Retesting the Export-Led Growth Hypothesis: A Panel Data Analysis

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Abstract

The export led-growth hypothesis is one of the widely researched areas in the field of international economics. However, there is an ongoing debate as to whether it is export that causes economic growth or vice versa; with past and current research showing mixed findings. This paper retested the export-led growth hypothesis using panel data for ten selected ECOWAS member countries from 2000 to 2017. We used panel autoregressive distributed lags/pooled mean group (ARDL/PMG) approach as well as the panel causality test to determine the directional relationships of the macroeconomic variables used. We further disaggregated export into three (merchandise export, services export and total export) and controlled for other growth-relevant variables. From the panel ARDL/PMG estimation, we found that merchandise export positively influences economic growth in both the short and long runs; while services export and total export positively impact economic growth only in the long run. Using the pairwise granger causality test, we found a long run causal relationship flowing from services and total exports to economic growth respectively. However, we also found a bidirectional relationship between merchandise export and economic growth. Given the findings, this study found support for the export-led growth hypothesis in ECOWAS. Policy wise, efforts to improve the region's economy should be channeled through export promotion strategies.

Keywords: ECOWAS, Export-Led Growth, Panel ARDL, Economic growth, Granger causality

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1. Introduction

The export-led growth (ELG) hypothesis is one of the oldest areas of research in the economics of international trade. It started gaining dominance between 1970 and 1980 when it was shown to be successful in the four Asian Tigers[1] (Dunn and Mutti, 2004; Gokmenoglu et al., 2015; Myovella, 2015). The ELG hypothesis maintains that export is the main engine of growth in an economy. As such, if policymakers want to improve the growth trajectory of their economies, exportation should be prioritized. When a country or region decides to liberalize trade by exporting more, the benefits are more on the supply side of the economy. Jimenez and Ramzi (2013) argue that export, especially manufactured export, is associated with some sort of positive externalities that affect other sectors of the economy. These other sectors, then, have the ability to produce goods that they could not produce prior to export promotion. Additionally, with export growth, the balance of payments is improved, foreign income is earned and employment level is raised. All these scenarios are made possible when exporting countries make use of their comparative advantage.

As a long debated topic, the ELG hypothesis came as a search for alternative ways to increase gross domestic product (GDP) growth for developing countries (Dunn and Mutti, 2004). Initially, developing countries between 1950 and 1970 adopted "Import Substitution Strategy" (ISS). With the ISS, countries preferred to put barriers on imported goods with the sole intent of producing all of those goods by themselves. This came from the backdrop that developing countries were disadvantaged when gains from trade are considered (Awad, 2019). As such limiting their reliance on international trade was a better option (Dunn and Mutti, 2004; Myovella et al., 2015). However, while it is true that there were few success stories from the Import Substitution Strategy, by the 1970s, empirical studies started to prove that the export-led growth strategy was more robust in inducing growth than the import substitution strategy (Balassa, 1978; Feder, 1983; Krueger, 1985; Dunn and Mutti, 2004).

Though there has been a wide consensus that export promotes growth than other sectors, there has also been mixed views. Researchers such as Buffie and Atolia (2012), Were (2015), Bresnahan et al. (2016) and Awad (2019) argue that trade growth is not mainly in favor of least developed countries (LDCs). Even if export is improved, the gains accumulated will still be minimum because these LDCs do not have the capacity to compete with exports emanating from the markets of developed countries. As such, they found a negative causality running from export to economic growth; thereby arguing that it is economic growth that influence trade growth. Additionally, opponents of the ELG hypothesis maintain that the export-led growth hypothesis, as an engine for growth, is an overstatement (Buffie and Atolia, 2012; Awad, 2019). The ELG hypothesis requires that all countries improve/increase their export in order to grow. But it is not possible for all countries to be net exporters at the same time. If this could even happen, who/which country could buy the excess export?

Even though several studies have shown that export drives economic growth, limited attention is given to the ELG hypothesis when it comes to Sub-Saharan Africa (Ee, 2016) and ECOWAS as a region (Iyoha and Okim, 2017). Most of the studies done used cointegration and Granger Causality tests on individual countries outside of ECOWAS. Only few studies, such as the one done by Lloyd, et al., (2014) and Iyoha and Okim (2017), analyzed the impact of export on economic

[1] The original Asian Tigers are: Hong Kong, Singapore, South Korea, and Taiwan.

growth for the ECOWAS region; and found support for the export-led growth hypothesis. However, the authors did not disaggregate the dataset so that policymakers can have a clear understanding on which sector(s) of export to prioritize in order to spur growth. We followed the work of Iyoha and Okim (2017), but deviated by disaggregating export into three parts (merchandise and services exports, and their combination). Various studies done in this line of research have produced mixed findings as well. This can also be attributed to the type of data used, as well as the methodology (i.e. estimation techniques). We retested the export-led growth hypothesis in ten ECOWAS member countries using panel cointegration, Panel Autoregressive Distributed Lags / Pooled Mean Group (ARDL/PMG), and panel causality test. The ARDL/PMG technique is necessary because of its attractive econometric advantages over other estimation techniques. For example, it is applied whether the series used are I(0), I(1), or mutually integrated but not I(2); it has superior small sample properties; it generates both short and long run dynamic relationships between the dependent and independent variables; the panel ARDL/PMG approach produces unbiased estimates even in the presence of endogenous covariates; and it is also effective even if the variables have different optimal lag lengths. Findings from such improvement better inform policymakers on priority areas in order to improve the lives of their citizens with regards to international trade.

The rest of the paper is structured as follow: Section two presents the literature review as well as an overview of ECOWAS. Section three discusses the data and research methodology. Section four presents the estimation results and their discussions. And section five presents the conclusion and policy recommendations of the study.

2. Literature Review

2.1 Overview of ECOWAS

The Economic Community of West African States (ECOWAS) is one of the eight recognized regional economic communities (RECs) of the African Union (AU) (African Development Bank, 2019). It was established in 1975, with the mandate of promoting economic integration among member countries. ECOWAS has fifteen (15) member countries; namely: Benin, Burkina Faso, Cabo Verde, Cote d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, The Gambia, and Togo. Trade wise, ECOWAS has embarked on several reform measures to ensure that trade flows as freely as possible within the region. The establishment of the ECOWAS Trade Liberalization Scheme (ETLS) in 1979 is a major policy tool to improving regional trade. With the ETLS, member countries can trade among themselves freely without the payment of customs duties and or other taxes. This ETLS is meant to improve intra-ECOWAS trade, thus making the region a customs union. In addition to the ETLS, the Common External Tariff (CET) is a related instrument that has recently been adopted by ECOWAS. It took off in January 2015. The CET is intended to facilitate free trade within the region by allowing all member countries to have a uniformed rate on imported goods. However, other policymakers have argued that the CET is likely to increase hardship in poorer countries by increasing the rate of inflation on imported goods. Usually, the CET import duty rate is higher than some individual member countries' rates (i.e. Liberia and Sierra Leone). So, from the supply side, this CET might only benefit those countries that have the ability to produce in the region (ECOWAS, 2016).

Additionally, the region has made some significant improvements since its establishment. For example, total ECOWAS trade has increased by an average of 18 percent per year between 2005

and 2014, with Nigeria, Ghana, Côte d'Ivoire and Senegal serving as active players (ECOWAS, 2016). ECOWAS trade is mainly driven by mining commodities (such as oil resources, iron, bauxite, manganese, gold, etc.); agricultural commodities (such as coffee, cocoa, cotton, rubber, fruits and vegetables), and other products rather marketed within the region (such as dry cereals, roots and tubers, livestock products, etc.) (ECOWAS, 2016).

2.2 Empirical literature on the export-led growth hypothesis

The export-led growth hypothesis has been a widely researched area in the field of international economics. Initially, the import substitution strategy was the trade policy tool in dominance around the 1950s and 1970s. However, search for alternative ways to increase gross domestic product (GDP) growth through international trade saw the export-oriented industrialization strategy gaining dominance around the 1970s (Balassa, 1978; Feder, 1983; Krueger, 1985; Dunn and Mutti, 2004). This export-oriented industrialization strategy is also known as the export-led growth hypothesis. It maintains that export is the engine of growth for an economy. It generates foreign income that can be used to purchase other machineries and equipment for development purposes (Dar et al., 2013; Iyoha and Okim, 2017).

However, the empirical literature has documented mixed findings concerning this export-led growth hypothesis. It is worth noting that many studies have found support for the export-led growth hypothesis. Prominent among those studies are the works of Jun (2007); Parida and Sahoo (2007); Shombe (2008); Obadan and Okojie (2010), Hye and Siddiqui (2011); Shahbaz et al. (2011); Lloyd, et al. (2014), Ee (2016); Iyoha and Okim (2017), just to name a few. The work of Shombe (2008) used time series data spanning from 1970 to 2005 to investigate the causal link between GDP and export in Tanzania. His finding shows that there is a long run relationship flowing from export to GDP for Tanzania. A study conducted in Pakistan by Shahbaz et al. (2011) used the ARDL bound testing approach and error correction model on quarterly time series data to analyze the impact of export on GDP growth. A positive long run relationship was found in favour of the export led-growth hypothesis. In a related study, Hye and Siddiqui (2011) examined the impact of export and terms of trade on economic growth in Pakistan. They found that export causes economic growth, while an adverse terms of trade hamper economic growth.

Obadan and Okojie (2010), for the Nigerian economy, used annual time series data from 1980 to 2007 to analyze the impact of trade on economic growth. Using ordinary least squares regression technique, they found that growth in trade causes economic growth. On his part, Ee (2016) tested the export-led growth hypothesis for selected Sub-Sahara African (SSA) countries from 1985 to 2014. Using panel cointegration, Fully Modified OLS and Dynamic OLS, the author found support for the export-led growth hypothesis in SSA.

In an attempt to establish the impact of export diversification and composition on economic growth in ECOWAS, Lloyd, et al. (2014), used panel data spanning the period 1975 to 2007 for their analysis. Using cointegration and panel least squares estimation technique, they found that export diversification and manufacturing (value-added index) had a positive and significant impact on economic growth. Similar result was found by Iyoha and Okim (2017) for ECOWAS. Using annual data for 15 ECOWAS member countries from 1990 to 2013, they also found a positive long run relationship flowing from export to economic growth.

While it is true that many researchers have settled for the export-led growth hypothesis, there has been other studies that have refuted this hypothesis. For example, in Costa Rica, Gokmenoglu et al. (2015) empirically tested the export-led growth hypothesis using Johansen cointegration and Granger Causality tests. The authors document a long run causal relationship flowing from economic growth to export growth. Similar result was found for Tanzania by Myovella et al. (2015). Using an annual time series data from 1980 to 2013, and applying the Johansen cointegration and Granger causality tests, the authors found that it is economic growth that causes agricultural export growth in Tanzania; thereby refuting the export-led growth hypothesis. For South Africa, Ogbokor and Meyer (2017) used quarterly time series data (from 1995Q1 to 2015Q4) to examine the relationship between foreign trade and economic performance. Using vector autoregressive estimation technique and granger causality test, the authors found no support for the export-led growth hypothesis in South Africa. Instead, it was economic growth that caused export growth. Other studies that found support for the growth-led export include the works of Bahmani-Oskooee et al. (2005); Reppas and Christopoulos (2005).

Besides the findings showing unidirectional relationship from economic growth to export growth, other studies found bi-directional relationship between the two variables. Key among them are the works of Dar et al. (2013), who found bi-directional relationship for the Indian economy; Shan and Sun (1998) and Mah (2005) for the Chinese economy; Ramos (2001) for Portugal; Awokuse (2005) for Korea, just to mention a few.

The mixed findings in the empirical literature are sometimes caused by differences in the treatment of data as well as methodology used. We took keen interest in this, thereby making improved contribution in this subject line.

3. Research Methodology

3.1 Theoretical Framework

GDP growth is a key measure in accounting for a country's strength relative to others. It gives an estimate of the monetary value of final goods and services produced within a year. For this study on the export-led growth hypothesis for ECOWAS, we used GDP per capita as a proxy for economic growth. The GDP per capita indicates the standard of living for a country/region. It is arrived at by dividing a country's/region's total output by its population. To begin, we start with the Neo-Classical Growth Model that argues that economic growth is dependent on labour, capital and technological progress; such that improvement in at least one of them will improve growth holding other things constant. The Neo-Classical Growth Model is stated below:

$$Y = F(A, L, K) \tag{1}$$

where Y is output (in our case, GDP per Capita), A is technological progress, L is Labour Force, and K is capital.

3.2 Model Specification

As shown by the Neo-classical production function in equation (1), growth of an economy is dependent upon technological progress, labour force and capital. Notwithstanding, in the works of Myovella *et al.* (2015) and Iyoha and Okim (2017), there are other control variables that influence the growth pattern of output (GDP) aside from the ones contained in equation (1). As such, we

modified equation (1) by incorporating other growth-relevant variables of which export is key. Modification of equation (1) enables us to arrive at a baseline equation as provided by equation (2):

$$GDPPC_{it} = A_o Labour_{it}^{\beta 1} Grossfixcap_{it}^{\beta 2} Export_{it}^{\beta 3} Exchrate_{it}^{\beta 4} \quad (2)$$

GDPPC is gross domestic product per capita; *Labour* is labour force; *Grossfixcap* is gross fixed capital formation (which is a proxy for capital); *Export* is the monetary value of export; and *Exchrate* is exchange rate. In order to capture the effect of each estimated parameter as an elasticity, we transformed equation (2) into a log-linear equation and rearranged the variables to suit the objective of our study, thus yielding equation (3).

$$\ln(GDPPC_{it}) = \alpha_0 + \beta_1 ln(Export_{it}) + \beta_2 ln(Labour_{it}) + \beta_3 ln(Grossfixcap_{it}) + \beta_4 ln(Exchrate_{it}) + \epsilon_{it} \quad (3)$$

Ln, as attached to a variable, indicates its logarithm value. With all other variables being previously defined, subscript *i* is used to represent individual country's index while subscript *t* is used to represent the time period of the study. β_0 is the intercept and (β_1 ... ... β_4) are the parameters to be estimated. And ϵ_{it} is the stochastic error term.

As mentioned earlier, the estimation in this study is carried out using three models. In the first model, we regressed log GDP per capita on the log of merchandise export plus other controls. For the second model, log GDP per capita is regressed on the log of services export plus other controls. And the third model is where we regressed log GDP per capita on the interaction term for log of merchandise export and log of services export plus other controls. Such a technique enables us to establish the stand-alone effect as well as the combined effect of the independent variables on the dependent variable. Given this method, we obtained our empirical models by decomposing equation (3) as presented below:

$$\ln(GDPPC_{it}) = \alpha_0 + \beta_1 ln(Merchex_{it}) + \beta_2 ln(Labour_{it}) + \beta_3 ln(Grossfixcap_{it}) + \beta_4 ln(Exchrate_{it}) + \epsilon_{it} \quad (4)$$

$$\ln(GDPPC_{it}) = \alpha_0 + \beta_1 ln(Services_{it}) + \beta_2 ln(Labour_{it}) + \beta_3 ln(Grossfixcap_{it}) + \beta_4 ln(Exchrate_{it}) + \epsilon_{it} \quad (5)$$

$$\ln(GDPPC_{it}) = \alpha_0 + \beta_1 ln(Merchex_{it} * Services_{it}) + \beta_2 ln(Labour_{it}) + \beta_3 ln(Grossfixcap_{it}) + \beta_4 ln(Exchrate_{it}) + \epsilon_{it} \quad (6)$$

In other to make inference about the data used, we conducted several diagnostic tests, which are reported in the next section.

3.3 Data

This study uses panel dataset for ten ECOWAS member countries spanning from 2000 to 2017. With the objective being to retest the export-led growth hypothesis, we gathered yearly data from the World Bank's World Development Indicators (2019) database on GDP per capita, merchandise

export, services export, labour force, gross fixed capital formation, and exchange rate. Due to unavailability of data for some ECOWAS member countries, we used ten selected countries for our analysis. The ten countries are: Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal, The Gambia, and Togo.

GDP per capita captures the living standard of the populations of ECOWAS member countries. It consists of the GDP divided by the total population. Merchandise export is the current United States dollar value of exported merchandise goods. Services export consists of the current United States dollar value of exported services. Labour force captures the working population of ECOWAS. The population here consists of the total number of people with ages between 15 and 64 years inclusively. Gross fixed capital formation is used as a proxy for capital. It is measured as the current United States dollar value of domestic capital. And exchange rate is the price of the local currencies relative to the United States dollar. In addition, we interacted merchandise export and services export so as to get the combined impact of total export on economic growth.

3.4 Estimation technique

The Panel Autoregressive Distributed Lags, specifically Pooled Mean Group (ARDL/PMG), is used to estimate the empirical models. The panel ARDL/PMG technique is necessary because of the attractive econometric advantages it has over other estimation techniques. It can be used where variables have mixed order of integration, such as I(0), I(1) or both, but not I(2). It is effective even in the presence of a small sample size, like this study. It produces both short and long run coefficients simultaneously. The panel ARDL/PMG approach produces unbiased estimates even in the presence of endogenous covariates. And it is also effective even if the variables have different optimal lag lengths. The basic ARDL model can be specified as:

$$\mathrm{Y}_{it} = \sum_{\mathrm{j}=1}^{\mathrm{p}} \lambda_{ij}\, \mathrm{Y}_{i,t-j} + \sum_{\mathrm{j}=0}^{\mathrm{q}} \delta'_{ij} \mathrm{X}_{i,t-j} + \mu_i + \epsilon_{it} \tag{7}$$

where Y_{it} represents the dependent variable; $\mathrm{X}_{i,t-j}$ represents the vector of independent variables; λ_{ij} is the coefficient on the lags of the dependent variable; δ'_{ij} represents the coefficients on the current and lags of the independent variables; μ_i is the fixed effect; and ϵ_{it} is the error term. In order to have long run relationship among the variables used, if equation (7) consists of variables that are cointegrated, it is required that the error term follow an I(0) order of integration in all cross-sections. The main feature of cointegrated variables is that their time paths are influenced by deviations from long run equilibrium (Mallick et al., 2016). This necessitates the need to introduce an error correction model in which short run deviations created can be corrected in the long run. As such, we re-parameterized equation (7) to account for the error correction version of the panel ARDL model, as specified below:

$$\Delta \ln \mathrm{Y}_{it} = \phi_i \left(\ln \mathrm{Y}_{i,t-1} - \theta'_i \ln \mathrm{X}_{it} \right) + \sum_{\mathrm{j}=1}^{\mathrm{p}-1} \lambda^*_{ij} \Delta \ln \mathrm{Y}_{i,t-1} + \sum_{\mathrm{j}=0}^{\mathrm{q}-1} \delta^*_{ij} \Delta \ln \mathrm{X}_{i,t-j} + \mu_i + \epsilon_{it} \tag{8}$$

where *Y* and *X* are as previously defined, θ'_i is a vector of long run coefficients; λ^*_{ij} and δ^*_{ij} represent the short run coefficients; and ϕ_i is the speed of adjustment coefficient. Theoretically, the

coefficient on the speed of adjustment must be negative and statistically significant in order for long run equilibrium to be restored.

4. Results and Discussions

With the objective of retesting the export-led growth hypothesis, we gathered data for ten selected ECOWAS member countries from the World Bank's World Development Indicators (2019) database. The dataset was summarized and the result is presented in Table 1. The mean values obtained are good measures of central tendency, given that they all lie midway between the maximum and minimum values. In the ECOWAS region, the value of GDP per Capita is averaged around US$842.73 per year, while the highest and lowest values are US$3,221.68 and US$158.41 respectively. By virtue of the fact that ECOWAS, as a region, reports per capita GDP to be less than US$1,000 for the period studied, justifies their inclusion in the list of low-income regions by the World Bank (Iyoha and Okim, 2017). For merchandise export, the average value obtained for the region is US$8.42 billion, with the maximum and minimum values being US$116 billion and US$4.69 million respectively. The maximum value for merchandise export is seen to be very high due to the presence of Africa's biggest economy (Nigeria). Services export is seen to have a high value, but it is lower than that of merchandise export. For the period studied, services export averaged around US$838 million, with the maximum and minimum being US$6.6 billion and US$37.522 million respectively.

Table 1: Summary Statistics

Variables	Obs	Mean	Std. Dev.	Maximum	Minimum
GDP per capita	180	842. 7291	586.8004	3221.678	158.4056
Merchandise Export	180	8420000000	20200000000	116000000000	4690000
Services Export	180	838000000	1120000000	6600000000	37522316
Merchandise*Services	180	19.3E+18	55.5E+18	39.3E+19	32.8E+13
Labour Force	180	14452650	23140116	102000000	631651
Gross fixed capital formation	180	73.8E+8	16.6E+9	85.7E+9	35720496
Exchange rate	180	404.9035	239.2331	733.0385	0.544919

Note: Author's computation based on dataset.

4.1. Panel Unit Root Test

In order to retest the export-led growth hypothesis for selected ECOWAS member countries, we tested for unit root so as to establish the order of integration for the variables used. In doing so, we adopted the Im-Pesaran-Shin (IPS) panel unit root test. This panel unit root test has greater power than the first generation test developed by Levin and Lin (1993) which does not cater for heterogeneity in the autoregressive coefficient (Ee, 2016). The null hypothesis for the IPS panel unit root test is that the variable has unit root (i.e. with individual unit root process). Table 2 presents the panel unit root test results.

It can clearly be seen that two of the variables are stationary at level (i.e. Log GDP per capita and the interaction between merchandise and services exports); thus, enabling us to reject the null hypothesis of non-stationarity (unit root) at level. With the exception of these two variables, all other variables became stationary after first difference. Given this finding, the variables used in this study are said to be integrated of orders I(0) and I(1). This order of integration enables us to

use the autoregressive distributed lags estimation technique (Phillips and Perron, 1988; Pesaran and Pesaran, 1997; Pesaran et al., 1999, 2001). With majority of the variables being integrated at order one, I(1), it suggests that there is a high possibility of a long run relationship.

Table 2: Panel Unit Root Test Result

Variables	IPS Test Statistics	
	Level	**First Difference**
Log GDP per capita	-1.48865*	
Log Merchandise Export	-0.90003	-6.92669***
Log Services Export	-1.04867	-7.91816***
Log Merchandise Export*Services Export	-2.15926**	
Log Labour Force	10.1873	-1.74920**
Log Gross fixed capital formation	-0.12766	-8.27962***
Log Exchange rate	0.50640	-4.86646***

Note: *, ** and *** denote rejection of null hypothesis at 10, 5 and 1 percent levels respectively.

4.2. Panel Cointegration Test

Since the panel unit root test result suggests that there is a likelihood of a long run relationship, we used the Pedroni's test for cointegration to establish the truthfulness of this long run relationship. The Pedroni (2000, 2004) cointegration test is a robust test that accounts for heterogeneity by making use of specific parameters that were allowed to vary across individual members of the sample (Ee, 2016). It has two main dimensions (the within and between dimensions). And these two dimensions present eleven test statistics, all under the null hypothesis of no cointegration. To make inference, the null hypothesis is rejected if the p-value is equal to or less than 5 percent significance level. In addition to the Pedroni Residual Cointegration test, we used the Kao (1999) Residual Cointegration test before reaching our conclusion. These cointegration tests results are presented in Tables 3 and 4.

Table 3: Pedroni Residual Cointegration Test

	Statistic	**Weighted Statistic**
Within-Dimension		
Panel v-Statistic	-2.318948 (0.9898)	-2.717986 (0.9967)
Panel rho-Statistic	2.888483 (0.9981)	3.123531 (0.9991)
Panel PP-Statistic	-4.245841 (0.0000) ***	-2.989252 (0.0014) ***
Panel ADF-Statistic	-5.126292 (0.0000) ***	-4.476998 (0.0000) ***
Between-Dimension	**Statistic**	
Group rho-Statistic	3.465510 (0.9997)	
Group PP-Statistic	-4.674629 (0.0000) ***	
Group ADF-Statistic	-4.853642 (0.0000)***	

Note: *P-values* are in parenthesis. *** indicates rejection of null hypothesis at 1 percent significance level.

Table 4: Kao Residual Cointegration Test

Test	T-Statistic	Prob.
ADF	-4.747818***	0.0000
Residual variance	0.007523	
HAC variance	0.010190	

Note: *** indicates rejection of null hypothesis at 1 percent significance level.

With majority of the test statistics rejecting the null hypothesis of no cointegration in table 3; and with the p-value being lower than 0.05 in table 4, we conclude that there exists a cointegrating relationship among the variables used. The cointegration and unit root test results led us to estimate the long run panel ARDL (Pooled Mean Group) in this study. The panel ARDL/PMG is proven to have some attractiveness over other estimation techniques like the Engle-Granger (1987), Johansen and Juselius (1990), and Johansen (1991) techniques, as discussed in section (3.4).

4.3. Panel Estimation Results and Discussion

After confirming a long run relationship based on the Pedroni (2000, 2004) and Kao (1999) cointegration tests, we estimated the dataset using the panel ARDL/PMG technique. The results are presented in Table 5, with the logarithm value of GDP per capita serving as dependent variable for the three estimation models used.

Table 5: Panel ARDL/PGM Estimation Results (Dependent Variable = Log GDP per Capita)

Variables	Model (1)	Model (2)	Model (3)
SHORT RUN EQUATION			
Log Merchandise Export	0.091782**		
	(0.0272)		
Log Services Export		-0.058852	
		(0.1690)	
Log Merchandise Export*Services Export			0.009880
			(0.7063)
Log Labour Force	0.833014	0.584833	0.281000
	(0.8586)	(0.9213)	(0.9549)
Log Gross fixed capital formation	-0.023319	0.055143	-0.007791
	(0.5550)	(0.1578)	(0.8051)
Log Exchange rate	-0.294511**	-0.570237***	-0.378492***
	(0.0131)	(0.0000)	(0.0027)
ECT	-0.557918***	-0.362727***	-0.537979***
	(0.0000)	(0.0010)	(0.0000)
C	-22.42177***	-15.70495***	-15.68517***
	(0.0000)	(0.0011)	(0.0000)
@TREND	-0.026200*	-0.012651	-0.016745
	(0.0572)	(0.2321)	(0.1038)
LONG RUN EQUATION			
Log Merchandise Export	0.043889*		
	(0.0710)		
Log Services Export		0.165730***	
		(0.0017)	
Log Merchandise Export*Services Export			0.012990**
			(0.0122)
Log Labour Force	2.793696***	2.949206***	2.094140***
	(0.0001)	(0.0010)	(0.0032)
Log Gross fixed capital formation (capital)	0.284715***	0.198786***	0.308493***
	(0.0000)	(0.0000)	(0.0000)
Log Exchange rate	-0.765358***	-0.712033***	-0.754591***
	(0.0000)	(0.0000)	(0.0000)
Mean dependent var	0.056545	0.056545	0.056545
S.E. of regression	0.056317	0.057517	0.115116
Sum squared resid	0.336194	0.350673	0.057849
Log likelihood	359.8400	343.3478	-3.186164
S.D. dependent var	0.115116	0.115116	0.354733
Akaike info criterion	-3.176000	-2.992754	-1.873504
Schwarz criterion	-1.863340	-1.680094	360.7547
Hannan-Quinn criterion	-2.643773	-2.460527	-2.653937

Note: *, ** and *** indicate significance level at 10, 5 and 1 percent respectively. *P-values* are in parenthesis.

With export being disaggregated, only merchandise export and exchange rate have a significant impact on GDP per capita in the short run. The short run results are indicating that of the export variables, only merchandise export positively influences GDP per capita among the countries studied. In particular, a one percent increase in the value of merchandise export leads to a rise in economic growth by 0.092 percent. Services export and the interaction between merchandise and services exports are seen to be insignificant in the short run. Probable reason for such results is that most of ECOWAS exports are primary commodities (i.e. merchandise exports), which are easily traded in the short run, thus impacting growth faster, though fragile. For example, big exporters like Nigeria exports mainly crude petroleum and petroleum products; Ghana exports mainly gold, cocoa, oil, timber, etc.; and Cote d'Ivoire's main export commodities are cocoa, coffee, timber, petroleum, cotton, etc. Because these commodities are in their primary stages, they are easily sold faster in the short run; a probable reason why merchandise export is significant in influencing growth than other export sectors in the short run.

Nevertheless, in the long run, it is evident that the three export variables used in this study have a positive and significant impact on economic growth. For instance, a one percent rise in merchandise export leads to a 0.044 percent rise in economic growth. Also, an increase in services export by one percent induces increase in economic growth by 0.166 percent. And a one percent increase in total export (i.e. the interaction between merchandise and services exports) leads to increase in economic growth by 0.013 percent. While it is true that export influences growth, we can see that disaggregating export produces different results for policy intervention. As seen from this study, among the three export variables, services export is highly significant and has a higher magnitude than the rest. This implies that if attention is given to services export as a driver of growth, in the long run, growth will rise as compared to if it were merchandise export. The logic behind this result, as indicated by the WTO, is that trade in services has four modes of supply[2] while trade in merchandise has only one mode of supply (WTO, 2004). This implies that investing in services export might not have immediate benefit in the short run, but the benefits are tremendous in the long run. In addition to this finding, total export (which is the interaction term between merchandise and services exports) produces a positive result on economic growth. Though the magnitude is smaller than that of services export, it points to the fact that the combined effect of export has a significant influence on economic growth in the region.

With export variables having a long run positive impact on economic growth, it corroborates the works of Lloyd et al. (2014) and Iyoha and Okim (2017), who found positive impacts of export on GDP growth for ECOWAS member countries.

With labour force being positive and statistically significant at one percent level for the three models in the long run, it indicates that an increase in the labour force is expected to increase economic growth in the region. Here, increase in labour force is not only restricted to quantity of labour. It also extends to the quality of labour that leads to efficiency. For example, improvement in the labour force such as training, education, apprenticeship, etc. will serve as a source of economic growth within the region in the long run.

[2] The four modes of supply are: Cross border trade, consumption abroad, establishment of commercial presence, and temporary movement of natural person.

For capital, the long run coefficients on the three models are positive and statistically significant in inducing growth for the ECOWAS bloc. A percentage increase in the stock of capital will also lead to increase in economic growth for ECOWAS member countries. This finding is an indication that in order for ECOWAS, as a region, to perform economically, regional capital mobilization should be prioritized. In this regard, ECOWAS policymakers should also embark on policies that would reduce administrative bottlenecks when attracting foreign direct investments (FDIs). These FDIs are a major source of capital accumulation.

The coefficients on exchange rate were found to be statistically significant in explaining economic growth in ECOWAS for both the short and long run periods. Surprisingly, exchange rate was found to have a negative impact on economic growth. The findings indicate that a one percent rise in exchange rate will lead to a fall in economic growth in both the short and long runs. As shown by this study and previous studies done, export growth leads to economic growth. And from the widespread literature, exchange rate depreciation/devaluation encourages export. Therefore, it is surprising to find that a rise in exchange rate reduces economic growth for this study. However, this result suggests that though export induces growth in ECOWAS, it is not sufficient enough to be relied upon as the sole engine of growth. The reason here is that majority of the goods exported from ECOWAS countries are done in their primary stages (i.e. raw materials). In this regard, even if exchange rate is increased (i.e. depreciation/devaluation), revenue generated to spur growth will still be small. Policy wise, value addition of exported goods alongside exchange rate depreciation would prove better in inducing economic growth in ECOWAS.

Finally, we obtained error correction terms (*ECT)* for the three models estimated. The ECTs, which are the speed of adjustment, lie within acceptable limits (-1 to 0) and are all statistically significant at one percent significance level. The coefficients on the *ECT* also meet the *a prior expectation* of being negative. For model (1), the coefficient of **-0.557918** indicates that 55.8 percent of deviations from previous periods will be corrected in the next period. With this result, it is clear that the speed of adjustment from short run to long run equilibrium is not a slow one[3].

4.4. Granger Causality Test

One important way of advancing policy recommendations for forecast purposes is to establish a directional relationship between or amongst macroeconomic variables. Granger (1969) causality test is one of those econometric tools used to establish whether or not a time series variable can be used to predict another time series. Usually, the Granger causality test is conducted to show causal relationship between/among variables. In this study, we used the Granger (1969) causality test to retest the export-led growth hypothesis for ten ECOWAS member countries. The test is conducted under the null hypothesis that variable *A* does not granger cause variable *B*, and vice versa. To make inference, we reject the null hypothesis if the sum of the estimated parameters is statistically significant. Granger causality, when present between/among variables, can take one of two types: unidirectional causality where only one variable is significant in causing the other; and feedback/bidirectional causality where the two variables cause each other (Gujarati and Porter, 2009). The Granger causality test result is presented in Table 6.

[3] Similar interpretations are done for model (2) and (3). Just that for model (2), the speed of adjustment is a bit slow.

Table 6: Pairwise Granger Causality Test Result

Null Hypothesis:	F-Statistic	Prob.
LnMERCHEX does not Granger Cause LnGDPPC	5.61486***	0.0044
LnGDPPC does not Granger Cause LnMERCHEX	4.84552***	0.0091
LnSERVICE does not Granger Cause LnGDPPC	11.6169***	2.E-05
LnGDPPC does not Granger Cause LnSERVICE	0.86196	0.4243
LnMERCHANDISE*SERVICE does not Granger Cause LnGDPPC	9.06461***	0.0002
LnGDPPC does not Granger Cause LnMERCHANDISE*SERVICE	1.07775	0.3429
LnSERVICE does not Granger Cause LnMERCHEX	0.19744	0.8210
LnMERCHEX does not Granger Cause LnSERVICE	3.13842**	0.0461
LnMERCHANDISE*SERVICE does not Granger Cause LnMERCHEX	0.19744	0.8210
LnMERCHEX does not Granger Cause LnMERCHANDISE*SERVICE	2.75372*	0.0668
LnMERCHANDISE*SERVICE does not Granger Cause LnSERVICE	3.13842**	0.0461
LnSERVICE does not Granger Cause LnMERCHANDISE*SERVICE	2.75371*	0.0668

Note: *, ** and *** indicate rejection of null hypothesis at 10, 5 and 1 percent significance levels respectively.

With export being disaggregated, the granger causality test results reveal a bi-directional relationship between merchandise export and GDP per capita. But this bi-directional relationship could not be established between GDP per capita and the other export variables. These results present key policy implications to consider. They prove that trade is actually a driver of economic growth, but it is not done in isolation with other sectors of the macro-economy. As it goes, an increase in merchandise export in the region will lead to an increase in economic growth, and vice versa. But for services export, it is evident that it is the exportation of services that determines economic growth. Since services have proven to have four modes of supply (WTO, 2004), it follows that growth emanating from it will spread to the economy since vast majority of the population are involved with providing services than producing/providing merchandise goods. In this regard, efforts to invest in the services sector of the region should be encouraged by all member states. Similar interpretation can be provided for the causal relationship between total export and economic growth. The results show a unidirectional relationship flowing from total export to economic growth. It is an indication that a combination of merchandise and services exports is very powerful to improve economic growth in the ECOWAS region.

Though the causal relationship between the stand-alone effect of merchandise export and economic growth is bi-directional, the findings further show that the causal relationship of the combined effect of total export and economic growth is unidirectional; flowing from total export to economic growth. This is also true for the stand-alone effect of services export and economic growth. With this, the findings of this study are in line with the works of Lloyd et al. (2014) and Iyoha and Okim (2017); thereby confirming the export-led growth hypothesis among ECOWAS member countries.

5. Conclusion and Policy Recommendations

Even though the export-led growth hypothesis has gained the attention of many researchers, there is still a debate on the export-led growth hypothesis versus the growth-led export hypothesis. Various researchers have used different methodologies and have produced different sets of results (i.e. there are mixed findings). In this study, we retested the export-led growth hypothesis for ten selected ECOWAS member countries from 2000 to 2017. Variables such as GDP per capita (proxy for economic growth); export; labour; gross capital formation (proxy for capital); and exchange rate were used. We further disaggregated export into three, namely; merchandise, services and total exports. Panel unit root and cointegration tests conducted informed us of a long run relationship among the variables. With a long run relationship established, we estimated the models using the Panel Autoregressive Distributed Lags (Pooled Mean Group) approach, and then conducted granger causality test.

The ARDL/PMG results show that the coefficient on merchandise export positively influences economic growth in both the short run and long runs; while the coefficients on services export and total export positively determine economic growth in the long run only. Notwithstanding, the coefficient on services export was found to be higher than the others, implying that investment in services export could produce more benefits than the others. Other control variables (labour and capital) also had positive impact on economic growth in the long run; while that of exchange rate had negative impact on economic growth in both the short and long runs.

For the panel granger causality test, we initially found a bidirectional causality between merchandise export and economic growth. Nevertheless, unidirectional relationships were found flowing from services export to economic growth; and from total export to economic growth. The findings of this study support the export-led growth hypothesis in the ECOWAS region.

Policy wise, it is recommended that efforts to improve economic growth of ECOWAS member countries be channeled through export promotion strategies, especially services export which could have greater impact in driving growth for the region. Besides that, export diversification and intra-ECOWAS trade would be a good 'engine' for growth. A well-trained labour force leads to efficiency in production. And this efficiency increases export that later translates into economic growth. As such, prioritizing improvement in the quality and quantity of labour force could also serve as a 'driver' of growth in the region. The same analysis holds through for capital. Intra-regional capital mobilization is key in spurring growth for the region. Finally, the monitoring and or controlling of monetary policy instruments affecting exchange rate is a sure way of avoiding exchange rate volatility that could adversely affect trade.

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