the rests of the variables (GDP, AXP, LAB, KAP, EXR, TEK and INS) are stationary at first difference. For Ghana, the series of LAB is stationary at second difference, while the rests (GDP, AXP, KAP, OPENS, EXR, TEK and INS) are stationary at first in difference. The results for Cote d'Ivoire reveals that the series of AXP, KAP, OPENS, EXR, and TEK are stationary at first difference while the series of GDP, LAB and INS are stationary at second difference. Benin Republic results show that the series of the variables AXP and OPENS are stationary at levels, GDP, KAP, EXR, TEK and INS are stationary at first difference, while LAB became stationary at second difference.

Table 7a: Nigeria's Pairwise Granger Causality Tests

Dependent Variable	Null Hypothesis:	Obs	F-Statistic	Prob.
GDP	EXR ⇸ GDP	33	3.72741	0.0367
	GDP ⇸ EXR		0.08511	0.9187
	AXP ⇸ GDP	33	3.49350	0.0442
	GDP ⇸ AXP		2.33581	0.1153
	INS ⇸ GDP	33	1.76600	0.1895
	GDP ⇸ INS		0.35084	0.7071
	KAP ⇸ GDP	33	1.54155	0.2317
	GDP ⇸ KAP		11.4349	0.0002
	LAB ⇸ GDP	33	1.92258	0.165
	GDP ⇸ LAB		0.32916	0.7223
	OPENS ⇸ GDP	33	5.93794	0.0071
	GDP ⇸ OPENS		4.02349	0.0291
	TEK ⇸ GDP	33	9.61720	0.0007
	GDP ⇸ TEK		1.71895	0.1976
AXP	EXR ⇸ AXP	33	0.83067	0.4462
	AXP ⇸ EXR		2.10358	0.1409
	INS ⇸ AXP	33	0.04048	0.9604
	AXP ⇸ INS		0.38316	0.6852
	KAP ⇸ AXP	33	1.97909	0.1571
	AXP ⇸ KAP		4.86947	0.0153
	LAB ⇸ AXP	33	0.37700	0.6893
	AXP ⇸ LAB		1.03507	0.3684
	OPENS ⇸ AXP	33	0.07346	0.9294
	AXP ⇸ OPENS		2.88695	0.0725
	TEK ⇸ AXP	33	0.65080	0.5293
	AXP ⇸ TEK		1.88664	0.1704

Source: Author's compilation from eviews 9 output
Note: ⇸ means Does Not Granger Cause

Table 7b: Ghana's Pairwise Granger Causality Tests

Dependent Variable	Null Hypothesis:	Obs	F-Statistic	Prob.
	GDP ǂ→ AXP	33	2.57410	0.0941
	AXP ǂ→ GDP		0.83299	0.4452
	GDP ǂ→ EXR	33	0.53552	0.5912
	EXR ǂ→ GDP		2.27562	0.1214
	INS ǂ→ GDP	33	1.00516	0.3788
	GDP ǂ→ INS		3.18518	0.0567
GDP	KAP ǂ→ GDP	33	1.81432	0.1816
	GDP ǂ→ KAP		8.21730	0.0016
	LAB ǂ→ GDP	33	0.24182	0.7868
	GDP ǂ→ LAB		5.10141	0.0129
	OPENS ǂ→ GDP	33	0.50519	0.6088
	GDP ǂ→ OPENS		3.12719	0.0595
	TEK ǂ→ GDP	33	1.83261	0.1787
	GDP ǂ→ TEK		3.13549	0.0591
	EXR ǂ→ AXP	33	3.74729	0.0361
	AXP ǂ→ EXR		0.65235	0.5286
	INS ǂ→ AXP	33	0.08752	0.9164
	AXP ǂ→ INS		2.53210	0.0975
	KAP ǂ→ AXP	33	5.90724	0.0072
AXP	AXP ǂ→ KAP		2.55230	0.0959
	LAB ǂ→ AXP	33	2.34442	0.1145
	AXP ǂ→ LAB		0.48921	0.6183
	OPENS ǂ→ AXP	33	2.01638	0.152
	AXP ǂ→ OPENS		3.12931	0.0594
	TEK ǂ→ AXP	33	0.05299	0.9485
	AXP ǂ→ TEK		2.12934	0.1378

Source: Author's compilation from eviews 9 output

Note: ǂ→ means Does Not Granger Cause

The country specific pairwise granger causality test for the two Anglophone speaking countries (Nigeria and Ghana) the selected for this work are reported on table 7a and 7b, while those of the two Francophone speaking countries (Cote d' ivoire and Benin) are presented on table 7c and 7d respectively. These results are further summarized on table 8.

Table 7c: Cote d' ivoire's Pairwise Granger Causality Tests

Dependent variable	Null Hypothesis:	Obs	F-Statistic	Prob.
	GDP ≠ → AXP	33	2.53493	0.0973
	AXP ≠ → GDP		4.47213	0.0206
	GDP ≠ → EXR	33	2.03765	0.1492
	EXR ǂ → GDP		1.47081	0.247
	INS ǂ→ GDP	33	2.59425	0.0926
	GDP ǂ→ INS		0.38338	0.6851
GDP	KAP ǂ→ GDP	33	2.16927	0.1331
	GDP ǂ→ KAP		17.7509	1.00E-05
	LAB ǂ → GDP	33	2.24174	0.125
	GDP ǂ→ LAB		2.01971	0.1516
	OPENS ǂ→ GDP	33	4.13778	0.0266
	GDP ǂ→ OPENS		1.66165	0.208
	TEK ǂ→ GDP	33	4.51212	0.02
	GDP ǂ→ TEK		1.81007	0.1823
	EXR ǂ → AXP	33	0.47464	0.627
	AXP ǂ→ EXR		0.82994	0.4465
	INS ǂ→ AXP	33	7.66729	0.0022
	AXP ǂ→ INS		1.20961	0.3134
	KAP ǂ→ AXP	33	3.04247	0.0637
AXP	AXP ǂ→ KAP		1.93958	0.1626
	LAB ǂ→ AXP	33	0.04601	0.9551
	AXP ǂ→ LAB		6.50931	0.0048
	OPENS ǂ→ AXP	33	2.99553	0.0662
	AXP ǂ→ OPENS		1.67424	0.2057
	TEK ǂ→ AXP	33	0.05322	0.9483
	AXP ǂ→ TEK		2.09238	0.1423

Source: Author's compilation from eviews 9 output

Note: ǂ→ means Does Not Granger Cause

Table 7d: Benin Republic's Pairwise Granger Causality Tests

Dependent variable	Null Hypothesis:	Obs	F-Statistic	Prob.
	GDP ǂ→ AXP	33	0.57268	0.5705
	AXP ǂ→ GDP		3.97334	0.0303
	GDP ǂ→ EXR	33	1.38482	0.267
	EXR ǂ→ GDP		0.82033	0.4506
	INS ǂ→ GDP	33	0.44917	0.6427
GDP	GDP ǂ→ INS		3.02638	0.0646
	KAP ǂ→ GDP	33	6.86421	0.0038
	GDP ǂ→ KAP		23.9023	9.00E-07
	LAB ǂ→ GDP	33	0.32433	0.7257
	GDP ǂ→ LAB		2.19542	0.1301
	OPENS ǂ→ GDP	33	0.48934	0.6182
	GDP ǂ→ OPENS		0.03946	0.9614
	TEK ǂ→ GDP	33	0.67969	0.5149
	GDP ǂ→ TEK		2.12369	0.1384
	EXR ǂ→ AXP	33	0.48155	0.6228
	AXP ǂ→ EXR		3.85461	0.0332
	INS ǂ→ AXP	33	0.70711	0.5017
	AXP ǂ→ INS		1.06636	0.3578
AXP	KAP ǂ→ AXP	33	0.27422	0.7622
	AXP ǂ→ KAP		1.18319	0.3212
	LAB ǂ→ AXP	33	1.51021	0.2383
	AXP ǂ→ LAB		0.17530	0.8401
	OPENS ǂ→ AXP	33	0.41576	0.6638
	AXPǂ→ OPENS		0.87546	0.4278
	TEK ǂ→ AXP	33	0.03318	0.9674
	AXP ǂ→ TEK		0.02086	0.9794

Source: Author's compilation from eviews 9 output

Note: ǂ→ means Does Not Granger Cause

Table 8: Summary Table of Country Specific Causations

Nigeria	Ghana	Cote d' ivoire	Benin Republic
GDP = f(EXR,AXP, OPENS, TEK)	AXP= f(GDP, EXR, KAP)	GDP=f(AXP, INS, OPENS, TEK)	GDP=f(AXP, KAP)
KAP =f(GDP)	INS=f(GDP, AXP)	AXP=f(GDP, INS, KAP, OPENS)	INS=f(GDP)
Opens= f(GDP, AXP)	KAP=f(GDP,AXP)	KAP=f(GDP)	KAP=f(GDP)
	LAB=f(GDP)	LAB=f(AXP)	EXR=f(AXP)
	OPENS=f(GDP,AXP)		
	TEK=f(GDP)		
Export- led Growth	Growth- led Export	Both Export-Led Growth and growth led export	Export led growth
Source: Author's Compilation			

The country specific analysis as summarized on table 8 has revealed that for Nigeria the export led growth theory applies given that agricultural exports serve as a predictor of economic growth. This means a unidirectional causality flowing from agricultural export to economic growth. The findings further stipulate that unidirectional causations from trade openness, technological progress, exchange rate as control variables to economic growth. In turn, economic growth signals the growth of gross capital formation. It is worth noting that agricultural export and economic growth are key to the performance of trade openness in Nigeria. These variables also exhibit unidirectional causality to trade openness.

For Ghana, the growth led export hypothesis takes prominence as economic growth predicts agricultural export. The control variables of exchange rate and gross capital formation are also

observed to predict agricultural export. Other key findings show that unidirectional causality of economic growth as well as agricultural export is found on the efficacy of institutions, gross capital formation and trade openness. While economic growth has a unidirectional causation on labour and technical progress in Ghana.

Cote d' ivoire has reported a bidirectional causation existing between economic growth and agricultural exports. This lay credence to the efficacy of both the export led growth and growth led export hypotheses in Cote d' ivoire. The control variables that also predict economic growth given its bidirectional status with agricultural exports show, unidirectional causation from institutions, trade openness and technical progress to economic growth. it is further observed that institutions, Gross capital formation and trade openness also exhibit flows of unidirectional causation to agricultural export. Further findings show that while economic growth predicts gross capital formation, agricultural export flow in a unidirectional structure to labour productivity in Cote d' ivoire.

In Benin republic, export led growth hypothesis is observed to play prominence in the zeal of the country to attain growth. This has ensured that agricultural export and gross capital formation indicates the movement recorded in economic growth. For changes in Institutions and gross capital formation, it is noted that economic growth signals their movements, except for exchange rate whose unidirectional flow is obtained from agricultural export. Summarily, the country specific causality results have shown that the assumption of panel causal homogeneity as opined by Cosmas (2015) is invalidated.

Conclusion

It can be found from this study that while a unidirectional causality runs from agricultural exports to economic growth for the panel analysis as well as for Nigeria and Benin Republic for the country specific analysis, it could not hold for Ghana, which has reported the potency of Growth-led export in the country-specific analysis. But for Cote d'ivoire, given the country specific analysis, the reportage is that of a mixed result, eliciting both export-led growth and Growth-led export in the analysis. It could therefore, be concluded that Export-Led Growth and Growth-Led Export hypothesis have heterogeneous implications for inter-country studies.

From the findings of this study, it can be recommended that each country should adopt appropriate path to growth that is beneficial to them. On the regional level, Nigeria, Ghana, Cote d'Ivoire and Benin Republic should adopt agricultural exports as a strategy of Exports-led growth to stimulate the regional economy that has positive implications on country specific terms.

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